Section 5: Operating Reserve Accounting

Welcome to the *Operating Reserve Accounting* section of the **PJM Manual for Operating Agreement Accounting**. In this section, you will find the following information:

- A description of how Operating Reserve is provided and accounted for in the Day-ahead and Balancing PJM Energy Markets (see "*Operating Reserve Accounting Overview*").

- How day-ahead and balancing credits are calculated for providers of pool-scheduled Operating Reserve (see "*Credits for Operating Reserve*").

- How the total pool cost of day-ahead and balancing Operating Reserve, Synchronous Condensing, and Reactive Services are allocated (see "*Charges for Operating Reserve*").

5.1 Operating Reserve Accounting Overview

Accounting for Operating Reserve is performed on a daily basis. A pool-scheduled resource of a PJM Member is eligible to receive credits for providing Operating Reserve in the day-ahead market and, provided that the resource was available for the entire time specified in its offer data, in the balancing market. The total resource offer amount for generation, including startup and no-load costs as applicable, is compared to its total energy market value for specified operating period segments during the day (including any amounts credited for day-ahead scheduling reserve in excess of the day-ahead scheduling reserve offer, any amounts credited for synchronized reserve in excess of the synchronized reserve offer plus opportunity cost, and any amounts credited for resources providing reactive services). If the total value is less than the offer amount, the difference is credited to the PJM Member.

Credits are also provided for pool-scheduled energy transactions, for dispatchable economic load reduction resources, for generating units operating as synchronous condensers (not for synchronized reserve nor for reactive services) at the direction of PJM, for cancellation of pool-scheduled resources, for units whose output is suspended or reduced due to a transmission constraint or other reliability reason, for units performing an annual black start test, and for units providing reactive services at the direction of PJM.

The offered price for pool-scheduled resources will be capped for the entire operating day in the event either of the following conditions exists:

- The generation resource is identified in the day-ahead schedule to be dispatched out of economic merit order to control an identified transmission constraint.

- The generation resource is dispatched to provide quick start reserve for reliability.

In the event one of the above conditions exists, the offer prices will be capped at one of the following three levels, as specified in advance by the resource owner:

- The weighted average real-time Locational Marginal Price at the generation bus during all hours over the past six months in which the resource was dispatched in economic merit order above minimum.

- The incremental operating cost of the generation resource as determined in the PJM Cost Development Guideline Manual plus a 10% adder.

- An amount negotiated between PJM and the Market Seller in the event the generation resource cannot recover costs with either of the first two methods above.

The total cost of Day-ahead Operating Reserve for the Operating Day is allocated and charged to PJM Members in proportion to their total cleared day-ahead demand and decrement bids plus their cleared day-ahead exports for that Operating Day. The total cost of Balancing Operating Reserve for the Operating Day is allocated and charged to PJM Members in proportion to their locational real-time deviations from day-ahead schedules and generating resource deviations during that Operating Day, or to PJM Members in proportion to their real-time load plus exports during that Operating day for generator credits provided for reliability. In order to determine the reason why the Operating Reserve credit has been earned so that the charges related can be properly allocated, PJM conducts a Balancing Operating Reserve Cost Analysis (BORCA). PJM also calculates a Regional Balancing Operating Reserve rate for the costs of Operating Reserves that result from actions to control transmission constraints that are solely within pre-defined regions in the RTO. Additional costs of Operating Reserves that result from actions to control transmission constraints that benefit the entire RTO will continue to be allocated equally to deviations across the entire RTO. A detailed description of the Regional Balancing Operating Reserve Cost Analysis (BORCA) analysis can be found in M11. The total cost of synchronous condenser payments (other than that for synchronized reserve or reactive services) for the Operating Day is allocated and charged to PJM Members in proportion to their total load plus their exports during that Operating Day. The total cost of Reactive Services for the Operating Day is allocated and charged to PJM Members in proportion to their total load in the applicable transmission zone.

5.2 Credit for Operating Reserve

Credits for Operating Reserve are calculated for each of the following situations:

- pool-scheduled generating resources (day-ahead and balancing markets)

- pool-scheduled transactions (day-ahead and balancing markets)

- canceled pool-scheduled resources (balancing market)

- resources providing quick start reserve (balancing market)

- resources reduced or suspended due to a transmission constraint or for other reliability purposes (balancing market)

- resources performing annual scheduled black start tests (balancing market)

- synchronous condensing for purposes other than providing synchronized reserve

- resources providing reactive services

- dispatchable economic load reduction resources that follow dispatch (day-ahead and balancing markets). See Section 10 for details on Load Response Operating Reserves Credits and Charges.

5.2.1 Credits for Pool-Scheduled Generating Resources

At the end of each Operating Day, PJM calculates the credits due each PJM Member for pool-scheduled generating resources.

PJM Actions:

- PJM retrieves the following information:

    - dispatcher generation scheduling and operations logs

    - resource offer data

    - scheduled MWh for generation offers cleared in day-ahead market

    - state estimator generation MWh, trued-up to match revenue meter generation MWh from PJM eMTR (if available)

    - scheduled MWh for eSchedules "Generation" contracts, if applicable

    - generator dispatch rates, UDS basepoint MWh, and ramp-limited desired MWh

    - generator day-ahead and real-time LMPs

- PJM calculates the resource's hourly day-ahead offer amount based on its day-ahead offer data and its cleared day-ahead Scheduled MWh for that hour.

- PJM accounting process applies the startup and hourly no-load bids if the start-up and no-load switch is set in the resource offer data and if the start-up bid is applicable for the MWh and status of the resource.

- Day-ahead credits for startup reflect the appropriate hot, intermediate, or cold state of the resource as it was scheduled in the day-ahead market.

- PJM calculates the resource's hourly day-ahead energy market value as:

    *Scheduled MWh * Day ahead LMP*

- PJM calculates the daily Day-ahead Operating Reserve credits for each resource as follows:

    - Sum hourly day-ahead offer amounts, including applicable no-load and startup costs, for the day

    - Sum hourly day-ahead energy market values for the day

    - Day-ahead Operating Reserve credit equals any portion of the resource's total day-ahead offer amount in excess of its total day-ahead market value

- PJM sums the Day-ahead Operating Reserve generating resource credits for each PJM Member, taking into account joint-ownership of generating units.

- PJM determines eligibility for Balancing Operating Reserve credits for each generating resource from dispatcher logs. The following operating guidelines are used in the determination of Operating Reserve credits:

- o Resource must operate according to the on and off times requested by PJM, and units tripping during pool-scheduled periods of operation will retain their eligibility up through the hour in which the unit trips (unless the unit trips before half-past the hour, in which case the hour of the trip will not be eligible).

- o Resources that trip, are requested to restart by PJM, and return to operate as requested, are eligible to receive credits for the latter period of operation.

- o Resources that operate on a different schedule from the schedule that was accepted in the day-ahead market are ineligible for credits.

- PJM determines the resource's hourly Real-time MWh based on its state estimated generator bus MWh or its scheduled MWh via a unit-specific eSchedules "Generation" contract or its revenue meter value from PJM eMTR, as applicable, for that hour.

