**ISO TARIFF APPENDIX N**

**Settlements and Billing**

**PART A**
**[Not Used]**

## PART B
## GRID OPERATIONS CHARGE COMPUTATION

### B 1 Purpose of charge

The Grid Operations Charge is a charge which recovers Redispatch costs incurred due to Intra-Zonal Congestion pursuant to Section 27.1.3 of the ISO Tariff. The Grid Operations Charge is paid by or charged to Scheduling Coordinators in order for the ISO to recover and properly redistribute the costs of adjusting the Balanced Schedules submitted by Scheduling Coordinators.

### B 2 Fundamental formulae

### B 2.1 Payments to Scheduling Coordinators with incremented schedules

When it becomes necessary for the ISO to increase the output of a Scheduling Coordinator's Generating Unit$_i$ or System Resource$_i$ or reduce a Curtailable Demand$_i$ in order to relieve Congestion within a Zone, the ISO will pay the Scheduling Coordinator. The amount that ISO pays the Scheduling Coordinator$_j$ is the price specified in the Scheduling Coordinator's Imbalance Energy bid for the Generating Unit$_i$ or System Resource$_i$ or Curtailable Demand$_i$ multiplied by the quantity of Energy Dispatched. The formula for calculating the payment to Scheduling Coordinator$_j$ for each block$_b$ of Energy of its bid curve in Trading Interval$_t$ is:

$$INC_{bijt} = adjinc_{bijt} * \Delta inc_{bijt}$$

### B 2.1.1 Total Payment for Trading Interval

The formula for calculating payment to Scheduling Coordinator$_j$ whose Generating Unit$_i$ or System Resource$_i$ has been increased or Curtailable Demand$_i$ reduced for all the relevant blocks$_b$ of Energy in the Imbalance Energy bid curve of that Generating Unit or System Resource or Curtailable Demand in the same Trading Interval$_t$ is:

$$PayTI_{ijt} = \sum_{b} INC_{bijt}$$

### B 2.2 Charges to Scheduling Coordinators with decremented schedules

When it becomes necessary for the ISO to decrease the output of a Scheduling Coordinator's Generating Unit$_i$ or System Resource$_i$ in order to relieve Congestion within a Zone, the ISO will make a charge to the Scheduling Coordinator. The amount that the ISO will charge Scheduling Coordinator$_j$ for decreasing the output of Generating Unit$_i$ is

the decremental reference price specified for the Scheduling Coordinator as determined in accordance with Section 27.1.1.6.1 multiplied by the quantity of Energy Dispatched. The amount that the ISO will charge Scheduling Coordinator$_j$ for decreasing the output of System Resource$_i$ is the price specified in the Scheduling Coordinator's Imbalance Energy bid for System Resource$_i$ multiplied by the quantity of Energy Dispatched. The formula for calculating the charge to Scheduling Coordinator$_j$ for each block$_b$ of Energy in its decremental reference price or Imbalance Energy Bid in Trading Interval$_t$ is:

$$DEC_{bijt} = adjdec_{bijt} * \Delta dec_{bijt}$$

**B 2.2.1 Total Charge for Trading Interval**

The formula for calculating the charge to Scheduling Coordinator$_j$ whose Generating Unit$_i$ or System Resource$_i$ has been decreased for all the relevant blocks$_b$ of Energy at the decremental reference price for Generating Unit$_i$, or Imbalance Energy bid for System Resource$_i$ in the same Trading Interval$_t$ is:

$$ChargeTI_{ijt} = \sum_{b} DEC_{bijt}$$

**B 2.3 Not Used**

**B 2.4 Net ISO Redispatch costs**

The Trading Interval net Redispatch cost encountered by ISO to relieve Intra-Zonal Congestion is the sum of the amounts paid by the ISO to those Scheduling Coordinators whose Generation or System Resource was increased or Curtailable Demand was decreased during the Trading Interval less the sum of the amounts received by the ISO from those Scheduling Coordinators whose Generating Units or System Resource were decreased during the Trading Interval. The fundamental formula for calculating the net Redispatch cost is:

$$REDISP_{CONGt} = \sum_{j} PayTI_{ijt} - \sum_{j} ChargeTI_{ijt}$$

Note that $REDISP_{CONGt}$ can be either positive or negative. This means that it is possible for the ISO to generate either a net cost or a net income, for any given Trading Interval. In the event the ISO does not make use of equal amounts of incremental and decremental dispatched MWHs, then the net Redispatch cost becomes the sum of the amounts paid (or charged) by the ISO to those Scheduling Coordinators whose Generation or System Resource was increased (or decreased) or Curtailable Demand was decreased (or increased) during the Trading Interval less the sum of the amounts received by the ISO from Scheduling Coordinators through the Imbalance Energy Market.

**B 2.5 Grid Operations Price**

The grid operations price is the Trading Interval rate used by the ISO to apportion net Trading Interval Redispatch costs to Scheduling Coordinators within the Zone with Intra-

Zonal Congestion. The grid operations price is calculated using the following formula: $$GOP_t = \frac{REDISP_{CONG_t}}{\sum_j QCharge_{jt} + \sum_j Export_{jt}}$$

**B 2.6 Grid Operations Charge**

The Grid Operations Charge is the vehicle by which the ISO recovers the net Redispatch costs. It is allocated to each Scheduling Coordinator in proportion to the Scheduling Coordinator's Demand in the Zone with Intra-Zonal Congestion and exports from the Zone with Intra-Zonal Congestion. The formula for calculating the Grid Operations Charge for Scheduling Coordinator$_j$ in Trading Interval$_t$ is:

$$GOC_{jt} = GOP_t * \left(QCharge_{jt} + EXPORT_{jt}\right)$$

**B 3 Meaning of terms of formulae**

**B 3.1 $INC_{bijt}$ - $**

The payment from the ISO due to Scheduling Coordinator$_j$ whose Generating Unit$_i$ or System Resource$_i$ is increased or Curtailable Load$_i$ is reduced within a block$_b$ of Energy in its Imbalance Energy bid in Trading Interval$_t$ in order to relieve Intra-Zonal Congestion.

**B 3.2 $adjinc_{bijt}$ - $/MWh**

The incremental cost for the rescheduled Generating Unit$_i$ or System Resource$_i$ or Curtailable Load$_i$ taken from the relevant block$_b$ of Energy in the Imbalance Energy bid submitted by the Scheduling Coordinator$_j$ or generated by the ISO for the Trading Interval$_t$.

**B 3.3 $\Delta incbijt$ - MW**

The amount by which the Generating Unit$_i$ or System Resource$_i$ or Curtailable Load$_i$ of Scheduling Coordinator$_j$ for Trading Interval$_t$ is increased by the ISO within the relevant block$_b$ of Energy in its Imbalance Energy bid.

**B 3.4 $PayTI_{jit}$ - $**

The Trading Interval payment to Scheduling Coordinator$_j$ whose Generating Unit$_i$ has been increased or System Resource$_i$ or Curtailable Load$_i$ reduced in Trading Interval$_t$ of the Trading Day.

**B 3.5 $DEC_{bijt}$ - $**

The charge to Scheduling Coordinator$_j$ whose Generating Unit$_i$ or System Resource$_i$ is decreased for Trading Interval$_t$ within a block$_b$ of Energy at the decremental reference price for Generating Unit$_i$ or in the Imbalance Energy bid for System Resource$_i$.

**B 3.6 $adjdec_{bijt}$ - $/MWh**

The decremental cost for the rescheduled Generating $Unit_i$ or System $Resource_i$ taken from the relevant $block_b$ of Energy at the decremental reference price for Generating $Unit_i$ or Imbalance Energy bid for System $Resource_i$ submitted by Scheduling $Coordinator_j$ or generated by the ISO for the Trading $Interval_t$.

**B 3.7 $\Delta dec_{bijt}$ - MW**

The amount by which the Generating $Unit_i$ or System $Resource_i$ of Scheduling $Coordinator_j$ for Trading $Interval_t$ is decreased by ISO within the relevant $block_b$ of Energy at the decremental reference price for Generating $Unit_i$ or Imbalance Energy bid for System $Resource_i$.

**B 3.8 $ChargeTI_{ijt}$ - $**

The Trading Interval charge to Scheduling $Coordinator_j$ whose Generating $Unit_i$ or System $Resource_i$ has been decreased in Trading $Interval_t$ of the Trading Day.

**B 3.9 Not Used**

**B 3.10 Not Used**

**B 3.10.1 Not Used**

**B 3.10.2 Not Used**

**B 3.11 $REDISP_{CONGt}$ - $**

The Trading Interval net cost to ISO to redispatch in order to relieve Intra-Zonal Congestion during Trading $Interval_t$.

**B 3.12 $GOP_t$ - $/MWh**

The Trading Interval grid operations price for Trading $Interval_t$ used by the ISO to recover the costs of Redispatch for Intra-Zonal Congestion Management.

**B 3.13 $GOC_{jt}$ - $**

The Trading Interval Grid Operations Charge by the ISO for Trading $Interval_t$ for Scheduling $Coordinator_j$ in the relevant Zone with Intra-Zonal Congestion.

**B 3.14 $QCHARGE_{jt}$ – MWh**

The Trading Interval metered Demand within a Zone for Trading $Interval_t$ for Scheduling $Coordinator_j$ whose Grid Operations Charge is being calculated.

**B 3.15 $EXPORT_{jt}$ – MWh**

The total Energy for Trading $Interval_t$ exported from the Zone to a neighboring Control Area by Scheduling $Coordinator_j$.

## PART C

## ANCILLARY SERVICES CHARGES COMPUTATION

### C 1 Purpose of charges

The Ancillary Services charges reimburse the ISO for the costs of purchasing Ancillary Services in the Day-Ahead and Hour-Ahead Markets. Each Scheduling Coordinator that does not self-provide Ancillary Services must purchase these services from the ISO. The ISO will in turn purchase these Ancillary Services from Scheduling Coordinators in the markets. Ancillary Services purchased and resold by the ISO includes Regulation, Spinning Reserve, Non-Spinning Reserve, and Replacement Reserve. Any references in this Part C to the Ancillary Service "Regulation" shall be read as referring to "Regulation Up" or "Regulation Down".

This Part C also addresses the payments by ISO to Scheduling Coordinators for the Dispatch of energy from Dispatched Ancillary Services Units and for the Dispatch of Supplemental Energy in the Real Time Market. The ISO recovers the costs of real-time Dispatch of such energy through the Imbalance Energy charges described in Part D of this Appendix.

The reference to a Scheduling Coordinator by Zone refers to the Demand of that Scheduling Coordinator which is located in the Zone. A Generation Unit, Load, or System Resource located in another Control Area is considered to be located in the Zone in which its contract path enters the ISO Controlled Grid.

The ISO will purchase Ancillary Services for each Trading Interval in both the Day-Ahead and Hour-Ahead Markets. Separate payments will be calculated for each service for each Trading Interval and in each market for each Generating Unit, Load and System Resource. The ISO will then calculate a total payment for each Scheduling Coordinator for each Trading Interval for each service for each Zone in each market for all the Generating Units, Loads and System Resources that the Scheduling Coordinator represents. The ISO will charge Scheduling Coordinators for Ancillary Services, other than for energy, which they purchase from the ISO by calculating and applying charges to each Scheduling Coordinator for each Trading Interval for each service in each Zone in each market.

The ISO will allocate the Ancillary Services capacity charges, for both the Day-Ahead Market and the Hour-Ahead Market, on a Zonal basis if the Day-Ahead Ancillary Services Market is procured on a Zonal basis. The ISO will allocate the Ancillary Services capacity charges, for both the Day-Ahead Market and the Hour-Ahead Market, on an ISO Control Area wide basis if the Day-Ahead Ancillary Services Market is defined on an ISO Control Area wide basis.