- Generation resources that are scheduled in the Day-ahead Market are financially responsible for selling their output in real-time. Section 3.2.3(f-1)(ii) of the PJM OATT details provisions for lost opportunity credits for those combustion turbines (CTs) that were scheduled in the Day-ahead Market but are not called on by PJM to run in real-time. CTs eligible to be called on in real-time must have a startup plus notification time of 2 hours or less for PJM to accurately economically assess the value of the unit and are therefore the only units eligible for these provisions. Any resource scheduled in the Day-ahead Market with a startup plus notification time of greater than 2 hours should assume that they are committed by PJM in real-time for the duration of the Day-ahead commitment and are therefore only eligible for the aforementioned make whole provisions if PJM denies the commitment of that unit in real-time for either economics or reliability.

- If a generation owner calls PJM to bring on a CT per its Day-ahead schedule and PJM does not permit the unit to operate in real-time either for reliability or economics, it may receive lost opportunity costs as described in section 3.2.3(f-1)(ii) of the OATT as it was not permitted to run by PJM in real-time.

- If a CT is committed in the Day-ahead Market with a startup plus notification time of 2 hours or less at the time of the Day-ahead commitment and then extends its startup plus notification time to more than 2 hours, it will not be eligible to receive the aforementioned lost opportunity cost provisions in section 3.2.3(f-1)(ii) of the PJM Tariff.

- PJM determines the resource's hourly Operating Reserve Desired MWh based on its ramp-limited desired MWh or UDS basepoint MWh, when available. If available, UDS basepoint MWh is used when 1.) the UDS basepoint MWh are less than or equal to the ramp-limited desired MWh or 2.) the UDS basepoint MWh is greater than the ramp-limited desired MWh and the resource's Real-time MWh is greater than the ramp-limited desired MWh.

- PJM determines the resource's percent off dispatch as the lesser of the difference between the resource's Real-time MWh and the UDS basepoint MWh or the Real-time MWh and the ramp-limited desired MWh, if available. UDS LMP desired MWh is used to calculate a resource's percent off dispatch when 1.) data is unavailable due

to technical difficulties or 2.) 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 5% or 5MW, whichever is lower.

- If the resource's UDS basepoint MWh and ramp-limited desired MWh are not available or the percent off dispatch is greater than 20%, PJM determines the resource's hourly UDS LMP Desired MWh based on its dispatch rate, applicable schedule's offer data, and minimum and maximum energy limits for that hour. For steam units, the lesser of the day-ahead scheduled and real-time economic minimum limits and the greater of the day-ahead scheduled and real-time economic maximum limits are used. For CTs, operating at PJM direction, the actual real-time output is used as the Operating Reserve Desired MWh value.

- PJM calculates the resource's hourly real-time energy offer amount based on its applicable schedule's offer data and its Real-time MWh for that hour. However, for any hour where the resource's Real-time MWh is greater than 110% of its Operating Reserve Desired MWh, Operating Reserve Desired MWh is used to determine the hourly real-time energy offer amount.

- PJM applies the start-up and hourly no-load bids if the start-up and no-load switch is set in the resource offer data and if the start-up bid is applicable for the MWh and status of the resource.

- If applicable, when a resource is started during the day at the direction of PJM, the resource's real-time offer amount for that day includes its startup costs based on the appropriate hot, intermediate, or cold state of the resource. For resources that start generating for PJM from a condensing state, the applicable startup cost for that resource equals the amount submitted in writing to the PJM Market Settlement Operations Department to be in effect that Operating Day.

- If applicable, the resource's real-time offer amount includes its hourly no-load costs prorated for any hour during which it starts generating or stops generating as follows, using a 10% tolerance:

    *If: Real time MWh <0.9 * Scheduled Minimum MWh,*

    Then: Hourly No Load is prorated by (Real time MWh / Scheduled Minimum MWh)

- PJM calculates the resource's hourly balancing energy market value as:

    *(Real time MWh – Scheduled MWh) * Real time LMP*

- Balancing Operating Reserve credits are calculated by operating segment within an Operating Day. A resource will be made whole for the duration of the greater of the day-ahead schedule or minimum run time (minimum down time for demand resources) and made whole separately for the block of hours it is operated at PJM's direction in excess of the greater of the day-ahead schedule or minimum run time (minimum down time for demand resources). Startup costs (shut down costs for demand resources), as applicable, will be included in the segment represented by the longer of the day-ahead schedule or minimum run time (minimum down time for demand resources).

- PJM calculates the daily Balancing Operating Reserve credits for each generating resource's operating segment as follows:
    - Sum hourly real-time offer amounts and include applicable no-load and startup costs for the segment
    - Sum hourly balancing energy market values for the segment

- For each operating segment, Balancing Operating Reserve credit equals any portion of the resource's total real-time offer amount in excess of: 1) its total day-ahead market value, plus 2) its total balancing market value, plus 3) any Day-ahead Operating Reserve credits, plus 4) any Day-Ahead Scheduling Reserve Market revenues in excess of its offer, plus 5) any Synchronized Reserve Market revenue in excess of its offer plus opportunity cost plus energy use plus startup costs, plus 6) any Reactive Services revenue.

- For any operating day in which PJM declares a Maximum Generation Emergency or a Maximum Generation Emergency Alert, or schedules units based on the anticipation of a Max Generation Emergency or Maximum Generation Emergency Alert, if a generator's priced-based offer results in revenues for "economic" hours to produce an effective offer price of $1000/MWh or greater, that generator shall not receive any operating reserve credits in accordance with the PJM Operating Agreement sections 3.2.3 (l), (m), and (n).
    - For the Real-time market, PJM calculates an effective offer price by summing the Operating Reserve credits which would have been applicable absent this exemption, plus the Real-time LMP market value provided to the generator during "economic" hours, all divided by the sum of the generation MWh during those "economic" hours. "Economic" hours are defined as: 1) those hours in which the Real-time LMP is at or above the generator's offer price; 2) those hours that PJM dispatched the generator in excess of its min run time and the generator's offer price is above the Real-time LMP; and, 3) those hours that a generator with a min run time of less than or equal to 1 hour and more than one available starts per day is operated at the request of PJM.

- PJM sums the Balancing Operating Reserve generating resource credits for each PJM Member, taking into account joint-ownership of generating units.

5.2.2 Credits for Pool-Scheduled Transactions

At the end of each Operating Day, PJM calculates the credits due each PJM Member for pool-scheduled energy sales to the spot market.

PJM Actions:

- PJM retrieves the following information:
    - dispatcher transaction logs
    - day-ahead and real-time external energy sales to spot market
    - hourly transaction bid rate and MW ($/MWh, MW)

- o day-ahead and real-time LMPs

- PJM calculates the hourly day-ahead offer amount for each spot market import transaction by multiplying the cleared day-ahead transaction MWh by the transaction offer price.

- PJM calculates the hourly day-ahead energy market value for each spot market import transaction by multiplying the cleared day-ahead transaction MWh by the day-ahead LMP at the sink of the transaction.

- PJM calculates the daily Day-ahead Operating Reserve credits for each transaction as follows:

  - o Sum hourly day-ahead offer amounts for the day

  - o Sum hourly day-ahead energy market values for the day

  - o Day-ahead Operating Reserve credit equals any portion of the transaction's total day-ahead offer amount in excess of its total day-ahead market value

- PJM sums the Day-ahead Operating Reserve transaction credits for each PJM Member.

- PJM calculates the hourly real-time offer amount for each spot market import transaction by multiplying the real-time transaction MWh by the transaction offer price.

- PJM calculates the hourly balancing energy market value for each spot market import transaction by multiplying the real-time hourly deviation from the cleared day-ahead transaction MWh amount by the real-time LMP at the sink of the transaction.

- PJM calculates the daily Balancing Operating Reserve credits for each transaction as follows:

  - o Sum hourly real-time offer amounts for the day

  - o Sum hourly balancing energy market values for the day

- Balancing Operating Reserve credit equals any portion of the transaction's total real-time offer amount in excess of: 1) its total day-ahead market value, plus 2) its total balancing market value, plus 3) any Day-ahead Operating Reserve credits.

- PJM sums the Balancing Operating Reserve transaction credits for each PJM Member.

5.2.3 Credits for Synchronous Condensing

At the end of each Operating Day, PJM calculates the credits due each PJM Member for synchronous condensing for purposes other than providing synchronized reserve or reactive services.

PJM Actions:

- PJM retrieves the following information:

  - o dispatcher generation scheduling and operations logs

- o resource offer data

- o resource generation data

- o real-time LMPs

- PJM calculates the duration of each pool-scheduled period of synchronous condensing operations based on logged start and stop times.

- PJM calculates each eligible resource's condensing cost for each period by multiplying the duration (in hours) by the hourly cost to condense plus energy use cost as specified in the offer data.

- When a resource is requested to start condensing from an off state, a condensing credit is provided equal to the resource's condensing startup cost as specified in the offer data.

- PJM calculates the daily synchronous condensing cost for each resource by summing all hourly condensing and energy use costs, including applicable startup costs, for the day.

- PJM sums the synchronous condensing credits for all resources for each PJM Member.

5.2.4 Credits for Canceled Pool-Scheduled Resources

At the end of each month, PJM calculates the credits due to each PJM Member for pool-scheduled resources that were canceled before coming on-line.

PJM Actions:

- PJM retrieves the following information:

  - o list of canceled resources (dispatcher log)

  - o resource startup cost data

  - o resource generation data

  - o written confirmation of actual costs incurred by participants due to cancellations (to be received within 45 days of date invoice was received by participant for the month in question)

- PJM credits each PJM Member for cancellations based on the actual costs incurred and submitted in writing to the PJM Market Settlement Operations Department. Eligibility is confirmed using resource generation data and dispatcher logs. The cancellation credit equals the actual costs incurred, capped at the appropriate start-up cost as specified in the generating resource's offer data.

- PJM sums the Balancing Operating Reserve cancellation credits for all pool-scheduled resources for each PJM Member.

- PJM Market Settlement Operations Department enters the appropriate adjustment into the current month's billing.

5.2.5 Credits for Resources providing Quick Start Reserve

At the end of each month, PJM calculates the credits due to each PJM Member for resources providing quick start reserve (under emergency conditions).

PJM Actions:

- PJM retrieves the following information:

    - list of units called on to provide quick start reserve for reliability (dispatcher log)

    - resource offer data

    - resource generation data

    - written confirmation of actual costs incurred by participants (to be received within 45 days of date invoice was received by participant for the month in question)

- PJM credits each PJM Member for resources providing quick start reserve based on the actual costs incurred and submitted in writing to the PJM Market Settlement Operations Department. Eligibility is confirmed using resource generation data and dispatcher logs.

- PJM sums the Balancing Operating Reserve quick start resource credits for all pool-scheduled resources for each PJM Member.

- PJM Market Settlement Operations Department enters the appropriate adjustment into the current month's billing.

5.2.6 Credits for Resources Reduced or Suspended due to a Transmission Constraint or for Other Reliability Reasons

At the end of each Operating Day, PJM calculates the credits due to each PJM Member for resources incurring lost opportunity costs associated with following PJM's request to reduce or suspend the output of a generating resource due to a transmission constraint or for other reliability reasons.

Pool-scheduled generators whose output is reduced or suspended and the hourly integrated real-time LMP at the unit's bus is higher than its offer corresponding to the level of output requested by PJM are credited hourly in an amount equal to: (Desired MWh – Actual MWh) * (Real-time LMP – Incremental Offer Rate at Actual MWh). The Desired MWh used in this calculation is based on the hourly integrated real-time LMP at the generator's bus and adjusted for any regulation or synchronized reserve assignments.

Pool-scheduled combustion turbine units scheduled to produce energy in the day-ahead market, but are not called on by PJM and do not operate in real-time, are credited hourly in an amount equal to the higher of: (Real-time LMP – Day-ahead LMP) * Day-ahead

scheduled MWh; or (Real-time LMP – Incremental Offer Rate at Day-ahead scheduled MWh) * Day-ahead scheduled MWh.

Pool-scheduled or self-scheduled wind generators whose output is reduced or suspended at the request of the Office of the Interconnection and 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 PJM are credited hourly in an amount equal to: (Desired MWh – Actual MWh) * (Real-time LMP – Incremental Offer Rate at Actual MWh). The Desired MWh used in this calculation is the lesser of the point on the unit's offer curve corresponding to the hourly integrated real-time LMP at the generator's bus adjusted for regulation or synchronized reserve assignments or the PJM forecasted output for the unit.

Pool-scheduled or self-scheduled wind generators are only eligible for the above-referenced credit if they:

- Operated the resource according to PJM Manual requirements for wind resources

If a technical issue (e.g. computer system failure or disruption or failure of communications equipment) occurs resulting in an erroneous forecast, PJM and the market participant will determine a mutually agreeable settlement value. Recommendations for reconciliation include but are not limited to:

- Using the average forecast values as determined by PJM wind forecasting tool from before and after the technical issue to determine forecast value during the issue

- Using the forecast value as determined by PJM wind forecasting tool from before the technical issue for the first half of the duration of the technical issue and forecast value from after the technical issue for the latter half of the duration of the technical issue

- Using Market Seller's forecast value during the technical issue

PJM Actions:

- PJM retrieves the following information:
    - list of units and timeframes reduced or suspended for a transmission constraint or other reliability reason (dispatcher logs and Market Operations eligibility data)
    - resource offer data
    - scheduled MWh for generation offers cleared in day-ahead market
    - state estimator generation MWh, trued-up to match revenue meter generation MWh from PJM eMTR (if available)
    - scheduled MWh for eSchedules "Generation" contracts, if applicable
    - generator day-ahead and real-time LMPs
    - assigned regulation MWh and regulation bias factors
    - assigned synchronized reserve MWh

- o hourly integrated wind forecast from PJM's wind forecasting tool
- PJM sums the Balancing Operating Reserve lost opportunity cost credits for all reduced or suspended generating resources for each PJM Member.