### C 2 Fundamental formulas

### C 2.1 ISO payments to Scheduling Coordinators

**C 2.1.1 Day-Ahead Market**

*(a)* *Regulation*. When the ISO purchases Regulation capacity in the Day-Ahead Market, Scheduling Coordinators for Generating Units that provide this capacity will receive payments for each Trading Interval of the Day-Ahead Market. The payment for a given Generating Unit which provides Regulation capacity over a given Trading Interval will be the total quantity of Regulation capacity provided times the Zonal Market Clearing Price for that Trading Interval in that Zone. The required Regulation capacity is defined in Appendix A. Regulation Up and Regulation Down payments shall be calculated separately. This payment for Scheduling Coordinator j for providing Regulation Up capacity from a resource i in Zone x for Trading Interval t is calculated as follows:

$$AGCUpPayDA_{ijxt} = AGCUpQDA_{ijxt} * PAGCUpDA_{xt}$$

This payment for Scheduling Coordinator j for providing Regulation Down capacity from a resource i in Zone x for Trading Interval t is calculated as follows:

$$AGCDownPayDA_{ijxt} = AGCDownQDA_{ijxt} * PAGCDownDA_{xt}$$

The total Regulation Up payment to each Scheduling Coordinator for a given Trading Interval in the Day-Ahead Market for all the resources that it represents in a given Zone is calculated by summing all the payments for the resources of the Scheduling Coordinator in the Zone for the Trading Interval. This payment for Scheduling Coordinator j in Zone x for Trading Interval t is calculated as follows:

$$AGCUpPayTotalDA_{jxt} = \sum_{i} AGCUpPayDA_{ijxt}$$

The total Regulation Down payment to each Scheduling Coordinator for a given Trading Interval in the Day-Ahead Market for all the resources that it represents in a given Zone is calculated by summing all the payments for the resources of the Scheduling Coordinator in the Zone for the Trading Interval. This payment for Scheduling Coordinator j in Zone x for Trading Interval t is calculated as follows:

$$AGCDownPayTotalDA_{jxt} = \sum_{i} AGCDownPayDA_{ijxt}$$

*(b)* *Spinning Reserve*. When ISO purchases Spinning Reserve capacity in the Day-Ahead Market. Scheduling Coordinators for Generating Units and System Resources that provide this capacity will receive payments for each Trading Interval of the Day-Ahead Market. The payment for a given Generating Unit or

System Resource which provides Spinning Reserve capacity over a given Trading Interval will be the total quantity of Spinning Reserve capacity provided times the Zonal Market Clearing Price for that Trading Interval in that Zone. The required Spinning Reserve capacity is defined in Appendix A. This payment for Scheduling Coordinator j for providing Spinning Reserve capacity from a resource i in Zone x for Trading Interval t is calculated as follows:

$$SpinPayDA_{ijxt} = SpinQDA_{ijxt} * PSpinDA_{xt}$$

The total Spinning Reserve payment to each Scheduling Coordinator for a given Trading Interval in the Day-Ahead Market for all the resources that it represents in a given Zone is calculated by summing all the payments for the resources of the Scheduling Coordinator in the Zone for the Trading Interval. This payment for Scheduling Coordinator j in Zone x for Trading Interval t is calculated as follows:

$$SpinPayTotalDA_{jxt} = \sum_{i} SpinPayDA_{ixt}$$

(b) *Non-Spinning Reserve*. When the ISO purchases Non-Spinning Reserve capacity in the Day-Ahead Market, Scheduling Coordinators for Generating Units, Loads and System Resources that provide this capacity will receive payments for each Trading Interval of the Day-Ahead Market. The payment for a given Generating Unit, Load or System Resource which provides Non-Spinning Reserve capacity over a given Trading Interval will be the total quantity of Non-Spinning Reserve capacity provided times the Zonal Market Clearing Price for that Trading Interval in that Zone. The required Non-Spinning Reserve capacity is defined in Appendix A. This payment for Scheduling Coordinator j for providing Non-Spinning Reserve capacity from a resource i in Zone x for Trading Interval t is calculated as follows:

(c) $$NonSpinPayDA_{ijxt} = NonSpinQDA_{ijxt} * PNonSpinDA_{xt}$$

The total Non-Spinning Reserve payment to each Scheduling Coordinator for a given Trading Interval in the Day-Ahead Market for all the resources that it represents in a given Zone is calculated by summing all the payments for the resources of the Scheduling Coordinator in the Zone for the Trading Interval. This payment for Scheduling Coordinator j in Zone x for Trading Interval t is calculated as follows:

$$NonSpinPayTotalDA_{jxt} = \sum_{i} NonSpinPayDA_{ijxt}$$

*(d)* *Replacement Reserve*. When the ISO purchases Replacement Reserve capacity in the Day-Ahead Market, Scheduling Coordinators for Generating Units, Loads and System Resources that provide this capacity will receive payments for each Trading Interval of the Day-Ahead Market. The payment for a given Generating Unit, Load or System Resource which provides Replacement Reserve capacity over a given Trading Interval will be the total

quantity of Replacement Reserve capacity provided times the Zonal Market Clearing Price for that Trading Interval in that Zone. The required Replacement Reserve capacity is defined in Appendix A. This payment for Scheduling Coordinator j for providing Replacement Reserve capacity from a resource i in Zone x for Trading Interval t is calculated as follows:

$$ReplPayDA_{ijxt} = ReplQDA_{ijxt} * PReplDA_{xt}$$

The total Replacement Reserve payment to each Scheduling Coordinator for a given Trading Interval in the Day-Ahead Market for all the resources that it represents in a given Zone is calculated by summing all the payments for the resources of the Scheduling Coordinator in the Zone for the Trading Interval. This payment for Scheduling Coordinator j in Zone x for Trading Interval t is calculated as follows:

$$ReplPayTotalDA_{jxt} = \sum_{i} ReplPayDA_{ijxt}$$

**C 2.1.2 Hour-Ahead Market**

*(a)* *Regulation*. When the ISO purchases Regulation capacity in the Hour-Ahead Market, Scheduling Coordinators for Generating Units that provide this capacity will receive payment for the Trading Interval of the Hour-Ahead Market. The payment for a given Generating Unit which provides Regulation capacity over the Trading Interval will be the total quantity of Regulation capacity provided times the Zonal Market Clearing Price for that Trading Interval in that Zone. The required Regulation capacity is defined in Appendix A. Regulation Up and Regulation Down payments shall be calculated separately. This payment for Scheduling Coordinator j for providing Regulation Up capacity from a resource i in Zone x for Trading Interval t is calculated as follows:

$$AGCUpPayHA_{ijxt} = AGCUpQIHA_{ijxt} * PAGCUpHA_{xt}$$

This payment for Scheduling Coordinator j for providing Regulation Down capacity from a resource i in Zone x for Trading Interval t is calculated as follows:

$$AGCDownPayHA_{ijxt} = AGCDownQIHA_{ijxt} * PAGCDownHA_{xt}$$

When a Scheduling Coordinator buys back, in the Hour-Ahead Market, Regulation capacity which it sold to the ISO in the Day-Ahead Market, the payment which the ISO receives will be the total quantity of Regulation capacity bought back times the Zonal Hour-Ahead Market Clearing Price for that Trading Interval in that Zone.

This payment to the ISO from Scheduling Coordinator j to buy back Regulation Up capacity from a resource i in Zone x for Trading Interval t is calculated as follows:

$$AGCUpReceiveHA_{ijxt} = AGCUpQDHA_{ijxt} * PAGCUpHA_{xt}$$

This payment to the ISO from Scheduling Coordinator j to buy back Regulation Down capacity from a resource i in Zone x for Trading Interval t is calculated as follows:

$$AGCDownReceiveHA_{ijxt} = AGCDownQDHA_{ijxt} * PAGCDownHA_{xt}$$

The total Regulation payment for the Trading Interval of the Hour-Ahead Market to each Scheduling Coordinator for all the resources that it represents in a given Zone is calculated by summing all the payments for the resources of the Scheduling Coordinator in the Zone for the Trading Interval and then deducting therefrom any amount payable by the Scheduling Coordinator to the ISO for Regulation bought back by the Scheduling Coordinator from the ISO in the Hour-Ahead Market for the Trading Interval on behalf of resources located in the Zone. This payment for Scheduling Coordinator j in Zone x for Trading Interval t is calculated as follows:

$$AGCDownPayTotalHA_{jxt} = \sum_{i} AGCDownPayHA_{ijxt} - \sum_{i} AGCDownReceiveHA_{ijxt}$$

$$AGCUpPayTotalHA_{jxt} = \sum_{i} AGCUpPayHA_{ijxt} - \sum_{i} AGCUpReceiveHA_{ijxt}$$

*(b)* <u>*Spinning Reserve*</u>. When the ISO purchases Spinning Reserve capacity in the Hour-Ahead Market, Scheduling Coordinators for Generating Units and System Resources that provide this capacity will receive payments for the Trading Interval of the Hour-Ahead Market. The payment for a given Generating Unit or System Resource which provides Spinning Reserve capacity over the Trading Interval will be the total quantity of Spinning Reserve capacity provided times the Zonal Market Clearing Price for that Trading Interval in that Zone. This payment for Scheduling Coordinator j for providing Spinning Reserve capacity from a resource i in Zone x for Trading Interval t is calculated as follows:

$$SpinPayHA_{ijxt} = SpinQIHA_{ijxt} * PSpinHA_{xt}$$

When a Scheduling Coordinator buys back in the Hour-Ahead Market Spinning Reserve capacity which it sold to the ISO in the Day-Ahead Market, the payment which the ISO receives will be the total quantity of Spinning Reserve capacity bought back times the Zonal Hour-Ahead Market Clearing Price for that Trading Interval in that Zone.

This payment to the ISO from Scheduling Coordinator j to buy back Spinning Reserve capacity from a resource i in Zone x for Trading Interval t is calculated as follows:

$$SpinReceiveHA_{ijxt} = SpinQDHA_{ijxt} * PSpinHA_{xt}$$

The total Spinning Reserve payment to each Scheduling Coordinator for the Trading Interval of the Hour-Ahead Market for all the resources that it represents in a given Zone is calculated by summing all the payments for the resources of the Scheduling Coordinator in the Zone for the Trading Interval and then deducting therefrom any amount payable by the Scheduling Coordinator to the ISO for Spinning Reserve bought back by the Scheduling Coordinator from the ISO in the Hour-Ahead Market for the Trading Interval on behalf of resources located in the Zone. This payment for Scheduling Coordinator j in Zone x for Trading Interval t is calculated as follows:

$$SpinPayTotalHA_{jxt} = \sum_{i} SpinPayHA_{ijxt} - \sum_{i} SpinReceiveHA_{ijxt}$$

*(c)* *Non-Spinning Reserve*. When the ISO purchases Non-Spinning Reserve capacity in the Hour-Ahead Market, Scheduling Coordinators for Generating Units, Loads and System Resources that provide this capacity will receive payment for the Trading Interval of the Hour-Ahead Market. The payment for a given Generating Unit, Load or System Resource which provides Non-Spinning Reserve capacity over the Trading Interval will be the total quantity of Non-Spinning Reserve capacity provided times the Zonal Market Clearing Price for that Trading Interval in that Zone. This payment for Scheduling Coordinator j for providing Non-Spinning Reserve capacity from a resource i in Zone x for Trading Interval t is calculated as follows:

$$NonSpinPayHA_{ijxt} = NonSpinQIHA_{ijxt} * PNonSpinHA_{xt}$$

When a Scheduling Coordinator buys back in the Hour-Ahead Market Non-Spinning Reserve capacity which it sold to the ISO in the Day-Ahead Market, the payment which the ISO receives will be the total quantity of Non-Spinning Reserve capacity bought back times the Zonal Hour-Ahead Market Clearing Price for that Trading Interval in that Zone.

This payment to the ISO from Scheduling Coordinator j to buy back Non-Spinning Reserve capacity from a resource i in Zone x for Trading Interval t is calculated as follows:

$$NonSpinReceiveHA_{ijxt} = SpinQDHA_{ijxt} * PNonSpinHA_{xt}$$

The total Non-Spinning Reserve payment to each Scheduling Coordinator for the Trading Interval of the Hour-Ahead Market for all the resources that it represents in a given Zone is calculated by summing all the payments for the resources of the Scheduling Coordinator in the Zone for the Trading Interval and then deducting therefrom any amount payable by the Scheduling

Coordinator to the ISO for Non-Spinning Reserve bought back by the Scheduling Coordinator from the ISO in the Hour-Ahead Market for the Trading Interval on behalf of resources located in the Zone. This payment for Scheduling Coordinator j in Zone x for Trading Interval t is calculated as follows:

$$NonSpinPayTotalHA_{jxt} = \sum_{i} NonSpinPayHA_{ijxt} - \sum_{i} NonSpinReceiveHA_{ijxt}$$

*(d)* *Replacement Reserve*. When the ISO purchases Replacement Reserve capacity in the Hour-Ahead Market, Scheduling Coordinators for Generating Units, Loads and System Resources that provide this capacity will receive payments for the Trading Interval of the Hour-Ahead Market. The payment for a given Generating Unit, Load or System Resource which provides Replacement Reserve capacity over the Trading Interval will be the total quantity of Replacement Reserve capacity provided times the Zonal Market Clearing Price for that Trading Interval in that Zone. This payment for Scheduling Coordinator j for providing Replacement Reserve capacity from a resource i in Zone x for Trading Interval t is calculated as follows:

$$ReplPayHA_{ijxt} = ReplQIHA_{ijxt} * PReplHA_{xt}$$

When a Scheduling Coordinator buys back in the Hour-Ahead Market Replacement Reserve capacity which it sold to the ISO in the Day-Ahead Market, the payment which the ISO receives will be the total quantity of Replacement Reserve capacity bought back times the Zonal Hour-Ahead Market Clearing Price for that Trading Interval in that Zone.