5.2.7 Credits for Resources Performing Annual Scheduled Black Start Tests

At the end of each month, PJM calculates the credits due to each PJM Member for resources performing annual black start tests. Compensation for energy delivered to the transmission system shall be provided for the unit's minimum run time at the higher of the unit's cost-capped offer or real-time LMP plus start-up and no-load for up to two start attempts, if necessary. Compensation for tests where no energy was delivered to the transmission system shall be provided for the unit's start-up costs for up to two start attempts, if necessary.

PJM Actions:

- PJM retrieves the following information:

  - o list of units performing annual scheduled black start tests (PJM Performance Compliance Department log)

  - o resource cost-capped offer data

  - o resource generation data

  - o applicable real-time LMP

  - o applicable start-up and no-load costs

- PJM sums the Balancing Operating Reserve annual black start test credits for all resources for each PJM Member.

- PJM Market Settlement Operations Department enters the appropriate adjustment into the current month's billing.

5.2.8 Credits for Resources Providing Reactive Services

At the end of each month, PJM calculates the credits due each PJM Member for reactive services. Generators whose active energy output is altered at the request of PJM for the purpose of maintaining reactive reliability within the PJM Region are credited hourly for lost opportunity costs if their output is reduced or suspended and credited in accordance with balancing operating reserve credit calculations if their output is increased.

Generators operating as synchronous condensers for the purpose of maintaining reactive reliability at the request of PJM, are credited for each hour (or partial hour) of condensing an amount equal to the higher of: 1) the Synchronized Reserve Market Clearing Price for the hour multiplied by the amount of synchronized reserve provided (i.e., economic maximum limit of the unit); or 2) the sum of the unit's offered cost to condense, energy use cost, start-up cost, and the unit-specific lost opportunity cost of the resource supplying the increment of Synchronized Reserve.

Lost Opportunity Cost = [(RT LMP – Energy Offer Price) * (LMP Desired Mw – Unit Mw)] only if quantity is positive

PJM Actions:

- PJM retrieves the following information:
    - dispatcher generation scheduling and operations logs
    - resource offer data
    - scheduled MWh for generation offers cleared in day-ahead market
    - state estimator generation MWh
    - state estimator generation MWh, trued-up to match revenue meter generation MWh from PJM eMTR (if available)
    - scheduled MWh for eSchedules "Generation" contracts, if applicable
    - generator day-ahead and real-time LMPs
    - assigned regulation MWh and regulation bias factors
    - assigned synchronized reserve MWh
- PJM sums the reactive services credits for all generating resources for each PJM Member.

5.3 Charges for Operating Reserve

The total cost of providing Operating Reserve for the Operating Day is the sum of the credits provided to PJM Members for supplying the Day-ahead and Balancing Market Operating Reserve. The daily total cost of Day-ahead Operating Reserve is allocated and charged to PJM Members in proportion to their cleared day-ahead demand and decrement bids plus their cleared day-ahead exports. The daily total cost of Balancing Operating Reserve is allocated and charged to PJM Members in proportion to their real-time deviations from day-ahead schedules and generator deviations, or to PJM Members in proportion to their real-time load plus exports for generator credits provided for reliability. The total daily cost of synchronous condenser payments (other than that for synchronized reserve or reactive services) is allocated and charged to PJM Members in proportion to their real-time load (excluding losses) plus exports during that Operating Day. The total daily cost of reactive services is allocated and charged to PJM members serving load in the transmission zone in which the generator providing reactive services resides in proportion to their real-time load (excluding losses) during that Operating Day.

PJM Actions:

- PJM calculates for each Operating Day the Total Cost of Day-ahead Operating Reserve by summing the following credits for all PJM Members:
    - Total Day-ahead Operating Reserve generating resource credits ($)
    - Total Day-ahead Operating Reserve transaction credits ($)

- PJM calculates for each Operating Day the Day-ahead Operating Reserve charges by allocating the total cost of Day-ahead Operating Reserve to each PJM Member based on their daily share of cleared day-ahead demand and decrement bids plus cleared day-ahead exports.

- PJM calculates for each Operating Day the Total Regional Cost of Balancing Operating Reserve to be charged for reliability by summing the total Balancing Operating Reserve resource credits for reliability ($) for each region and for all PJM Members

- PJM calculates for each Operating Day the Balancing Operating Reserve charges for reliability by allocating the total cost of Balancing Operating Reserve for reliability on a regional basis to each PJM Member based on their daily share of the sum of their load plus exports in each region (RTO, East, and West). West region is defined as transmission zones AEP, AP, ATSI, ComEd, DEOK, DUQ, and Dayton, and East region is defined as transmission zones AE, BGE, DOM, Penelec, PEPCO, Meted, PPL, JCPL, PECO, Delmarva, PSEG, and Rockland. RTO region includes the East and West region and exports that are at interfaces or hubs not completely contained in either the East or West region.

- PJM calculates for each Operating Day the Total Cost of Balancing Operating Reserve to be charged to deviations by summing the following credits for all PJM Members:

    o Total Regional Balancing Operating Reserve generating resource credits for deviations ($)

    o Total Balancing Operating Reserve demand resource credits ($)

    o Total Balancing Operating Reserve transaction credits ($)

    o Total Balancing Operating Reserve cancellation credits ($)

    o Total Balancing Operating Reserve quick start resource credits ($)

    o Total Balancing Operating Reserve reduction/suspension credits ($)

    o Total Balancing Operating Reserve annual black start test credits ($)

- PJM calculates for each Operating Day the total generating resource deviations as the sum of hourly deviations for generating resources that are not following dispatch as follows:

    o Each pool-scheduled or dispatchable self-scheduled generator not following PJM dispatch due to its actual output not being between its ramp-limited Desired MWh and UDS Basepoint MWh, and its % off dispatch is > 10%, will be assessed deviations as Real-time MWh – ramp-limited desired MWh. If the % off dispatch is > 20%, deviations will be assessed as Real-time MWh – UDS LMP Desired MWh (as determined in the Credits for Pool-Scheduled Generating Resources section of this manual).

    o For each self-scheduled generating resource with an economic maximum limit less than or equal to 110% of the economic minimum limit or not dispatched by PJM above its economic minimum,unless the resource is lowering its output in accordance with PJM direction in response to a

minimum generation emergency event (or declaration) will be assessed deviations as Real-time MWh – Day-ahead Schedule MWh.

- o Each unit that has tripped or is scheduled Day-ahead and does not run in Real-time will be assessed deviations as Real-time MWh – Day-ahead scheduled MWh

- o Each unit that is dispatchable Day-Ahead but is Fixed Gen in real-time will be assessed deviations as Real-time MWh – UDS LMP Desired MWh

- o Each unit that is not dispatchable in both the Day-ahead and Real-time market will be assessed deviations as Real-time MWh – Day-ahead scheduled MWh. Units that choose to participate in the Day-ahead pumped storage optimization program are considered not dispatchable in the Day-ahead market.

- o Each unit where the 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 5MW, whichever is lower, and UDS LMP Desired MWh for the hours is either below the real-time economic minimum or above the real-time economic maximum, will be assessed deviations as Real-time MWh – UDS LMP Desired MWh

- o Deviations are not calculated if 1.) the absolute value of the hourly deviation MWh is less than 5 MWh or 2.) the absolute value of the deviation MWh ratio to applicable day-ahead scheduled MWh or desired MWh is less than or equal to 5%

- Hours during which a generator is assigned by PJM for: Regulation; or, assigned by PJM for Synchronized Reserve (and actual MWh are less than day-ahead scheduled MWh) are omitted from this calculation.

- Resource deviations for units located at a "single bus" will be able to offset one another. A "single bus" will be any unit located at the same site and that has the identical electrical impacts on the transmission system. Unit parameters do not have to be identical for the units' deviation MWh to offset one another. Units at a "single bus" must be contained in the same customer account.

- PJM calculates for each Operating Day the withdrawal deviations as the sum of the following hourly real-time deviations from day-ahead values for each customer account:

- o Absolute Value of (cleared day-ahead demand bid MWh + cleared day-ahead decrement bid MWh + day-ahead sale transaction MWh – real-time load de-rated for transmission losses – real-time sale transaction MWh)

- o Withdrawal deviations will be calculated separately for each zone, hub, and interface whereby allowing netting to occur within each of those locations. Further netting will also occur for any hubs and interfaces fully contained within a given zone.

- o Dynamically scheduled export transactions are omitted from this calculation.

- PJM calculates for each Operating Day the injection deviations as the sum of the following hourly real-time deviations from day-ahead values for each customer account:

    o Absolute Value of (cleared day-ahead increment offer MWh + day-ahead purchase transaction MWh – real-time purchase transaction MWh)

    o Injection deviations will be calculated separately for each zone, hub, and interface whereby allowing netting to occur within each of those locations. Further zonal netting will also occur for any hubs and interfaces fully contained within a given zone.

- Resource, withdrawal, and injection deviations that occur within a single zone (including applicable hubs and interfaces) will be associated with a particular PJM region (East or West).

- Resource, withdrawal, and injection deviations that occur for hubs and interfaces not fully contained within a single zone will be associated with the RTO region.

- PJM calculates for each Operating Day the Balancing Operating Reserve charges to deviations by allocating the total cost of Balancing Operating Reserve for deviations on a regional basis to each customer account based on their daily share of the sum of the total hourly deviations in each region (RTO, East, and West).

- A PJM Member's deviations in the RTO region include deviations at hubs and interfaces that are not completely contained in the either the East or West region as well as deviations in either the East or West region.

- PJM calculates for each Operating Day the Balancing Operating Reserve charges for reliability by allocating the total cost of Balancing Operating Reserve for reliability on a regional basis to each PJM Member based on their daily share of the sum of their load plus exports in each region (RTO, East, and West).

- A PJM Member's load plus exports in the RTO region include exports at hubs and interfaces that are not completely contained in either the East or West region as well as load plus exports in either the East or West region.

- Any Operating Reserve charges attributable to generators operated on behalf of transmission owners for local constraints, or on behalf of generation owners for special unit constraints, are directly assessed to the applicable requesting party.

- PJM calculates for each Operating Day the synchronous condensing charges by allocating a pro-rata share of the total cost of synchronous condensing payments to PJM exports (excluding dynamically scheduled exports) with the remaining costs separately allocated based on PJM Region real-time load (excluding losses) ratio shares.

- PJM calculates for each Operating Day the total cost of reactive services for the purpose of maintaining reactive reliability. The cost of reactive services are allocated and charged to each market participant based on real-time load (excluding losses) ratio shares in the transmission zone(s) in which the reactive services were provided.

5.4 Reconciliation for Operating Reserve Charges

Section 10: PJM Load Response Programs Accounting

Welcome to the *PJM Load Response Programs Accounting* section of the **PJM Manual for Operating Agreement Accounting**. In this section, you will find the following information:

- An overview of PJM Load Response Programs (see "*PJM Load Response Programs Overview*").

- A description of the accounting procedure for the PJM Load Response Programs (see "*PJM Load Response Programs Accounting Procedures*").

10.1 PJM Load Response Programs Overview

The PJM Load Response Programs are designed to provide compensation to end-use customers or curtailment service providers ("CSP") for reduction of consumption when scheduled or dispatched by PJM and when satisfying the Net Benefits Test or when an emergency event occurs. PJM offers three different types of Load Response Programs, the Full Emergency, the Emergency Energy Only, and the Economic Load Response Programs.

The Full Emergency Load Response Program is designed to provide a method by which end-use customers may be compensated by reducing load during a Load Management.

The Emergency Energy Only Program is designed to provide a method by which end-use customers may be compensated by PJM for voluntarily reducing load during an Emergency Energy Only event.

The Economic Load Response Program is designed to provide compensation to end-use customers or curtailment service providers ("CSP") for reduction of consumption when scheduled or dispatched by PJM and when satisfying the Net Benefits Test.

10.2 PJM Load Response Programs Accounting Procedures

10.2.1 Full Emergency and Emergency Energy Only Load Response Program

Under the Full Emergency and Emergency Energy Only Load Response Programs, emergency energy payment for reducing load is based on the actual kWh relief provided plus an adjustment for losses. Compensation is equal to the measured reduction adjusted for losses times the appropriate zonal Locational Marginal Price (LMP). If, however, the sum of the hourly energy payments to a participant dispatched by PJM is not greater than or equal to the value of the standing offer price for actual, achieved reductions, then the CSP will be made whole up to the value of the standing offer for the actual, achieved reductions.

The measured reduction for emergency energy payments for both Energy Only and Full Emergency Load Response Program participants can be either measured output of backup generation or the difference between the measured load the hour before the reduction and each hour during the reduction.

ILR and DR Full Emergency and Capacity only Load Response participants are subject to the Load Management Test Failure Charge and the Demand Resource and ILR Compliance Penalty Settlements as described in Manual 18: PJM Capacity Market, Section 9: Settlements.

During Emergency conditions, costs for Emergency purchases in excess of LMP are allocated to PJM Market Participants in proportion to their increase in net purchases from the PJM energy market during the hour in the real-time market compared to the day-ahead market. Consistent with this pricing methodology, all energy charges under the Full Emergency and Emergency Energy Only Load Response Programs are allocated to PJM Market Participants in proportion to their real-time deviation from their net interchange in the day-ahead market, whenever that deviation increases their spot market purchases or decreases their spot market sales less any real-time dispatch reduction MWs.

PJM Actions:

- PJM retrieves the following information:

    - each PJM Market Participant's load reduction meter data

    - EDC loss de-ration factors

    - Energy Loss factor

    - each PJM Market Participant's real-time net hourly interchange (MWh)

    - each PJM Market Participant's day-ahead net hourly interchange (MWh)

    - hourly list of integrated real-time LMPs ($)

    - hourly real-time dispatch reduction MWh

- PJM calculates the total credits for each PJM Market Participant in the Emergency Load Response Program as:

    *(Actual kWh relief provided * (1-EDC loss de-ration factor) * Energy Loss factor) ***

    (Appropriate real-time zonal LMP or aggregate LMP)

- PJM allocates the total hourly charge for the Emergency Load Response Program to PJM Market Participants in proportion to their real-time deviation from their net interchange in the day-ahead market, whenever that deviation increases their spot market purchases or decreases their spot market sales less any real-time dispatch reduction MWs.