This payment to the ISO from Scheduling Coordinator j to buy back Replacement Reserve capacity from a resource i in Zone x for Trading Interval t is calculated as follows:

$$ReplReceiveHA_{ijxt} = ReplQDHA_{ijxt} * PReplHA_{xt}$$

The total Replacement Reserve payment to each Scheduling Coordinator for the Trading Interval of the Hour-Ahead Market for all the resources that it represents in a given Zone is calculated by summing all the payments for the resources of the Scheduling Coordinator in the Zone for the Trading Interval and then deducting therefrom any amount payable by the Scheduling Coordinator to the ISO for Replacement Reserve bought back by the Scheduling Coordinator from the ISO in the Hour-Ahead Market for the Trading Interval on behalf of resources located in the Zone. This payment for Scheduling Coordinator j in Zone x for Trading Interval t is calculated as follows:

$$ReplPayTotalHA_{jxt} = \sum_{i} ReplPayHA_{ijxt} - \sum_{i} ReplReceiveHA_{ijxt}$$

**C 2.2 ISO allocation of charges to Scheduling Coordinators**

**C 2.2.1 Day-Ahead Market**

*(a)* *Regulation*. The ISO will charge the Zonal cost of providing Regulation capacity that is not self-provided by Scheduling Coordinators, in the Day-Ahead Market, through the application of a charge to each Scheduling Coordinator for each Trading Interval. This charge will be computed by multiplying the Regulation user rate for the Trading Interval by the Scheduling Coordinator's Regulation obligation, for which it has not self-provided, for the same period.

The Zonal Regulation user rate for the Day-Ahead Market is calculated by dividing the total cost to ISO of purchasing Regulation Capacity within the Zone, for the Trading Interval, by the total ISO Regulation MW purchases for the Trading Interval within the Zone. Regulation Up and Regulation Down payments shall be calculated separately.

The Day-Ahead Regulation Up user rate in Zone x for Trading Interval t is calculated as follows:

$$AGCUpRateDA_{xt} = \frac{\sum_{j} AGCUpPayTotalDA_{jxt}}{AGCUpPurchDA_{xt}}$$

where,

$AGCUpPayTotalDA_{ixt}$ = Total Regulation Up payments for the Settlement Period t in the Day-Ahead Market for the Zone x.

The Day-Ahead Regulation Down user rate in Zone x for Trading Interval t is calculated as follows:

$$AGCDownRateDA_{xt} = \frac{\sum_{j} AGCDownPayTotalDA_{jxt}}{AGCDownPurchDA_{xt}}$$

where,

$AGCDownPayTotalDA_{jxt}$ = Total Regulation Down payments for the Settlement Period t in the Day-Ahead Market for the Zone x.

The Regulation capacity charge for Scheduling Coordinator j in the Day-Ahead Market in Zone x for Trading Interval t is calculated as follows:

$$AGCUpChgDA_{jxt} = AGCUpOblig_{jxt} * AGCUpRateDA_{xt}$$

$$AGCDownChgDA_{jxt} = AGCDownOblig_{jxt} * AGCDownRateDA_{xt}$$

*(b)* *Spinning Reserve*. The ISO will charge the Zonal cost of providing Spinning Reserve capacity that is not self-provided by Scheduling Coordinators, in the Day-Ahead Market, through the application of a charge to each Scheduling

Coordinator for each Trading Interval. This charge will be computed by multiplying the Spinning Reserve capacity user rate for the Trading Interval by the Scheduling Coordinator's Spinning Reserve obligation, for which it has not self-provided, for the same period. The Zonal Spinning Reserve capacity user rate for the Day-Ahead Market is calculated by dividing the total cost to ISO of purchasing Spinning Reserve capacity within the Zone, for the Trading Interval, by the total ISO Spinning Reserve MW purchases for the Trading Interval within the Zone. The Day-Ahead Spinning Reserve capacity user rate in Zone x for Trading Interval t is calculated as follows:

$$SpinRateDA_{xt} = \frac{\sum_{j} SpinPayTotalDA_{jxt}}{SpinPurchDA_{xt}}$$

The Spinning Reserve capacity charge for Scheduling Coordinator j in the Day-Ahead Market in Zone x for Trading Interval t is calculated as follows:

$$SpinChgDA_{jxt} = SpinOblig_{jxt} * SpinRateDA_{xt}$$

*(c)* *Non-Spinning Reserve*. The ISO will charge the Zonal cost of providing Non-Spinning Reserve capacity that is not self-provided by Scheduling Coordinators, in the Day-Ahead Market, through the application of a charge to each Scheduling Coordinator for each Trading Interval. This charge will be computed by multiplying the Non-Spinning Reserve capacity user rate for the Trading Interval by the Scheduling Coordinator's Non-Spinning Reserve obligation, for which it has not self-provided, for the same period.

The Zonal Non-Spinning Reserve capacity user rate for the Day-Ahead Market is calculated by dividing the total cost to ISO of purchasing Non-Spinning Reserve capacity within the Zone, for the Trading Interval, by the total ISO Non-Spinning Reserve MW purchases for the Trading Interval within the Zone. The Day-Ahead Non-Spinning Reserve capacity user rate in Zone x for Trading Interval t is calculated as follows:

$$NonSpinRateDA_{xt} = \frac{\sum_{j} NonSpinPayTotalDA_{jxt}}{NonSpinPurchDA_{xt}}$$

The Non-Spinning Reserve capacity charge for Scheduling Coordinator j in the Day-Ahead Market in Zone x for Trading Interval t is calculated as follows:

$$NonSpinChgDA_{jxt} = NonSpinOblig_{jxt} * NonSpinRateDA_{xt}$$

**C 2.2.2 Hour-Ahead Market**

*(a)* *Regulation*. The ISO will charge the Zonal net cost of providing Regulation capacity that is not self-provided by Scheduling Coordinators, in the Hour-Ahead Market through the application of a charge to each Scheduling Coordinator for the Trading Interval concerned. This charge will be computed by multiplying the Regulation user rate for the Trading Interval by the Scheduling Coordinator's Regulation obligation, for which it has not self-provided, for the same period.

The Zonal Regulation capacity user rate for the Hour-Ahead Market is calculated by dividing the total cost to the ISO of purchasing Regulation capacity within the Zone less any amounts payable to the ISO by Scheduling Coordinators for Regulation bought back from the ISO in the Hour-Ahead Market on behalf of resources located in the Zone, for the Trading Interval, by the total ISO Regulation capacity MW purchases for the Trading Interval within the Zone. Regulation Up and Down payments shall be calculated separately. The Hour-Ahead Regulation Up capacity user rate in Zone x for Trading Interval t is calculated as follows:

$$AGCUpRateHA_{xt} = \frac{\sum_{j} AGCUpPayTotalHA_{jxt}}{AGCUpPurchHA_{xt}}$$

where,

$AGCUpPayTotalHa_{jxt}$= Totlal Regulation Up payments for the Settlement Period t in the Hour-Ahead Market for Zone x.

The Hour-Ahead Regulation Down capacity user rate in Zone x for Trading Interval t is calculated as follows:

$$AGCDownRateHA_{xt} \frac{\sum_{j} AGCDownPayTotalHA_{jxt}}{AGCDownPurchHA_{xt}}$$

where,

$AGCDownPayTotalHA_{xt}$ = Total Regulation Down payments for the Settlement Period t in the Hour-Ahead Market for Zone x.

The Regulation capacity charge for Scheduling Coordinator j in the Hour-Ahead Market in Zone x for Trading Interval t is calculated as follows:

$AGCUpChgHA_{jxt} = (AGCUpOblig_{jxt} * AGCUpRateHA_{xt})$

$AGCDownChgHA_{jxt} = (AGCDownOblig_{jxt} * AGCDownRateHA_{xt})$

*(b)* Spinning Reserve. The ISO will charge the Zonal net cost of providing Spinning Reserve capacity that is not self-provided by Scheduling Coordinators, in the Hour-Ahead Market, through the application of a charge to each Scheduling Coordinator for the Trading Interval. This charge will be computed by multiplying the Spinning Reserve capacity user rate for the Trading Interval by the Scheduling Coordinator's Spinning Reserve obligation, for which it has not self-provided, for the same period. The Zonal Spinning Reserve capacity user rate for the Hour-Ahead Market is calculated by dividing the total cost to ISO of purchasing Spinning Reserve capacity within the Zone less any amounts payable to the ISO by Scheduling Coordinators for Spinning Reserve bought back from the ISO in the Hour-Ahead Market on behalf of resources located in the Zone, for the Trading Interval, by the total ISO Spinning Reserve MW purchases for the Trading Interval within the Zone. The Hour-Ahead Spinning Reserve capacity user rate in Zone x for Trading Interval t is calculated as follows:

$$SpinRateHA_{xt} = \frac{\sum_{j} SpinPayTotalHA_{jxt}}{SpinPurchHA_{xt}}$$

The Spinning Reserve capacity charge for Scheduling Coordinator j in the Hour-Ahead Market in Zone x for Trading Interval t is calculated as follows:

$$SpinChgHA_{jxt} = (SpinOblig_{jxt} * SpinRateHA_{xt})$$

*(c)* Non-Spinning Reserve. The ISO will charge the Zonal net cost of providing Non-Spinning Reserve capacity that is not self-provided by Scheduling Coordinators, in the Hour-Ahead Market, through the application of a charge to each Scheduling Coordinator for the Trading Interval. This charge will be computed by multiplying the Non-Spinning Reserve capacity user rate for the concerned Trading Interval by the Scheduling Coordinator's Non-Spinning Reserve obligation, for which it has not self-provided, for the same period. The Zonal Non-Spinning Reserve capacity user rate for the Hour-Ahead Market is calculated by dividing the total cost to ISO of purchasing Non-Spinning Reserve capacity within the Zone less any amounts

*(d)* payable to the ISO by Scheduling Coordinators for Non-Spinning Reserve bought back from the ISO in the Hour-Ahead Market on behalf of resources in the Zone, for the Trading Interval, by the total ISO Non-Spinning Reserve MW purchases for the Trading Interval within the Zone. The Hour-Ahead Non-Spinning Reserve capacity user rate in Zone x for Trading Interval t is calculated as follows:

$$NonSpinRateHA_{xt} = \frac{\sum_{j} NonSpinPayTotalHA_{jxt}}{NonSpinObligTotal_{xt}}$$

The Non-Spinning Reserve capacity charge for Scheduling Coordinator j in the Hour-Ahead Market in Zone x for Trading Interval t is calculated as follows:

$NonSpinChgHA_{jxt} = (NonSpinOblig_{jxt} * NonSpinRateHA_{xt})$

**C 2.2.3 Replacement Reserve**

The user rate per unit of Replacement Reserve obligation for each Settlement Period t for each Zone x shall be as follows:

$$ReplRate_{xt} = \frac{(PRepResDA_{xt} * OrigReplReqDA_{xt}) + (PRepResHA_{xt} * OrigReplReqHA_{xt})}{OrigReplReqDA_{xt} + OrigReplReqHA_{xt}}$$

where:

$OrigReplReqDA_{xt}$ = Replacement Reserve requirement net of self-provision in the Day-Ahead Market before consideration of any substitutions pursuant to Section 8.2.3.6.

$OrigReplReqHA_{xt}$ = Incremental change in the Replacement Reserve requirement net of self-provision between the Day-Ahead Market and the Hour-Ahead Market before consideration of any substitutions pursuant to Section 8.2.3.

$PRepResDA_{xt}$ is the Market Clearing Price for Replacement Reserve in the Day-Ahead Market for Zone *x* in Settlement Period *t*.

$PRepResHA_{xt}$ is the Market Clearing Price for Replacement Reserve in the Hour-Ahead Market for Zone *x* in Settlement Period *t*.

For each Settlement Period t, each Scheduling Coordinator shall pay to the ISO a sum calculated as follows for each Zone x:

$ReplRate_{xt} * ReplOblig_{jxt}$

where

$ReplOblig_{jxt} = DevReplOblig_{jxt} + RemRepl_{jxt} - SelfProv_{jxt} + NetInterSCTrades_{jxt}$ $DevReplOblig_{jxt}$ is the Scheduling Coordinator's obligation for deviation Replacement Reserve in Zone x in the Settlement Period t and $RemRepl_{jxt}$ is the Scheduling Coordinator's obligation for remaining Replacement Reserve in Zone x for Settlement Period t.

$SelfProv_{jxt}$ is Scheduling Coordinator's Replacement Reserve self-provision in Zone x for Settlement Period t.

$NetInterSCTrades_{jxt}$ is the sale of Replacement Reserve less the purchase of Replacement Reserve through Inter-Scheduling Coordinator Trades by Scheduling Coordinator j in Zone x for Settlement Period t.

Deviation Replacement Reserve for Scheduling Coordinator i in Zone x for Settlement Period t is calculated as follows:

If $ReplObligTotal_{xt} > TotalDeviations_{xt}$ then:

$$DevReplOblig_{xjt} = \left[ Max\left(0, \sum_i GenDev_{ijxt}\right) - Min\left(0, \sum_i LoadDev_{ijxt}\right)\right]$$

If $ReplObligTotal_{xt} < TotalDeviations_{xt}$ then:

$$DevReplOblig_{xjt} = \frac{ReplObligTotal_{xt}}{TotalDeviations_{xt}} * \left[ Max\left(0, \sum_i GenDev_{ijxt}\right) - Min\left(0, \sum_i LoadDev_{ijxt}\right)\right]$$

where,

$$TotalDeviations_{xt} = \sum_j \left[ Max\left(0, \sum_i GenDev_{ijxt}\right) - Min\left(0, \sum_i LoadDev_{ijxt}\right)\right] GenDev_{ijxt}$$

= The deviation between scheduled and actual Energy generation for Generator i represented by Scheduling Coordinator I in Zone x during Settlement Period t as referenced in SABP Part D.

$LoadDev_{ijxt}$ = The deviation between scheduled and actual Load consumption for resource I represented by Scheduling Coordinator in Zone x during Settlement Period t as referenced in SABP Part D.

$DevReplOblig_{xt}$ is total deviation Replacement Reserve in Zone x for Settlement Period t.

$ReplObligTotal_{xt}$ is total Replacement Reserve Obligation in Zone x for Settlement Period t.

Remaining Replacement Reserve for Scheduling Coordinator j in Zone x for Settlement Period t is calculated as follows:

$$RemRepl_{xjt} = \frac{MeteredDemand_{jxt}}{TotalMeteredDemand_{xt}} * TotalRemRepl_{xt}$$

where:

$MeteredDemand_{jxt}$ is the Scheduling Coordinator's total metered Demand excluding exports in Zone x for Settlement Period t.

$TotalMeteredDemand_{xt}$ is total metered Demand excluding exports in Zone x for Settlement Period t.

$TotalRemRepl_{xt} = Max[0, ReplObligTotal_{xt} - DevReplOblig_{xt}]$

**C 2.2.4 Rational Buyer Adjustments**

(a) If, in any Settlement Period, no quantity of Regulation, Spinning Reserve, Non-Spinning Reserve or Replacement Reserve is purchased in the Day-Ahead Market or the Hour-Ahead Market due to the operation of Section 8.2.3.6 of the ISO Tariff, then in lieu of the user rate determined in accordance with Section C 2.2.1, C 2.2.2, or C 2.2.3, as applicable, the user rate for the affected Ancillary Service for that Settlement Period shall be determined as follows:

(i) If the affected market is a Day-Ahead Market, the user rate for the affected Ancillary Service shall be set at the lowest capacity reservation price for an unaccepted qualified capacity bid in a Day-Ahead Market for that Ancillary Service or for another Ancillary Service that meets the requirements for the affected Ancillary Service. If there are no such unaccepted bids, the user rate for the affected Ancillary Service shall be the lowest Market Clearing Price for the same Settlement Period established in the Day-Ahead Market for another Ancillary Service that meets the requirements for the affected Ancillary Service.

(ii) If the affected market is an Hour-Ahead Market, the user rate for the affected Ancillary Service shall be set at the lowest capacity reservation price for an unaccepted qualified capacity bid in the Hour-Ahead Market for the same Settlement Period for that Ancillary Service or for another Ancillary Service that meets the requirements for the affected Ancillary Service. If there are no such unaccepted bids, the user rate for the affected Ancillary Service shall be the user rate for the same Ancillary Service in the Day-Ahead Market in the same Settlement Period.

(b) With respect to each Settlement Period, in addition to the user rates determined in accordance with Sections C 2.2.1 through C 2.2.3, or Section C 2.2.4(a), as applicable, each Scheduling Coordinator shall be charged an additional amount equal to its proportionate share, based on total purchases by Scheduling Coordinators of Regulation, Spinning Reserve, Non-Spinning Reserve and Replacement Reserve of the amount, if any, by which (i) the total payments to Scheduling Coordinators pursuant to Section C 2.1 for the Day-Ahead Market and Hour-Ahead Market and all Zones, exceed (ii) the total amounts charged to Scheduling Coordinators pursuant to Sections C 2.2.1 through C 2.2.3, for the Day-Ahead Market and Hour-Ahead Market and all Zones. If total amounts charged to Scheduling Coordinators exceed the total payments to Scheduling Coordinators, each Scheduling Coordinator will be refunded its proportionate share, based on total purchases by Scheduling Coordinators of Regulation, Spinning Reserve, Non-Spinning Reserve and Replacement Reserve.

**C 2.2.5 Real-Time Market**

(a) The ISO will charge the costs of purchasing Instructed Imbalance Energy output from Dispatched Spinning Reserve, Non-Spinning Reserve, Replacement Reserve and Supplemental Energy resources through the Instructed Imbalance Energy settlement process.

(b) The ISO will charge the costs of purchasing Uninstructed Imbalance Energy (including incremental and decremental Energy from Generating Units providing Regulation) through the Uninstructed Imbalance Energy settlement process.

(c) The ISO will charge the costs of Regulation Energy Payment Adjustments as calculated in accordance with Section 8.11.5 of the ISO Tariff, in accordance with Section 11.2.9.

**C 3 Meaning of terms of formulae**

**C 3.1 $AGCUpPayDA_{ijxt}$ - $**

The payment for Scheduling Coordinator j for providing Regulation Up capacity in the Day-Ahead Market from a resource i in Zone x for Trading Interval t.

**$AGCDownPayDA_{ijxt}$ - $**

The payment for Scheduling Coordinator j for providing Regulation Down capacity in the Day-Ahead Market from a resource i in Zone x for Trading Interval t.

**C 3.2 $AGCUpQDA_{ijxt}$ – MW**

The total quantity of Regulation Up capacity provided in the ISO Day-Ahead Market from resource i by Scheduling Coordinator j in Zone x for Trading Interval t.

**$AGCDownQDA_{ijxt}$ – MW**

The total quantity of Regulation Down capacity provided in the ISO Day-Ahead Market from resource i by Scheduling Coordinator j in Zone x for Trading Interval t.

**C 3.3 $PAGCUpDA_{xt}$ - $/MW**

In the case of Capacity made available in accordance with the ISO's Final Day-Ahead Schedules, the Market Clearing Price for units exempt from FERC Ancillary Service rate caps or the bid price for those Units subject to the cap for Regulation Up Capacity in the Day-Ahead Market for Trading Interval t in Zone x. In the case of Capacity not included in the ISO's Final Day-Ahead Schedules but made available in accordance with amended Ancillary Services supplier schedules issued in accordance with Section 8.7, the bid price for the unit for Regulation Up Capacity in Zone x for Trading Interval t.

**$PAGCDownDA_{xt}$ - $/MW**

In the case of Capacity made available in accordance with the ISO's Final Day-Ahead Schedules, the Market Clearing Price for units exempt from FERC Ancillary Service rate caps or the bid price for those Units subject to the cap for Regulation Down Capacity in the Day-Ahead Market for Trading Interval t in Zone x. In the case of Capacity not included in the ISO's Final Day-Ahead Schedules but made available in accordance with amended Ancillary Services supplier schedules issued in accordance with Section 8.7, the bid price for the unit for Regulation Down Capacity in Zone x for Trading Interval t.

**C 3.4 $AGCUpPayTotalDA_{jxt}$ - $**

The total payment for Regulation Up capacity to Scheduling Coordinator j in the Day-Ahead Market in Zone x for Trading Interval t.

**$AGCDownPayTotalDA_{jxt}$ - $**

The total payment for Regulation Down capacity to Scheduling Coordinator j in the Day-Ahead Market in Zone x for Trading Interval t.

**C 3.5 $AGCUpPayHA_{ijxt}$ - $**

The payment for Scheduling Coordinator j for providing incremental (additional to Day-Ahead) Regulation Up capacity in the Hour-Ahead Market from a resource i in Zone x for Trading Interval t.

**$AGCDownPayHA_{ijxt}$ - $**

The payment for Scheduling Coordinator j for providing incremental (additional to Day-Ahead) Regulation Down capacity in the Hour-Ahead Market from a resource i in Zone x for Trading Interval t.

**C 3.5.1 $AGCUpReceiveHA_{ijxt}$ - $**

The payment from Scheduling Coordinator j for buying back from the ISO in the Hour-Ahead Regulation Up capacity which the ISO had purchased from Scheduling Coordinator j in the Day-Ahead Market from a resource i in Zone x for Trading Interval t.

**$AGCDownReceiveHA_{ijxt}$ - $**

The payment from Scheduling Coordinator j for buying back from the ISO in the Hour-Ahead Regulation Down capacity which the ISO had purchased from Scheduling Coordinator j in the Day-Ahead Market from a resource i in Zone x for Trading Interval t.

**C 3.6 $AGCUpQIHA_{ijxt}$ – MW**

The total quantity of incremental (additional to Day-Ahead) Regulation Up capacity provided in the ISO Hour-Ahead Market from resource i by Scheduling Coordinator j in Zone x for Trading Interval t.

**$AGCDownQIHA_{ijxt}$ – MW**

The total quantity of incremental (additional to Day-Ahead) Regulation Down capacity provided in the ISO Hour-Ahead Market from resource i by Scheduling Coordinator j in Zone x for Trading Interval t.

**C 3.7 $AGCUpQDHA_{ijxt}$ – MW**

The total quantity of decremental (less than Day-Ahead) Regulation Up capacity provided in the ISO Hour-Ahead Market from resource i by Scheduling Coordinator j in Zone x for Trading Interval t.

**$AGCDownQDHA_{ijxt}$ – MW**

The total quantity of decremental (less than Day-Ahead) Regulation Down capacity provided in the ISO Hour-Ahead Market from resource i by Scheduling Coordinator j in Zone x for Trading Interval t.

**C 3.7.1 $PAGCUpHA_{xt}$ - $/MW**

The Market Clearing Price for units exempt from FERC Ancillary Service rate caps or the bid price for those units subject to the cap for incremental (additional to Day-Ahead) Regulation Up capacity in the Hour-Ahead Market for Trading Interval t in Zone x. On buyback condition, MCP applies.

**$PAGCDownHA_{xt}$ - $/MW**

The Market Clearing Price for units exempt from FERC Ancillary Service rate caps or the bid price for those units subject to the cap for incremental (additional to Day-Ahead) Regulation Down capacity in the Hour-Ahead Market for Trading Interval t in Zone x. On buyback condition, MCP applies.

**C 3.8 $AGCUpPayTotalHA_{jxt}$ - $**

The total payment for incremental (additional to Day-Ahead) Regulation Up capacity to Scheduling Coordinator j in the Hour-Ahead Market in Zone x for Trading Interval t, after deduction of payments from Scheduling Coordinator j for buying back from the ISO in the Hour-Ahead, Regulation Up capacity which the ISO had purchased from Scheduling Coordinator j in the Day-Ahead Market in Zone x for Trading Interval t.

**$AGCDownPayTotalHA_{jxt}$ - $**

The total payment for incremental (additional to Day-Ahead) Regulation Down capacity to Scheduling Coordinator j in the Hour-Ahead Market in Zone x for Trading Interval t, after deduction of payments from Scheduling Coordinator j for buying back from the ISO in the Hour-Ahead, Regulation Down capacity which the ISO had purchased from Scheduling Coordinator j in the Day-Ahead Market in Zone x for Trading Interval t.

**C 3.9 $AGCUpRateDA_{xt}$ - $/MW**

The Day-Ahead Regulation Up capacity user rate charged to Scheduling Coordinators by the ISO in Zone x for Trading Interval t.

**$AGCDownRateDA_{xt}$ - $/MW**

The Day-Ahead Regulation Down capacity user rate charged to Scheduling Coordinators by the ISO in Zone x for Trading Interval t.

**C 3.10** **$AGCUpObligTotal_{xt}$ – MW**

The net total Regulation Up obligation in Zone x for Trading Interval t as defined in Appendix A. This net total equals the total obligation minus that self-provided.

**$AGCDownObligTotal_{xt}$ – MW**

The net total Regulation Down obligation in Zone x for Trading Interval t as defined in Appendix A. This net total equals the total obligation minus that self-provided.

**C 3.11** **$AGCUpChgDA_{jxt}$ - $**

The Regulation Up charge for Scheduling Coordinator j in the Day-Ahead Market in Zone x for Trading Interval t.

**$AGCDownChgDA_{jxt}$ - $**

The Regulation Down charge for Scheduling Coordinator j in the Day-Ahead Market in Zone x for Trading Interval t.

**C 3.12** **$AGCUpOblig_{jxt}$ – MW**

The net Regulation Up obligation for Scheduling Coordinator j in Zone x for Trading Interval t as defined in Appendix A. This net obligation equals the obligation minus that self-provided.

**$AGCDownOblig_{jxt}$ – MW**

The net Regulation Down obligation for Scheduling Coordinator j in Zone x for Trading Interval t as defined in Appendix A. This net obligation equals the obligation minus that self-provided.

**C 3.13** **$AGCUpRateHA_{xt}$ - $/MW**

The Hour-Ahead incremental (additional to Day-Ahead) Regulation Up capacity user rate charged to Scheduling Coordinators by the ISO in Zone x for Trading Interval t.

**$AGCDownRateHA_{xt}$ - $/MW**

The Hour-Ahead incremental (additional to Day-Ahead) Regulation Down capacity user rate charged to Scheduling Coordinators by the ISO in Zone x for Trading Interval t.

**C 3.14 $AGCUpChgHA_{jxt}$ - $**

The incremental (additional to Day-Ahead) Regulation Up charge for Scheduling Coordinator j in the Hour-Ahead Market in Zone x for Trading Interval t.

**$AGCDownChgHA_{jxt}$ - $**

The incremental (additional to Day-Ahead) Regulation Down charge for Scheduling Coordinator j in the Hour-Ahead Market in Zone x for Trading Interval t.

**C 3.15 $EnQPay_{ijxt}$ - $**

The payment for Scheduling Coordinator j for Instructed Imbalance Energy output from a resource i in the Real Time Market in Zone x for Trading Interval t.