10.2.2 Economic Load Response Program Prior to 4/1/2012

Under the Economic Load Response Program, Market Participants have the option to participate in both the Day-ahead and Real-time Energy Markets. Participation in the Real-time Energy Market consists of being dispatched by PJM or self-scheduling. End-use customers that have a retail rate equal to a real-time index or real-time index with a fixed block, can only participate in the Real-time Energy Market and must be dispatched by PJM.

Day-ahead Operations:

PJM will accept demand reduction bids from an end-use customer or its representative CSP for a specific MW curtailment (in minimum increments of .1 MW or 100 kW). The demand reduction bid will include the day-ahead LMP above which the end-use customer would not consume, and could also include shut-down costs and/or the number of contiguous hours for which the load reduction must be committed.

Reimbursement for reducing load is based on the reductions of MWh committed in the day-ahead market. An end-use customer or representative CSP that submits a load reduction bid day-ahead that is accepted by PJM will be paid by PJM the day-ahead LMP less an amount equal to the applicable generation and transmission charges. The applicable generation and transmission charges are those charges the participant would have otherwise paid the LSE absent the load reduction. PJM shall recover LMP less an amount equal to the applicable generation and transmission charges from the LSE that otherwise would have the load that was reduced.In all cases, the applicable zonal or aggregate LMP is used as appropriate for the individual end-use customer.

Total payments to end-use customers or their representative CSP for accepted day-ahead Economic Load Response bids will not be less than the total value of the load response bid, included any submitted shut-down costs. Any shortfall will be made up through normal, day-ahead operating reserve.

End-use customers or their representative CSP that have load reductions committed in the day-ahead market that cannot demonstrate hourly performance in real-time equal to at least that of the day-ahead commitment will be charged real-time LMP for the amount of the shortfall, plus any associated balancing operating reserve charges. LSEs that otherwise would have load that was reduced shall receive any associated operating reserve credits plus, if real-time LMP is higher than day-ahead LMP during the shortfall, the difference between day-ahead and real-time LMP times the shortfall.

End-use customers or their representative CSP that have load reductions committed in the day-ahead market that have hourly performance in real-time greater than that of the day-ahead commitment will be credited for the additional load response according to the Real-Time Economic Load accounting process.

PJM Actions:

- PJM retrieves the following information:

    o   each PJM Market Participant's cleared day-ahead scheduled load reduction quantities

    o   each PJM Market Participant's actual metered reduction

    o   EDC loss de-ration factors

    o   Energy Loss factor

    o   each PJM Market Participant's cleared day-ahead demand bids

    o   associated shut-down costs

    o   hourly list of integrated day-ahead LMPs ($)

    o   retail rate (generation and transmission)

- PJM shall recover day-ahead LMP less an amount equal to the applicable generation and transmission charges from the LSE that otherwise would have the load that was reduced as:

    *Cleared Day-ahead MWh load reduction * (Day-ahead LMP – retail rate)*

- Payment will be made by PJM to the end-use customer or its representative (CSP) as:

    *Cleared Day-ahead MWh load reduction * (Day-ahead LMP – retail rate)*

- End-use customers or their representatives (LSEs/CSPs) that have load reductions committed in the day-ahead market that cannot demonstrate hourly performance in real-time equal to at least that of the day-ahead commitment will be charged real-time LMP for the amount of the shortfall, plus any associated balancing operating reserve charges. LSEs that otherwise would have load that was reduced shall receive any associated operating reserve credits plus, if real-time LMP is higher than day-ahead LMP during the shortfall, the difference between day-ahead and real-time LMP times the shortfall:

    LSE that otherwise would have the load that was reduced:

    *Real-Time Charge = (Actual MWh relief provided * (1- EDC loss de-ration factor) * Energy Loss factor) - DA Cleared Reduction MWh) * (RT LMP – DA LMP) + (((Actual MWh relief provided * (1- EDC loss de-ration factor) * Energy Loss factor) - DA Cleared Reduction MWh) ✗ * MAX(0,(DA LMP-MIN(RT LMP, Retail Rate))))*

    Payment will be made by PJM to the end-use customer or its representative (LSE/CSP) as:

    *Real-Time Credit = (Actual MWh relief provided * (1- EDC loss de-ration factor) * Energy Loss factor) - DA Cleared Reduction MWh) * MAX(0, (RT LMP – MIN(DA LMP, Retail Rate)))*

- End-use customers or their representative CSP that have load reductions committed in the day-ahead market that have hourly performance in real-time greater than that of the day-ahead commitment will be credited for the additional load response according to the Real-Time Economic Load accounting process:

    LSE that otherwise would have the load that was reduced:

    *Real-Time Charge = ((Actual MWh relief provided * (1- EDC loss de-ration factor) * Energy Loss factor) - DA Cleared Reduction MWh) * MAX(0,(RT LMP – Retail Rate))*

    Payment will be made by PJM to the end-use customer or its representative (LSE/CSP) as:

    *Real-Time Credit = ((Actual MWh relief provided * (1- EDC loss de-ration factor) * Energy Loss factor) - DA Cleared Reduction MWh) * MAX(0,(RT LMP – Retail Rate)*

Real-Time Operations:

Reimbursement for reducing load is based on the actual kWh relief provided in excess of committed day-ahead load reductions plus an adjustment for losses. The end-use customer or representative CSP will be paid by PJM the real-time LMP less an amount equal to the applicable generation and transmission charges. In cases where load response is dispatched by PJM, the total payment to end-use customers or their representative CSP will not be less than the total value of the load response bid, including any submitted shut-down costs. Any shortfall will be made up through normal, balancing operating reserve. In all

cases, the applicable zonal or aggregate LMP issued as appropriate for the individual end-use customer. PJM shall recover LMP less an amount equal to the applicable generation and transmission charges from the LSE that otherwise would have the load that was reduced.

When PJM has dispatched in real time the load reduction of an end-use customer that has a retail rate equal to a real-time index or a real-time index with a fixed block, PJM shall pay the CSP the difference between the actual savings achieved by the load reduction based on zonal LMP and the total value of the load response bid, if the savings achieved are less than the total value of the load response bid.

PJM Actions:

- PJM retrieves the following information:
  - each PJM Market Participant's day-ahead scheduled load reduction quantities
  - each PJM Market Participant's actual metered reduction de-rated for transmission losses
  - associated shut-down costs
  - EDC loss de-ration factors
  - Energy Loss factor
  - hourly list of integrated real-time LMPs ($)
  - retail rate (generation and transmission)
- PJM shall recover real-time LMP less an amount equal to the applicable generation and transmission charges from the LSE that otherwise would have the load that was reduced:

*(Actual MWh relief provided * (1- EDC loss de-ration factor) * Energy Loss factor) * Max(0, (Real-Time LMP – Retail Rate))*

   Payment will be made by PJM to the end-use customer or its representative (CSP) as:

*(Actual MWh relief provided * (1- EDC loss de-ration factor) * Energy Loss factor) * (Real-Time LMP – retail rate)*

10.2.3 Economic Load Response Program as of 4/1/2012

Under the Economic Load Response Program, Market Participants have the option to participate in both the Day-ahead and Real-time Energy Markets. Participation in the Real-time Energy Market consists of submitting a day-ahead offer that cleared or being dispatched by PJM.