**C 3.16 [NOT USED]**

**C 3.17 [NOT USED]**

**C 3.18 [NOT USED]**

**C 3.19 $SpinPayDA_{ijxt}$ - $**

The payment for Scheduling Coordinator j for providing Spinning Reserve capacity in the Day-Ahead Market from a resource i in Zone x for Trading Interval t.

**C 3.20 $SpinQDA_{ijxt}$ – MW**

The total quantity of Spinning Reserve capacity provided in the Day-Ahead Market by resource i represented by Scheduling Coordinator j in Zone x for Trading Interval t.

**C 3.20A $REPA_{ijxt}$ - $**

The Regulation Energy Payment Adjustment payable for real-time incremental or decremental Energy provided from Regulation resource i of Scheduling Coordinator j in Zone x in Trading Interval t.

**C 3.20B $RUP_{ijxt}$ – MW**

The upward Regulation capacity of Regulation resource i in Zone x included in the Final Schedule for Ancillary Services of Scheduling Coordinator j for Trading Interval t, weighted in proportion to the ISO's need for upward Regulation.

**C3.20C $RDN_{ijxt}$ – MW**

The downward Regulation capacity of Regulation resource i in Zone x included in the Final Schedule for Ancillary Services of Scheduling Coordinator j for Trading Interval t, weighted in proportion to the ISO's need for downward Regulation.

**C 3.20D CUP – number**

The constant established by the ISO and subject to change by resolution of the ISO Governing Board. Initially this shall be set at 1. The ISO may modify the value of CUP within a range of 0-1 either generally in regard to all hours or specifically in regard to particular times of the day, after the ISO Governing Board approves such modifications, by a notice issued by the Chief Executive Officer of the ISO and posted on the ISO Internet "Home Page," at http//www.caiso.com, or such other Internet address as the ISO may publish from time to time, specifying the date and time from which the modification shall take effect, which shall be not less than seven (7) days after the Notice is issued.

**C 3.20E CDN – number**

The constant established by the ISO and subject to change by resolution of the ISO Governing Board. Initially this shall be set at 1. The ISO may modify the value of CDN within a range of 0-1 either generally in regard to all hours or specifically in regard to particular times of the day, after the ISO Governing Board approves such modifications, by a notice issued by the Chief Executive Officer of the ISO and posted on the ISO Internet "Home Page," at http//www.caiso.com, or such other Internet address as the ISO may publish from time to time, specifying the date and time from which the modification shall take effect, which shall be not less than seven (7) days after the Notice is issued.

**C 3.21 $PSpinDA_{xt}$ -$/MW**

In the case of Capacity made available in accordance with the ISO's Final Day-Ahead Schedules, the Day-Ahead Market Clearing Price for units exempt from FERC Ancillary Service rate caps or the bid price for those units subject to the cap for Spinning Reserve Capacity in Zone x for Trading Interval t. In the case of Capacity not included in the ISO's Final Day-Ahead Schedules but made available in accordance with amended Ancillary Services supplier schedules issued in accordance with Section 8.7, the bid price for the unit for Spinning Reserve Capacity in Zone x for Trading Interval t.

**C 3.22 $SpinPayTotalDA_{jxt}$ - $**

The total payment to Scheduling Coordinator j for Spinning Reserve capacity in the Day-Ahead Market in Zone x for Trading Interval t.

**C 3.23 $SpinPayHA_{ijxt}$ - $**

The payment for Scheduling Coordinator j for providing incremental (additional to Day-Ahead) Spinning Reserve capacity in the Hour-Ahead Market from a resource i in Zone x for Trading Interval t.

**C 3.23.1 $SpinReceiveHA_{ljxt}$ - $**

The payment from Scheduling Coordinator j for buying back from the ISO in the Hour-Ahead, Spinning Reserve capacity which the ISO had purchased from Scheduling Coordinator j in the Day-Ahead Market from a resource i in Zone x for Trading Interval t.

**C 3.24 $SpinQIHA_{ijxt}$ – MW**

The total quantity of incremental (additional to Day-Ahead) Spinning Reserve capacity provided in the Hour-Ahead Market by resource i represented by Scheduling Coordinator j in Zone x for Trading Interval t.

**C 3.25 $SpinQDHA_{ijxt}$ – MW**

The total quantity of decremental (less than Day-Ahead) Spinning Reserve capacity provided in the ISO Hour-Ahead Market from resource i by Scheduling Coordinator j in Zone x for Trading Interval t.

**C 3.25.1 $PSpinHA_{xt}$ -$/MW**

The Hour-Ahead Market Clearing Price for units exempt from FERC Ancillary Service rate caps or the bid price for those units subject to the cap for incremental (additional to Day-Ahead) Spinning Reserve capacity in Zone x for Trading Interval t. On Buyback condition, MCP applies charge for HA.

**C 3.26 $SpinPayTotalHA_{jxt}$ - $**

The total payment to Scheduling Coordinator j for incremental (additional to Day-Ahead) Spinning Reserve capacity in the Hour-Ahead Market in Zone x for Trading Interval t, after deduction of payments from Scheduling Coordinator j for buying back from the ISO in the Hour-Ahead, Spinning Reserve capacity which the ISO had purchased from Scheduling Coordinator j in the Day-Ahead Market in Zone x for Trading Interval t.

**C 3.27 $SpinRateDA_{xt}$ - $/MW**

The Day-Ahead Spinning Reserve capacity user rate charged to Scheduling Coordinators by the ISO in Zone x for Trading Interval t.

**C 3.28 $SpinObligTotal_{xt}$ – MW**

The net total Spinning Reserve capacity obligation in Zone x for Trading Interval t as defined in Appendix A. This net total equals the total obligation minus that self-provided.

**C 3.29 $SpinChgDA_{jxt}$ - $**

The Spinning Reserve capacity charge for Scheduling Coordinator j in the Day-Ahead Market in Zone x for Trading Interval t.

**C 3.30 $SpinOblig_{jxt}$ – MW**

The net Spinning Reserve capacity obligation for Scheduling Coordinator j in Zone x for Trading Interval t as defined in Appendix A. This net obligation equals the obligation minus that self-provided.

**C 3.31 $SpinRateHA_{xt}$ - $/MW**

The Hour-Ahead incremental (additional to Day-Ahead) Spinning Reserve capacity user rate charged to Scheduling Coordinators by the ISO in Zone x for Trading Interval t.

**C 3.32 $SpinChgHA_{jxt}$ - $**

The incremental (additional to Day-Ahead) Spinning Reserve capacity charge for Scheduling Coordinator j in the Hour-Ahead Market in Zone x for Trading Interval t.

**C 3.33 $NonSpinPayDA_{ijxt}$ - $**

The payment for Scheduling Coordinator j for providing Non-Spinning Reserve capacity in the Day-Ahead Market from a resource i in Zone x for Trading Interval t.

**C 3.34 $NonSpinQDA_{ijxt}$ – MW**

The total quantity of Non-Spinning Reserve capacity provided from resource i in the Day-Ahead Market by Scheduling Coordinator j in Zone x for Trading Interval t.

**C 3.35 $PNonSpinDA_{xt}$ - $/MW**

In the case of Capacity made available in accordance with the ISO's Final Day-Ahead Schedules, the Day-Ahead Market Clearing Price for units exempt from FERC Ancillary Service rate caps or the bid price for those units subject to the cap for Non-Spinning Reserve Capacity for Trading Interval t in Zone x. In the case of Capacity not included in the ISO's Final Day-Ahead Schedules but made available in accordance with amended Ancillary Services supplier schedules issued in accordance with Section 8.7, the bid price for the unit for Non-Spinning Reserve Capacity in Zone x for Trading Interval t.

**C 3.36 $NonSpinPayTotalDA_{jxt}$ - $**

The total payment to Scheduling Coordinator j for providing Non-Spinning Reserve capacity in the Day-Ahead Market in Zone x for Trading Interval t.

**C 3.37 $NonSpinPayHA_{ijxt}$ - $**

The payment for Scheduling Coordinator j for providing incremental (additional to Day-Ahead) Non-Spinning Reserve capacity in the Hour-Ahead Market from a resource i in Zone x for Trading Interval t.

**C 3.37.1 $NonSpinReceiveHA_{ijxt}$ - $**

The payment from Scheduling Coordinator j for buying back from the ISO in the Hour-Ahead, Non-Spinning Reserve capacity which the ISO had purchased from Scheduling Coordinator j in the Day-Ahead Market from a resource i in Zone x for Trading Interval t.

**C 3.38 $NonSpinQIHA_{ijxt}$ – MW**

The total quantity of incremental (additional to Day-Ahead) Non-Spinning Reserve capacity provided from resource i in the Hour-Ahead Market by Scheduling Coordinator j in Zone x for Trading Interval t.

**C 3.39 $NonSpinQDHA_{ijxt}$ – MW**

The total quantity of decremental (less than Day-Ahead) Non-Spinning Reserve capacity provided in the ISO Hour-Ahead Market from resource i by Scheduling Coordinator j in Zone x for Trading Interval t.

**C 3.39.1 $PNonSpinHA_{xt}$ - $/MW**

The Hour-Ahead Zonal Market Clearing Price for units exempt from FERC Ancillary Service rate caps or the bid price for those units subject to the cap for incremental (additional to Day-Ahead) Non-Spinning Reserve capacity for Trading Interval t in Zone x. On Buyback condition, MCP applies.

**C 3.40 $NonSpinPayTotalHA_{jxt}$ - $**

The total payment to Scheduling Coordinator j for providing incremental (additional to Day-Ahead) Non-Spinning Reserve capacity in the Hour-Ahead Market in Zone x for Trading Interval t, after deduction of payments from Scheduling Coordinator j for buying back from the ISO in the Hour-Ahead, Non-Spinning Reserve capacity which the ISO had purchased from Scheduling Coordinator j in the Day-Ahead market in Zone x for Trading Interval t.

**C 3.41 $NonSpinRateDA_{xt}$ - $/MW**

The Day-Ahead Non-Spinning Reserve capacity user rate charged to Scheduling Coordinators by the ISO in Zone x for Trading Interval t.

**C 3.42 $NonSpinObligTotal_{xt}$ – MW**

The net total Non-Spinning Reserve capacity obligation in Zone x for Trading Interval t as defined in Appendix A. This net total obligation equals the total minus that self-provided.

**C 3.43 $NonSpinChgDA_{jxt}$ - $**

The Non-Spinning Reserve Capacity charge for Scheduling Coordinator j in the Day-Ahead Market in Zone x for Trading Interval t.

**C 3.44 $NonSpinOblig_{jxt}$ – MW**

The net Non-Spinning Reserve capacity obligation for Scheduling Coordinator j in Zone x for Trading Interval t as defined in Appendix A. This net obligation is the obligation minus that self-provided.

**C 3.45 NonSpinRateHA$_{xt}$ - $/MW**

The Hour-Ahead incremental (additional to Day-Ahead) Non-Spinning Reserve capacity user rate charged to Scheduling Coordinators by the ISO in Zone x for Trading Interval t.

**C 3.46 NonSpinChgHA$_{jxt}$ - $**

The incremental (additional to Day-Ahead) Non-Spinning Reserve Capacity charge for Scheduling Coordinator j in the Hour-Ahead Market in Zone x for Trading Interval t.

**C 3.47 NonSpinObligHA$_{jxt}$ – MW**

The net incremental (additional to Day-Ahead) Non-Spinning Reserve capacity obligation in the Hour-Ahead Market for Scheduling Coordinator j in Zone x for Trading Interval t as defined in Appendix A. This net obligation is the obligation minus that self-provided.

**C 3.48 ReplPayDA$_{ijxt}$ - $**

The payment for Scheduling Coordinator j for providing Replacement Reserve capacity in the Day-Ahead Market from a resource i in Zone x for Trading Interval t.

**C 3.49 ReplQDA$_{ijxt}$ – MW**

The total quantity of Replacement Reserve capacity provided in the Day-Ahead Market from resource i by Scheduling Coordinator j in Zone x for Trading Interval t.

**C 3.50 PReplDA$_{xt}$ -$/MW**

In the case of Capacity made available in accordance with ISO's Final Day-Ahead Schedules, the Day-Ahead Market Clearing Price for units exempt from FERC Ancillary Service rate caps or the bid price for those units not subject to the cap for Replacement Reserve Capacity in Zone x for Trading Interval t. In the case of Capacity not included in the ISO's Final Day-Ahead Schedules but made available in accordance with amended Ancillary Services supplier schedules issued in accordance with Section 8.7, the bid price for the unit for Replacement Reserve Capacity in Zone x for Trading Interval t.

**C 3.51 ReplPayTotalDA$_{jxt}$ - $**

The total payment to Scheduling Coordinator j for providing Replacement Reserve capacity in the Day-Ahead Market in Zone x for Trading Interval t.

**C 3.51.1 ReplReceiveHA$_{ijxt}$ - $**

The payment from Scheduling Coordinator j for buying back from the ISO in the Hour-Ahead, Replacement Reserve capacity which the ISO had purchased from Scheduling

Coordinator j in the Day-Ahead Market from a resource i in the Zone x for Trading Interval t.

**C 3.52 $ReplPayHA_{ijxt}$ - $**

The payment for Scheduling Coordinator j for providing of incremental (additional to Day-Ahead) Replacement Reserve capacity in the Hour-Ahead Market from a resource i in Zone x for Trading Interval t.

**C 3.53 $ReplQIHA_{ijxt}$ – MW**

The total quantity of incremental (additional to Day-Ahead) Replacement Reserve capacity provided in the Hour-Ahead Market from resource i by Scheduling Coordinator j in Zone x for Trading Interval t.

**C 3.54 $ReplQDHA_{ijxt}$ – MW**

The total quantity of decremental (less than Day-Ahead) Replacement Reserve capacity provided in the ISO Hour-Ahead Market from resource i by Scheduling Coordinator j in Zone x for Trading Interval t.

**C 3.54.1 $PReplHA_{xt}$ -$/MW**

The Hour-Ahead Market Clearing Price for Non-FERC jurisdictional units or the bid price for FERC jurisdictional units for incremental (additional to Day-Ahead) Replacement Reserve capacity in Zone x for Trading Interval t. On Buyback condition, MCP applies.

**C 3.55 $ReplPayTotalHA_{jxt}$ - $**

The total payment to Scheduling Coordinator j for providing of incremental (additional to Day-Ahead) Replacement Reserve capacity in the Hour-Ahead Market in Zone x for Trading Interval t, after deduction of payments from Scheduling Coordinator j for buying back from the ISO in the Hour-Ahead, Replacement Reserve capacity which the ISO had purchased from Scheduling Coordinator j in the Day-Ahead Market in Zone x from Trading Interval t.

**C 3.56 $ReplRateDA_{xt}$ - $/MW**

The Day-Ahead Replacement Reserve capacity user rate charged to Scheduling Coordinators by the ISO in Zone x for Trading Interval t.

**C 3.57 $ReplChgDA_{jxt}$ - $**

The Replacement Reserve capacity charge for Scheduling Coordinator j in the Day-Ahead Market in Zone x for Trading Interval t.

**C 3.58 $\mathbf{ReplRateHA_{xt}}$ – $/MW**

The Hour-Ahead incremental (additional to Day-Ahead) Spinning Reserve capacity user rate charged to Scheduling Coordinators by the ISO in Zone x for Trading Interval t.

**C 3.59 $\mathbf{ReplChgHA_{jxt}}$ - $**

The incremental (additional to Day-Ahead) Replacement Reserve capacity charge for Scheduling Coordinator j in the Hour-Ahead Market in Zone x for Trading Interval t.

**C 3.60 $\mathbf{ReplObligTotal_{xt}}$ – MW**

The net total Replacement Reserve capacity obligation in the Day-Ahead and Hour-Ahead Markets in Zone x for Trading Interval t as defined in Appendix A. This net total obligation is the total obligation minus that self-provided.

**C 3.61 $\mathbf{ReplPayTotal_{jxt}}$ - $**

The total payment to Scheduling Coordinator j for providing Replacement Reserve capacity in the Day-Ahead and Hour-Ahead Markets in Zone x for Trading Interval t.

**C 3.62 $\mathbf{PavgRepl_{xt}}$ - $/MW**

The average price paid for Replacement Reserve capacity in the Day-Ahead Market and the Hour-Ahead Market in Zone x in Trading Interval t.

**C 3.63 $\mathbf{UnDispReplChg_{jxt}}$ - $**

The undispatched Replacement Reserve Capacity charge for Scheduling Coordinator j in the Day-Ahead and Hour-Ahead Markets in Zone x for Trading Interval t.

**C 3.64 $\mathbf{ReplOblig_{jxt}}$ – MW**

The Replacement Reserve capacity obligation in the Day-Ahead and Hour-Ahead Markets for Scheduling Coordinator j in Zone x for Trading Interval t as defined in Appendix A.

**C 3.65 $\mathbf{ReplQDisp_{xt}}$ – MWh**

The Dispatched Replacement Reserve capacity in the Day-Ahead Market in Zone x in Trading Interval t.

**C 3.66 $\mathbf{AGCUpPurchDA_{xt}}$ – MW**

The total quantity of Regulation Up capacity provided in the Day-Ahead Market in Zone x for Trading Interval t, not including self-provided quantities.

**AGCDownPurchDA$_{xt}$ – MW**

The total quantity of Regulation Down capacity provided in the Day-Ahead Market in Zone x for Trading Interval t, not including self-provided quantities.

**C 3.67** **SpinPurchDA$_{xt}$ – MW**

The total quantity of Spinning Reserve capacity provided in the Day-Ahead Market in Zone x for Trading Interval t, not including self-provided quantities.

**C 3.68** **NonSpinPurchDA$_{xt}$ – MW**

The total quantity of Non-Spinning Reserve capacity provided in the Day-Ahead Market in Zone x for Trading Interval t, not including self-provided quantities.

**C 3.69** **AGCUpPurchHA$_{xt}$ – MW**

The net quantity of Regulation Up capacity provided in the Hour-Ahead Market in Zone x for Trading Interval t, not including self-provided quantities.

**AGCDownPurchHA$_{xt}$ – MW**

The net quantity of Regulation Down capacity provided in the Hour-Ahead Market in Zone x for Trading Interval t, not including self-provided quantities.

**C 3.70** **SpinPurchHA$_{xt}$ – MW**

The net quantity of Spinning Reserve capacity provided in the Hour-Ahead Market in Zone x for Trading Interval t, not including self-provided quantities.

**C 3.71** **NonSpinPurchDA$_{xt}$ – MW**

The net quantity of Non-Spinning Reserve capacity provided in the Hour-Ahead Market in Zone x for Trading Interval t, not including self-provided quantities.

## PART D
## IMBALANCE ENERGY CHARGE COMPUTATION

**D 1 Purpose of charge**

The Imbalance Energy charge is the term used for allocating the cost of not only the Imbalance Energy (the differences between scheduled and actual Generation and Demand), but also any Unaccounted for Energy (UFE) and any errors in the forecasted Transmission Losses as represented by the GMMs. Any corresponding cost of Dispatched Replacement Reserve Capacity that is not allocated as an Ancillary Service is also included along with the Imbalance Energy charge.

**D 2 Fundamental formulae**

**D 2.1.1 Uninstructed Imbalance Energy Charges on Scheduling Coordinators**

Uninstructed Imbalance Energy attributable to each Load Take-Out Point, Generating Unit, System Unit, or System Resource for which a Scheduling Coordinator has a Final Hour-Ahead Schedule or Metered Quantity, for each Settlement Interval shall be deemed to be sold or purchased, as the case may be, by the ISO and charges or payments for Uninstructed Imbalance Energy shall be settled by debiting or crediting, as the case may be, the Scheduling Coordinator with an amount for each Settlement Interval.

Uninstructed Imbalance Energy within a Settlement Interval shall be settled in two tiers that are defined in relation to the expected Energy associated with the Final Hour-Ahead Schedule, if any, and the Dispatch Instruction as follows:

1) Deviations from the expected Energy associated with a Dispatch Instruction resulting in: 1) under delivery of Instructed Imbalance Energy that is also equal to or greater than the Final Hour-Ahead Schedule, or 2) over delivery of Instructed Imbalance Energy that is also less than or equal to the Final Hour-Ahead Schedule constitutes tier 1 Uninstructed Imbalance Energy that shall be settled at a Resource-Specific Settlement Interval Ex Post Price as described in Part D 2.4.

2) Deviations from the expected Energy associated with a Dispatch Instruction resulting in: 1) over delivery of Instructed Imbalance Energy that is also greater than the Final Hour-Ahead Schedule, or 2) under delivery of Instructed Imbalance Energy that is also less than the Final Hour-Ahead Schedule constitutes tier 2 Uninstructed Imbalance Energy and shall be settled at the Zonal Settlement Interval Ex Post Price as described in Part D 2.5.

Imbalance Energy is calculated as follows:

Generator Calculation for ISO Metered Entities:

$$IE_{i,h,o} = ME_{i,h,o} - SE_{i,h,o}$$

Load Calculation:

$$IE_{i,h,o} = SE_{i,h,o} - ME_{i,h,o}$$

System Resource Calculation:

$$IE_{i,h,o} = \sum_{1}^{k}\sum_{1}^{v} REAL\_TIME\_FLOW_{i,h,o,k,v} - SE_{i,h,o}$$

where,

$$SE_{i,h,o} = \frac{HAfin_{i,h}}{6}$$

$ME_{i,h,o}$ actual Meter Data for each resource *i* of each Settlement Interval *o* for each hour *h*.

Uninstructed Imbalance Energy is calculated as follows:

$$UIE_{i,h,o} = E_{i,h,o} - IIE\_REG_{i,h,o}$$

where:

$$E_{i,h,o} = IE_{i,h,o} - \sum_{1}^{k} IIE\_LOSS_{i,h,o,k} - \sum_{1}^{k} IIE\_ML_{i,h,o,k} - \sum_{1}^{k}\sum_{1}^{m} IIE\_PREDISPATCH_{i,h,o,k,m} - \sum_{1}^{k} RE\_STANDARD_{i,h,o,k} - \sum_{1}^{k} RED_{i,h,o,k} - \sum_{1}^{k}\sum_{1}^{m} IIE\_ECON_{i,h,o,k,m} - \sum_{1}^{k}\sum_{1}^{L} OOS\_P_{i,h,o,k,L} - \sum_{1}^{k}\sum_{1}^{L} OOS\_N_{i,h,o,k,L} - \sum_{1}^{k}\sum_{1}^{m} RIE_{i,h,o,k,m} - \sum_{1}^{k} IIE\_RERATE_{i,h,o,k}$$

$IIE\_REG_{i,h,o}$ is the Regulating Energy for resource *i* during Settlement Interval *o* in hour *h*

$$UIE\_1_{i,h,o} = \begin{cases} \min\left(UIE_{i,h,o}, -\min\left(0, \sum_{1}^{k}\sum_{1}^{m} IIE\_ECON_{i,h,o,k,m} + \sum_{1}^{k}\sum_{1}^{m} IIE\_PREDISPATCH_{i,h,o,k,m}\right.\right. \\ \quad + \sum_{1}^{k}\sum_{1}^{L} OOS\_P_{i,h,o,k,L} + \sum_{1}^{k}\sum_{1}^{L} OOS\_N_{i,h,o,k,L} + \sum_{1}^{k} RED_{i,h,o,k} \quad \therefore UIE_{i,h,o} \geq 0 \\ \quad \left.\left. + \sum_{1}^{k} IIE\_LOSS_{i,h,o,k} + \sum_{1}^{k}\sum_{1}^{m} RIE_{i,h,o,k,m} + \sum_{1}^{k} IIE\_ML_{i,h,o,k} + \sum_{1}^{k} RERATE_{i,h,o,k}\right)\right) \\ \max\left(UIE_{i,h,o}, -\max\left(0, \sum_{1}^{k}\sum_{1}^{m} IIE\_ECON_{i,h,o,k,m} + \sum_{1}^{k}\sum_{1}^{m} IIE\_PREDISPATCH_{i,h,o,k,m}\right.\right. \\ \quad + \sum_{1}^{k}\sum_{1}^{L} OOS\_P_{i,h,o,k,L} + \sum_{1}^{k}\sum_{1}^{L} OOS\_N_{i,h,o,k,L} + \sum_{1}^{k} RED_{i,h,o,k} \quad \therefore UIE_{i,h,o} < 0 \\ \quad \left.\left. + \sum_{1}^{k} IIE\_LOSS_{i,h,o,k} + \sum_{1}^{k}\sum_{1}^{m} RIE_{i,h,o,k,m} + \sum_{1}^{k} IIE\_ML_{i,h,o,k} + \sum_{1}^{k} RERATE_{i,h,o,k}\right)\right) \end{cases}$$

$$UIE\_2_{i,h,o} = UIE_{i,h,o} - UIE\_1_{i,h,o}$$

$$UIEC_{i,h,o} = \left(-1 * UIE\_1_{i,h,o} * STLMT\_PRICE_{i,h,o}\right) + \left(-1 * UIE\_2_{i,h,o} * ZONAL\_EX\_POST\_PRICE_{j,h,o}\right)$$

**D 2.1.2 Instructed Imbalance Energy Charges on Scheduling Coordinators**

Standard Ramping Energy is Energy associated with a Standard Ramp and shall be deemed delivered and settled at a price of zero dollars per MWh.

Ramping Energy Deviation is Energy produced or consumed due to hourly schedule changes in excess of Standard Ramping Energy and shall be paid or charged, as the case may be, at a Resource-Specific Settlement Interval Ex Post Price calculated using the applicable Dispatch Interval Ex Post Prices as described in this Part D 2.4. For Scheduling Coordinators scheduling a MSS that has elected to follow its Load, this Ramping Energy Deviation will account for the units following Load.