Day-ahead Settlements:

PJM will accept demand reduction bids from an end-use customer or its representative CSP for a specific MW curtailment (in minimum increments of .1 MW or 100 kW). The demand reduction bid will include the day-ahead LMP above which the end-use customer would not consume, and could also include shut-down costs and/or the number of contiguous hours for which the load reduction must be committed.

Credits for reducing load are based on the reductions of MWh committed in the day-ahead market.

- Effective 4/1/2012 – 6/30/2012, an end-use customer or representative CSP that submits a load reduction bid day-ahead that is cleared by PJM when the applicable zonal or aggregate day-ahead LMP is less than the price determined under the Net Benefits Test for that month, will be paid by PJM the day-ahead LMP less an amount equal to the applicable generation and transmission charges. The applicable generation and transmission charges are those charges the participant would have otherwise paid the LSE absent the load reduction.

- Effective 7/1/2012, an end-use customer or representative CSP that submits a load reduction bid day-ahead that is cleared by PJM when the applicable zonal or aggregate day-ahead LMP is less than the price determined under the Net Benefits Test for that month, will not be compensated by PJM for the reduction.

- Effective 4/1/2012, an end-use customer or representative CSP that submits a load reduction bid day-ahead that is cleared by PJM when the applicable zonal or aggregate day-ahead LMP is greater than or equal to the price determined under the Net Benefits Test for that month, will be paid by PJM the day-ahead LMP.

The cost of payments to Economic Load Response Participants are recovered from Market Participants as follows:

- Effective 4/1/2012 – 6/30/2012, for any submitted load reduction day-ahead bid that is cleared by PJM when the day-ahead LMP is less than the price determined under the Net Benefits Test for that month, PJM shall recover LMP less an amount equal to the applicable generation and transmission charges from the LSE that otherwise would have the load that was reduced.

- Effective 7/1/2012, payment is no longer made to any submitted load reduction day-ahead bid that is cleared by PJM when the day-ahead LMP is less than the price determined under the Net Benefits Test for that month,

- Effective 4/1/2012, for any submitted load reduction day-ahead bid that is accepted by PJM when the day-ahead LMP is greater than or equal to the price determined under the Net Benefits Test for that month, PJM shall recover the costs from Market Participants on a ratio-share basis based on their real-time exports from the PJM Region and real-time loads in each Zone for which the load-weighted average real-time LMP for the hour during which the reduction occurred is greater than the price determined under the Net Benefits Test for that month.

Total payments to end-use customers or their representative CSP for accepted day-ahead Economic Load Response bids that follow PJM dispatch instructions will not be less than the

total value of the load response bid, including any submitted shut-down costs. Details can be found in the Day-ahead Operating Reserve Load Response Settlements Section.

End-use customers or their representative CSP that have load reductions committed in the day-ahead market that deviate from the day-ahead schedule in real-time shall be charged or credited for such variance at the real-time LMP per the Real-time Settlements section below, plus any associated balancing operating reserve charges per the Balancing Operating Reserves Load Response Settlements Section.

PJM Actions:

- PJM retrieves the following information:
    - each PJM Market Participant's cleared day-ahead scheduled load reduction quantities
    - each PJM Market Participant's actual metered reduction
    - EDC loss de-ration factors
    - Energy Loss factor
    - associated shut-down costs
    - hourly integrated day-ahead LMPs ($/MWh)
    - retail rate (generation and transmission)
    - monthly Net Benefits Test price
    - hourly real-time load (excluding losses) for each LSE (MWh)
    - hourly real-time PJM export schedules for each market participant (MWh)

- Payment will be made by PJM to the end-use customer or representative CSP as:

**Cleared Day-ahead MWh load reduction * (Day-ahead LMP – retail rate) when the applicable zonal or aggregate Day-ahead LMP < Monthly Net Benefits Test Price

OR

Cleared Day-ahead MWh load reduction * Day-ahead LMP when the applicable zonal or aggregate day-ahead LMP >= Monthly Net Benefits Test

**Note: As of 7/1/2012, payment will no longer be settled when the applicable zonal or aggregate Day-ahead LMP is less than the Monthly Net Benefits Test Price.

- Effective 4/1/2012 – 6/30/2012, PJM shall recover the payment of LMP less an amount equal to the applicable generation and transmission charges (retail rate) from the LSE that otherwise would have the load that was reduced

- PJM shall recover payments for day-ahead cleared load reductions when the day-ahead LMP is greater than or equal to the price determined under the Net Benefits Test for that month as:

  Total Day-ahead Load Response Credits * { (Real-time Load in Applicable Zone(s) + Real-time Exports) / (Total Applicable Zone(s) Real-time Load + Total PJM Real-time Exports)}

  where the applicable zones are those zones for which the load-weighted average real-time LMP for the hour during which the reduction occurred is greater than or equal to the Monthly Net Benefits Test Price

Real-time Settlements:

Credits for reducing load are based on the actual kWh relief provided in excess of committed day-ahead load reductions plus an adjustment for losses.

- Effective 4/1/2012 – 6/30/2012, an Economic Load Response Participant that curtails or causes the curtailment of demand in real-time in response to PJM dispatch, and for which the applicable real-time LMP is less than the threshold price established under the Net Benefits Test, will be compensated by PJMSettlement at the real-time LMP less an amount equal to the applicable generation and transmission charges.

- Effective 7/1/2012, an Economic Load Response Participant that curtails or causes the curtailment of demand in real-time in response to PJM dispatch, and for which the applicable real-time LMP is less than the threshold price established under the Net Benefits Test, will not be compensated by PJM for the reduction.

- Effective 4/1/2012, an Economic Load Response Participant that curtails or causes the curtailment of demand in real-time in response to PJM dispatch, and for which the applicable real-time LMP is equal to or greater than the threshold price established under the Net Benefits Test, will be compensated by PJMSettlement at the real-time LMP.

In cases where load response is dispatched by PJM and follows dispatch within a 20% threshold, the total payment to end-use customers or their representative CSP will not be less than the total value of the load response bid, including any submitted shut-down costs. Details can be found in the Balancing Operating Reserve Load Response Settlements Section.

The cost of payments to Economic Load Response Participants for load reductions are recovered from Market Participants as follows:

- Effective 4/1/2012 – 6/30/2012, for any curtailment of demand in real-time in response to PJM dispatch, and for which the applicable real-time LMP is less than the threshold price established under the Net Benefits Test, PJM shall recover the applicable LMP less an amount equal to the applicable generation and transmission charges from the Load Serving Entity whose load was reduced.

- Effective 7/1/2012, payment is no longer made to any load reductions in real-time when the real-time LMP is less that the price determined under the Net Benefits Test.

- Effective 4/1/2012, for any real-time load reductions in real-time in response to PJM dispatch, and for which the applicable real-time LMP is greater than or equal to the price determined under the Net Benefits Test for that month, PJM shall recover the costs from Market Participants on a ratio-share basis based on their real-time exports from the PJM Region and real-time loads in each Zone for which the load-weighted average real-time LMP for the hour during which the reduction occurred is greater than or equal to the price determined under the Net Benefits Test for that month.

PJM Actions:

- PJM retrieves the following information:
    - each PJM Market Participant's day-ahead scheduled load reduction quantities
    - each PJM Market Participant's actual metered reduction de-rated for transmission losses
    - associated shut-down costs
    - EDC loss de-ration factors
    - Energy Loss factor
    - hourly integrated real-time LMPs ($/MWh)
    - retail rate (generation and transmission)
    - monthly Net Benefits Test price
    - hourly real-time load (excluding losses) for each LSE (MWh)
    - hourly real-time PJM export schedules for each market participant (MWh)

- Payment will be made by PJM to the end-use customer or representative CSP that curtails or causes the curtailment of demand in real-time in response to PJM dispatch as:

**{(Actual MWh relief provided * (1- EDC loss de-ration factor) * Energy Loss factor) – Cleared Day-ahead MWh load } * Max(0, (Real-Time LMP – Retail Rate)) when the applicable zonal or aggregate Real-time LMP < Monthly Net Benefits Test Price

OR

{(Actual MWh relief provided * (1- EDC loss de-ration factor) * Energy Loss factor) – Cleared Day-ahead MWh load } * Real-Time LMP when the applicable zonal or aggregate Real-time LMP >= Monthly Net Benefits Test Price

**Note: As of 7/1/2012, payment will no longer be settled when the applicable zonal or aggregate Real-time LMP is less than the Monthly Net Benefits Test Price.

Effective 4/1/2012 – 6/30/2012, PJM shall recover the payments of LMP less an amount equal to applicable generation and transmission charges from the LSE whose load was reduced.

- PJM shall recover payments for real-time load reductions when the real-time LMP is greater than or equal to the price determined under the Net Benefits Test for that month as:

Total Real-time Load Response Credits * { (Real-time Load in Applicable Zone(s) + Real-time Exports) / (Total Applicable Zone(s) Real-time Load + Total PJM Real-time Exports)}

where the applicable zones are those zones for which the load-weighted average real-time LMP for the hour during which the reduction occurred is greater than or equal to the Monthly Net Benefits Test Price

Day-ahead Operating Reserve Load Response Settlements:

Total payments to Economic Load Response Participants for cleared day-ahead demand reduction bids with an offer price equal to or greater than the threshold price established under the Net Benefits Test that follow the dispatch instructions of the Office of the Interconnection will not be less than the total value of the demand reduction bid.

Day-ahead cleared load reduction resources are considered to be following dispatch instructions if the actual load reduction quantity for a given hour deviates by no more than 20% above or below the Desired MW quantity. 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 payments based on the 20% criteria, then the resource will also not be made whole for its shutdown cost.

Effective 4/1/2012 – 6/30/2012, total payments to Economic Load Response Participants for accepted day-ahead demand reduction bids that follow the dispatch instructions of the Office of the Interconnection, for which the applicable day-ahead LMP is less than the threshold price established under the Net Benefits Test, and the demand reduction offer price was less than the price established under the Net Benefits Test, will not be less than the total value of the demand reduction bid less an amount equal to the applicable generation and transmission charges. Any shortfall between the applicable day-ahead LMP (less an amount equal to the applicable generation and transmission charges) and the total value of the demand reduction bid will be made up through normal, day-ahead operating reserves.

- Total payments to Economic Load Response Participants for accepted day-ahead demand reduction bids with an offer price equal to or greater than the threshold price established under the Net Benefits Test that follow the dispatch instructions of the Office of the Interconnection will not be less than the total value of the demand reduction bid.:

Sum[(Offer Price * Day-ahead committed MWs) + Shutdown Cost – Day-ahead Economic Load Response Credits] across all hours of the day

- Effective 4/1/2012 – 6/30/2012, total payments to Economic Load Response Participants for accepted day-ahead demand reduction bids that follow the dispatch instructions of the Office of the Interconnection, for which the applicable day-ahead LMP is less than the threshold price established under the Net Benefits Test, and the demand reduction offer price was less than the price established under the Net

Benefits Test, will not be less than the total value of the demand reduction bid less an amount equal to the applicable generation and transmission charges

*Sum[((Offer Price – Retail Rate) * Day-ahead committed MWs) + Shutdown Cost – Day-ahead Economic Load Response Credits] across all hours of the day*

- The daily total cost of Day-ahead Operating Reserve which includes Day-ahead Load Response Operating Reserve payments are allocated and charged to PJM Members in proportion to their cleared day-ahead demand and decrement bids plus their cleared day-ahead exports.

Balancing Operating Reserve Load Response Settlements:

In cases where the demand reduction follows dispatch as instructed by the Office of the Interconnection, and the demand reduction offer price is equal to or greater than the threshold price established under the Net Benefits Test, payment will not be less than the total value of the demand reduction bid, including any submitted shut-down costs.

Real-time load reduction resources are considered to be following dispatch instructions if the actual load reduction quantity for a given hour deviates by no more than 20% above or below the Desired MW quantity. 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 payments based on the 20% criteria, then the resource will also not be made whole for its shutdown cost.

Balancing Operating Reserve credits are calculated by operating segment within an Operating Day. A load response resource considered to be following dispatch instructions will be made whole for the duration of the greater of the day-ahead schedule or minimum down time and made whole separately for the block of hours it is operated at PJM's direction in excess of the greater of the day-ahead schedule or minimum down time. Shutdown costs, as applicable, will be included in the segment represented by the longer of the day-ahead schedule or minimum down time.

- Total payments to Economic Load Response Participants for real-time demand reductions with an offer price equal to or greater than the threshold price established under the Net Benefits Test that follow the dispatch instructions of the Office of the Interconnection will not be less than the total value of the demand reduction bid and are calculated for each operating segment.

- Effective 4/1/2012 – 6/30/2012, total payments to Economic Load Response Participants for real-time demand reduction bids with an offer price less than the threshold price established under the Net Benefits Test that follow the dispatch instructions of the Office of the Interconnection will not be less than the total value of the demand reduction bid less an amount equal to the applicable generation and transmission charges.

- The daily total cost of Balancing Load Response Operating Reserve Payments is allocated and charged to PJM Members in proportion to their real-time deviations from day-ahead schedules and generator deviations.

Dispatchable economic load reduction 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. In the case where the Market Participant deviates by more than twenty percent of the day-ahead committed bid or the desired amount, the Market Participant will incur Balancing Operating Reserve charges.:

*Abs[(Actual MWh relief provided * (1- EDC loss de-ration factor) * Energy Loss factor) – Desired MWh] * RTO Balancing Operating Reserves Deviation Rate + Abs[(Actual MWh relief provided * (1- EDC loss de-ration factor) * Energy Loss factor) – Desired MWh] * Locational Balancing Operating Reserves Deviation Rate (East or West depending on zone)*