Ramping Energy Deviation shall be settled as an explicit component of Instructed Imbalance Energy for each resource *i* in Dispatch Interval *k* of Settlement Interval *o* for hour *h*, and calculated as follows:

$$REDC_{i,h,o} = \left(\sum_{1}^{k} RED_{i,h,o,k}\right) * STLMT\_PRICE_{i,h,o}$$

Hourly Predispatched energy from System Resources is an explicit component of Instructed Imbalance Energy for each interchange resource *i* in Dispatch Interval *k* of Settlement Interval *o* for hour *h*, and settled pursuant to Sections 11.2.4.1.1 and 11.2.4.1.1.2 of the ISO Tariff. The settlement calculation is as follows:

If (

*( COST_AT_STLMT_PRICE $_{i,h,o}$ >= 0*

And

*BID_COST $_{i,h,o}$ >=0 )*

Then

$$IIEC\_PREDISPATCH_{i,h,o} = (-1) *$$

$$\left[ min\left(COST\_AT\_STLMT\_PRICE_{i,h,o}, BID\_COST_{i,h,o}\right) \right.$$

$$\left. + (STLMT\_PRICE_{i,h,o} * PRE\_DISP\_ABC\_BQ_{i,h,o}) \right]$$

Else

*IIEC_PREDISPATCH $_{i,h,o}$ = (-1) **

*[BID_COST $_{i,h,o}$ + (STLMT_PRICE$_{i,h,o}$ * PRE_DISP_ABC_BQ$_{i,h,o}$)]*

Where

*COST_AT_STLMT_PRICE $_{i,h,o}$ =*

$$\left( \sum_{1}^{k} IIE\_PREDISPATCH_{i,h,o,k} \right) * STLMT\_PRICE_{i,h,o}$$

*BID_COST $_{i,h,o}$ =*

$\sum_{1}^{k}\sum_{1}^{m} IIE\_PREDISPATCH\_FOR\_SEGMENT_{i,h,o,k,m} * IIE\_PRICE_{i,h,o,k,m}$ for the portion of incremental energy bid segments with IIE_PRICE$_{i,h,o,k,m}$ less than or equal to the Maximum Bid Level and all decremental energy bid segments with IIE_PRICE$_{i,h,o,k,m}$ limited to the Bid Floor when IIE_PRICE$_{i,h,o,k,m}$.is less than the Bid Floor.

) )

where

*PRE_DISP_ABC_BQ$_{i,h,o}$ =* $\sum_{1}^{k}\sum_{1}^{m} IIE\_PREDISPATCH\_FOR\_SEGMENT_{i,h,o,k,m}$ for the portion of incremental energy bid segments with *IIE_PRICEi*$_{,h,o,k,m}$ greater than the Maximum Bid Level.

The amount of Instructed Imbalance Energy that will be deemed delivered in each Dispatch Interval will be based on Dispatch Instructions, as provided for in Section 34.3, and Final Hour-Ahead Schedules. The amount of Instructed Imbalance Energy to be settled in a Settlement Interval will be equal to the sum of all Instructed Imbalance Energy for all Dispatch Intervals within the relevant Settlement Interval. Instructed Imbalance Energy for each Settlement Interval shall be settled at the relevant Resource Specific Settlement Interval Ex Post Price. Generating Units, Participating Loads, and System Units may be eligible to recover their Energy Bid costs in accordance with Section 11.2.4.1.1.1. Instructed Imbalance Energy from System Resources shall be settled in accordance with Section 11.2.4.1.1.2.

The Instructed Imbalance Energy amount for each resource *i* in Settlement Interval *o* for hour *h* shall be determined as follows:

$$IIEC_{i,h,o} = (-1) * \left( \begin{array}{l} \sum_{1}^{k} \sum_{1}^{m} IIE\_ECON_{i,h,o,k,m} + \sum_{1}^{k} \sum_{1}^{m} RIE_{i,h,o,k,m} \\ + \sum_{1}^{k} IIE\_RERATE_{i,h,o,k} + \sum_{1}^{k} IIE\_ML_{i,h,o,k} \end{array} \right) * STLMT\_PRICE_{i,h,o}$$

$$+ \; IIEC\_OOS_{i,h,o} \; + \; REDC_{i,h,o} + IIEC\_REG_{i,h,o} + IIEC\_PREDISPATCH_{i,h,o}$$

Uninstructed Imbalance Energy is Imbalance Energy due to non-compliance with a Dispatch Instruction and shall be settled as provided for in SABP Part D Section 2.1.1.

**D 2.2 Unaccounted for Energy Charge**

The Unaccounted for Energy Charge on Scheduling Coordinator *g* in Settlement Interval *o* of Settlement Period *h* for each relevant Zone *j* is calculated in the following manner:

The UFE for each utility Service Area *s,* for which separate UFE calculation is performed, is calculated as follows,

$$UFE_{UDC,s,h,o} = \sum_{q \in UDC_s} I_{a,q,j,h,o} - \sum_{q \in UDC_s} E_{a,q,j,h,o} + \sum_{i \in UDC_s} G_{a,i,j,h,o} - \sum_{i \in UDC_s} L_{a,i,j,h,o} - TL_{s,h,o}$$

The Transmission Loss $TL_{s,h,o}$ in Settlement Interval *o* of Settlement Period *h* for utility Service Area *s* is calculated as follows:

$$TL_{s,h,o} = \left( \sum_{i} \left[ G_{a,i,j,h,o} * (1 - GMM_{a,i,h}) \right] + \sum_{q} \left[ I_{a,q,j,h,o} * (1 - GMM_{a,q,h}) \right] \right) * \frac{PFL_{s,h}}{\sum_{s} PFL_{s,h}}$$ Where

$PFL_{s,h}$ are the Transmission Losses for utility Service Area *s* as calculated by a power flow solution for Settlement Period *h*, consistent with the calculation of final forecasted Generation Meter Multipliers.

Each metered demand point *z* in utility Service Area *s*, either ISO grid connected or connected through UDC *s*, is allocated a portion of the UFE as follows:

$$UFE_{i,j,h,o} = UFE_{UDC,s,h,o} * \frac{L_{i,j,h,o}}{\sum_{i \in UDC_s} L_{i,j,h,o}}$$

The UFE charge for Scheduling Coordinator *g* for Settlement Interval *o* of Settlement Period *h* in Zone *j* is calculated as a charge or payment using the applicable Zonal Settlement Interval Ex Post Price as follows:

$$UFEC_{g,j,h,o} = \left( \sum_{i \in SCg} UFE_{i,j,h,o,} \right) * ZONAL\_EX\_POST\_PRICE_{j,h,o}$$

**D 2.3 Hourly Ex Post Price**

The Hourly Ex Post Price is the Energy-weighted average of the Dispatch Interval Ex Post Prices in each Zone *j* during each Settlement Period using the absolute value of Instructed Imbalance Energy procured from all Participating Generators, Participating Load, System Units, and System Resources in each applicable Dispatch Interval. The Hourly Ex Post Price may vary between Zones if Congestion is present.

$$HP_{j,h} = \frac{\sum_{1}^{p} \sum_{1}^{i} \left| IIE\_TOTAL_{j,i,h,p} \right| * EX\_POST\_PRICE_{j,h,o,p}}{\sum_{1}^{p} \sum_{1}^{i} \left| IIE\_TOTAL_{j,i,h,p} \right|}$$

where,

*p* is the Dispatch Interval index for hour *h*.

**D 2.4 Resource-Specific Settlement Interval Ex Post Price**

The Resource-Specific Settlement Interval Ex Post Price is the weighted-average of the Dispatch Interval Ex Post Prices in each Settlement Interval using the Instructed Imbalance Energy from the respective Participating Generator, Participating Load, or System Resource, in each applicable Dispatch Interval. If there is no Instructed Imbalance Energy from a Participating Generator, Participating Load, or System Resource, in any of the applicable Dispatch Intervals, the Resource-Specific Settlement Interval Ex Post Price for that resource would be the simple average of the applicable Dispatch Interval Ex Post Prices in the Settlement Interval.

The Resource-Specific Settlement Interval Ex Post Price is calculated as follows:

$$STLMT\_PRICE_{i,h,o} = \frac{\sum_{1}^{k} IIE\_TOTAL_{i,h,o,k} * EX\_POST\_PRICE_{j,h,o,k}}{\sum_{1}^{k} IIE\_TOTAL_{i,h,o,k}}$$

Where:

$$IIE\_TOTAL_{i,h,o,k} = \sum_{1}^{m} IIE\_ECON_{i,h,o,k,m} + \sum_{1}^{m} IIE\_PREDISPATCH_{i,h,o,k,m} + IIE\_ML_{i,h,o,k} + \sum_{1}^{m} RIE_{i,h,o,k,m} + \sum_{1}^{L} OOS\_P_{i,h,o,k,L} + \sum_{1}^{L} OOS\_N_{i,h,o,k,L} + IIE\_LOSS_{i,h,o,k} + RED_{i,h,o,k} + \sum_{1}^{k} IIE\_RERATE_{i,h,o,k}$$

**D 2.5 Zonal Settlement Interval Ex Post Price**

The Zonal Settlement Interval Ex Post Price is the weighted-average of the Dispatch Interval Ex Post Prices in each Settlement Interval using the absolute value of Instructed Imbalance Energy procured from all Participating Generators, Participating Load, System Units, and System Resources in each applicable Dispatch Interval. If there is no Instructed Imbalance Energy from a Participating Generator, Participating Load, or System Resource, in any of the applicable Dispatch Intervals, the Zonal Settlement Interval Ex Post Price for that Zone would be the simple average of the applicable Dispatch Interval Ex Post Prices in the Settlement Interval.

The Zonal Settlement Interval Ex Post Price is calculated as follows:

$$ZONAL\_EX\_POST\_PRICE_{j,h,o} = \frac{\sum_{p=1}^{2}\sum_{1}^{i}\left|IIE\_TOTAL_{i,h,p}\right| * EX\_POST\_PRICE_{j,h,o,p}}{\sum_{p=1}^{2}\sum_{1}^{i}\left|IIE\_TOTAL_{i,h,p}\right|}$$

where p is the Dispatch Interval index for hour h.

**D 2.6 Calculation of Unrecovered Cost Payment for Generating Units, System Units, Dynamically Scheduled System Resources, and Curtailable Demand.**

As set forth in 11.2.4.1.1.1, Generating Units, System Units, dynamically scheduled System Resources, and Curtailable Demand resources will be eligible to recover their bid costs (less than or equal to the Maximum Bid Level) for extra-marginal Energy dispatched above Pmin, if such costs are not recovered from the net of expected revenues earned through participation in the ISO's Real Time Market during the Trade Day (24-hour period).

The Unrecovered Cost Payment for each resource i shall be determined for the Trade Day *d* then evenly divided over n-Settlement Intervals as follows:

$$COST\_RECOVERY_{i,d} = min\left(0, \sum_{1}^{h}\sum_{1}^{o}\left(MR\_DEFICIT_{i,h,o} + MR\_SURPLUS_{i,h,o}\right)\right)$$

where,

$MR\_DEFICIT_{i,h,o}$ = Market Revenue deficit for resource i in hour h for Settlement interval o based on the difference between the expected revenues earned in the Settlement Interval and and/or its bid cost;$MR\_SURPLUS_{i,h,o}$= Market Revenue surplus for resource i in hour h for Settlement interval o based on the difference between the expected revenues earned in the Settlement Interval and/or its bid cost.

Resource i shall receive a share of its total cost recovery in each Settlement Interval o that is included in the $COST\_RECOVERY_{i,d}$ calculation.

$$COST\_RECOVERY_{i,h,o} = COST\_RECOVERY_{i,d} / n$$

where,

*n* is the number of Settlement Intervals o that are included in the $COST\_RECOVERY_{i,d}$ calculation for resource i in Trade Day d.

**Calculation of Market Revenue Surplus or Deficit**

The market revenue surplus or deficit for each resource i will be computed for each Settlement Interval o based on the difference between the revenues earned in the Settlement Interval at the relevant 10-minute Ex Post price and the resource's bid cost (less than or equal to the Maximum Bid Level) as follows:

$$MR\_DIFF_{i,h,o} = \left( \sum_{1}^{k} \sum_{1}^{m} IIE\_ECON_{i,h,o,k,m} + \sum_{1}^{k} \sum_{1}^{m} RIE_{i,h,o,k,m} \right) * STLMT\_PRICE_{i,h,o} - BID\_COST_{i,h,o} - BID\_COST\_RIE_{i,h,o}$$

for all incremental energy bid segments *m* with $IIE\_PRICE_{i,h,o,k,m}$ and $RIE\_PRICE_{i,h,o,k,m}$ less than or equal to the Maximum Bid Level and all decremental energy bid segments *m* with $IIE\_PRICE_{i,h,o,k,m}$ and $RIE\_PRICE_{i,h,o,k,m}$ greater than or equal to the Bid Floor.

$$MR\_DEFICIT_{i,h,o} = min(0, MR\_DIFF_{i,h,o})$$

$$MR\_SURPLUS_{i,h,o} = \max(0, MR\_DIFF_{i,h,o})$$

where,

$$BID\_COST_{i,h,o} = \left( \sum_{1}^{k} \sum_{1}^{m} IIE\_ECON_{i,h,o,k,m} * IIE\_PRICE_{i,h,o,k,m} \right)$$

$$BID\_COST\_RIE_{i,h,o} = \sum_{1}^{k} \sum_{1}^{m} RIE_{i,h,o,k,m} * RIE\_PRICE_{i,h,o,k,m}$$

**D 2.6.1 Tolerance Band and Performance Check**

The ISO shall determine the Tolerance Band for each Settlement Interval *o* for PGA resources and dynamically scheduled System Resources based on the data from the Master File as follows:

$$TOLERANCE\_BAND_{i,h,o} = \pm \max\left(FIX\_LIM\ ,\ TOL\_PERCENT\ * P\max_i\right) / 6$$

where,

*FIX_LIM* is a fixed MW limit and is initially equal to 5 MW.

*TOL_PERCENT* is a fixed percentage and is initially equal to 3%.$Pmax_i$ is the maximum operating capacity in MW of resource *i* specified in the Master File.

*The ISO shall determine the Tolerance Band for each Settlement Interval* o *for PLA resources as follows*:

$$TOLERANCE\_BAND_{i,h,o} = \pm\ max\left(FIX\_LIM\ ,\ TOL\_PERCENT * HAfin_{i,h}\right) / 6$$

where $HAfin_{i,h}$ *is the* Final Hour Ahead Energy Schedule.

Resources must operate within their relevant Tolerance Band in order to receive any above-Ex Post Price payments. The ISO shall determine the performance status of the resource for each Settlement Interval o. A resource shall have met its performance requirement if its $UIE_{i,h,o}$ is within its relevant Tolerance Band. A resource meeting its performance requirement in Settlement Interval o will have a $PERF\_STAT_{i,h,o} = 1$. A resource that has not met its performance requirement in Settlement Interval *o* will have a $PERF\_STAT_{i,h,o} = 0$.

Must-offer resources that produce a quantity of Energy above Minimum Load due to an ISO Dispatch Instruction during a Waiver Denial Period are not subject to the Tolerance Band requirement for purposes of receiving Minimum Load Cost Compensation, as defined in Section 40.8. Accordingly, the $PERF\_STAT_{i,h,o}$ for eligible must-offer resources, as defined in Section 40.8, shall be set to 1, irrespective of deviations outside of the Tolerance Band, for the purpose of determining eligibility for Minimum Load Cost Compensation during a Waiver Denial Period. The Tolerance Band shall be used to apply UDP during a Waiver Denial Period.

Non-dynamically scheduled System Resources do not have a Tolerance Band. Non-Participating Load Agreement (PLA) load resources are not subject to the performance requirement.

**D 2.6.2 Unrecovered Costs Neutrality Allocation**

For each Settlement Interval *o*, the total Unrecovered Costs for Trade Day *d* shall be allocated pro-rata to each Scheduling Coordinator *g* based on its Metered Demand, calculated as follows:

$URC\_ALLOC_{g,h,o} = M_{g,h,o} * Per\ Unit\ Price$

where,

$M_{g,h,o}$ = the Metered Demand in the ISO control area for Scheduling

Coordinator *g* in Settlement Interval *o* for hour *h*;

$$Per\ Unit\ Price = \frac{-1 * \sum_{1}^{i} COST\_RECOVERY_{i,h,o}}{\sum_{1}^{g} M_{g,h,o}}$$

**D 2.6.3 Calculation of Unrecovered Bid Cost Payment for System Resources**

As set forward in Section 11.2.4.1.1.2, System Resources that are pre-dispatched hourly incremental or decremental Instructed Imbalance Energy will be settled based on their Energy bid costs for each Settlement Interval for the quantity of Energy delivered in each Settlement Interval. The hourly pre-dispatched Instructed Imbalance Energy is first settled as set forth in Section D 2.1.2. An additional uplift payment for any applicable Settlement Interval shall be determined when settlement as set forth in Section D 2.1.2 is insufficient recovery of its bid costs for the Settlement Interval. For pre-dispatched hourly Instructed Imbalance Energy, where the resource-specific settlement amount is positive and the bid-cost is positive, an uplift payment is determined for each Settlement Interval based on the minimum of zero or the difference between the resource-specific settlement amount and the bid cost settlement amount as follows:

The predispatched uplift payment for each applicable Settlement Interval is calculated as follows:

$$PREDISPATCH\_PMT_{i,h,o} = PREDISPATCH\_UPLIFT_{i,h} / n$$

If (

$(\ COST\_AT\_STLMT\_PRICE_{i,h,o} >= 0$

And

$BID\_COST_{i,h,o} >= 0\ )$

Then

$$PREDISPATCH\_UPLIFT_{i,h,o} = \min\left(0,\ COST\_AT\_STLMT\_PRICE_{i,h,o} - BID\_COST_{i,h,o}\right)$$

Where

$$COST\_AT\_STLMT\_PRICE_{i,h,o} =$$

$$\left(\sum_{1}^{k} IIE\_PREDISPATCH_{i,h,o,k}\right) * STLMT\_PRICE_{i,h,o}$$

$$BID\_COST_{i,h,o} =$$

$$\sum_{1}^{k}\sum_{1}^{m} IIE\_PREDISPATCH\_FOR\_SEGMENT_{i,h,o,k,m} * IIE\_PRICE_{i,h,o,k,m}$$

Else

$$PREDISPATC\ H\_UPLIFT_{i,h,o} = 0\ )$$

for the portion of incremental energy bid segments with $IIE\_PRICE_{i,h,o,k,m}$ less than or equal to the Maximum Bid Level and all decremental energy bid segments with $IIE\_PRICE_{i,h,o,k,m}$ limited to the Bid Floor when $IIE\_PRICE_{i,h,o,k,m}$ is less than the Bid Floor.

**D 2.6.4 Allocation of Unrecovered Cost Payments for Hourly Pre-dispatched System Resources**

For each Settlement Interval *o*, the total uplift payments ($PREDISPATCH\_PMT_{i,h,o}$) for all hourly pre-dispatched System Resources will be included in the Excess Cost Payments to be allocated to a Scheduling Coordinator's Net Negative Deviation through allocation of excess costs and/or ISO metered Demand through excess cost neutrality allocation.

**D 2.6.5 Excess Cost Payments for Instructed Incremental Energy Bids above the Maximum Bid Level**

Incremental Instructed Imbalance Energy above the Maximum Bid Level will receive an additional Excess Cost Payment subject to operating within a resource's Tolerance Band.

Excess cost payments are calculated as follows:

$$EXCESS\_COST_{i,h,o} = \left[\left(\sum_{1}^{k}\sum_{1}^{m} IIE\_ECON_{i,h,o,k,m} + \sum_{1}^{k}\sum_{1}^{m} IIE\_PREDISPATCH_{i,h,o,k,m} + \sum_{1}^{k}\sum_{1}^{m} RIE_{i,h,o,k,m}\right) * STLMT\_PRICE_{i,h,o} - BID\_COST_{i,h,o} - BID\_COST\_RIE_{i,h,o}\right] * PERF\_STAT_{i,h,o}$$

for the portion of energy bid segments with $IIE\_PRICE_{i,h,o,k,m}$ and $RIE\_PRICE_{i,h,o,k,m}$ greater than the Maximum Bid Level.

**D 2.7 Transmission Loss Obligation**

The transmission loss obligation charge shall be determined as follows:

For Generators:

$TL_{i,h,o} = ME_{i,h,o} * (1 – GMMa_h)$

For System Resources, the transmission loss obligation shall be determined as follows:

$TL_{i,h,o}$ =

$$\sum_{1}^{k}\sum_{1}^{v} REAL\_TIME\_FLOW_{i,h,o,k,v} * (1 – GMMa_h)$$

The transmission loss charge will be calculated based on the following formulation:

$TLC_{i,h,o}$ =

$$-\sum_{1}^{k} IIE\_LOSS_{i,h,o,k} * STLMT\_PRICE_{i,h,o} + TL_{i,h,o} * STLMT\_PRICE_{i,h,o}$$

**D 2.8 Uninstructed Deviation Penalty Charges**

The ISO will calculate but not assess charges for UDP according to this Section 2.8 until the first day of the month two months after the software that calculates UDP is put into service.

For negative Uninstructed Deviation Penalty billable quantities where $UDP\_BQ_{h,o} < 0$ and $ZONAL\_EX\_POST\_PRICE_{j,h,o} > 0$,

$UDP\_NEG\_Amt_i\ AMT_{i\,h,o}$ =

-1 * $UDP\_BQ_{i,h,o}$ * $ZONAL\_EX\_POST\_PRICE_{j,h,o}$ * .5

For positive UDP billable quantities where $UDP\_BQ_{i,h,o} > 0$ and $ZONAL\_EX\_POST\_PRICE_{j,h,o} > 0$, then

$UDP\_POS\_AMT_{i,h,o} = UDP\_BQ_{i,o,h} * ZONAL\_EX\_POST\_PRICE_{j,h,o}$

where,

$UDP\_BQ_{i,o,h}$ is the Uninstructed Deviation Penalty (UDP) billable quantity in MWh for a resource, or aggregated resource, denoted by i for Settlement Interval *o* of hour *h.*

$UDP\_POS\_AMT_{i,o,h}$ or $UDP\_NEG\_AMT_{i,o,h}$ are the penalty amounts in Dollars for either an aggregated or individual resource *i* for Settlement Interval *o* of hour *h.*

The ISO will not calculate UDP settlement amounts for Settlement Intervals when the corresponding Zonal Settlement Interval Ex Post Price is negative or zero.

For an MSS that has elected to follow its own Load, the Scheduling Coordinator for the MSS Operator will be assessed the Uninstructed Deviation Penalty charges based on the Deviation Band and Deviation Price in Section 4.9.9.2 of the ISO Tariff.

**D 2.9 Minimum Load Cost Compensation**

The ISO shall calculate a Must-Offer Generator's Minimum Load Cost Compensation (MLCC), pursuant to section 40.8.1 of the ISO Tariff, as the Minimum Load Cost for each resource *i* during Settlement Interval *o* of hour *h,* as defined in section 40.8.4 of the ISO Tariff.

**D 3 Meaning of terms in the formulae**

**D 3.1 [Not Used]**

**D 3.2 $COST\_AT\_STLMT\_PRICE_{i,h,o}$ - $/MWh**

The sum of all dollar amounts from each dispatched bid segment for Energy quantities settled at the Resource-Specific Ex Post Price, for resource i during Settlement Interval o of hour h, and limited to those bid segments with Energy Bid prices below the Maximum Bid Level.

**D 3.3 $BID\_COST_{i,h,o}$ - $/MWh**

The sum of all dollar amounts from each dispatched bid portion of Energy quantities settled at the maximum of either the corresponding Energy Bid price for those bids with Energy Bid prices below the Maximum Bid Level or the Bid Floor, for resource i during Settlement Interval o during hour h.

**D 3.4 $PRE\_DISP\_ABC\_BQ_{i,h,o}$ - MWh**

The pre-dispatched Energy from all Energy Bids with any Energy Bid price above the Maximum Bid Level, for resource i during Settlement Interval o during hour h.

**D 3.5 $IIE\_PREDISPATCH\_FOR\_SEGMENT_{i,h,o,k,m}$ - MWh**

The pre-dispatched Energy for resource i during Dispatch Interval k of Settlement Interval o of hour h for bid segment m.

**D 3.6 [Not Used]**

**D 3.6.1 [Not Used]**

**D 3.6.2 [Not Used]**

**D 3.6.3 [Not Used]**

**D 3.7** **$G_{a,i,j,h,o}$ – MWh**

The total actual metered Generation of Generator i in Zone j during Settlement Interval o during Settlement Period h.

**D 3.8** **[Not Used]**

**D 3.9** **[Not Used]**

**D 3.9.1** **[Not Used]**

**D 3.10** **[Not Used]**

**D 3.11** **[Not Used]**

**D 3.12** **$GMM_{a,i,h}$ – fraction**

The final forecasted Generation Meter Multiplier (GMM) for a Generator i in Settlement Period h as calculated by the ISO at the hour-ahead stage (but after close of the Hour-Ahead Market).

**D 3.13** **$GMM_{a,j,h}$ – fraction**

The forecasted Generation Meter Multiplier for an Energy import at Scheduling Point q in Settlement period h as provided to the Scheduling Coordinator by the ISO after close of the Hour-Ahead Market.

**D 3.14** **[Not Used]**

**D 3.15** **$L_{a,i,j,h,o}$ – MWh**

The actual metered Demand of Demand i in Zone j in Settlement Interval o during Settlement Period h.

**D 3.15.1** **[Not Used]**

**D 3.15.2** **[Not Used]**

**D 3.16** **[Not Used]**

**D 3.17** **[Not Used]**

**D 3.17.1** **[Not Used]**

**D 3.18** **[Not Used]**

**D 3.19** **$I_{a,q,j,h,o}$ – MWh**

The total actual Energy import of Scheduling Coordinator g through Scheduling Point q in Settlement Interval o during Settlement Period h. This is deemed to be equal to the scheduled Energy over the same interval.

**D 3.20** **[Not Used]**

**D 3.21 [Not Used]**

**D 3.22 [Not Used]**

**D 3.23 $E_{a,q,j,h,o}$ – MWh**

The total actual Energy export of Scheduling Coordinator g through Scheduling Point q in Settlement Interval o for Settlement Period *h*. This is deemed to be equal to the total scheduled Energy export during the same interval.

**D 3.24 [Not Used]**

**D 3.25 [Not Used]**

**D 3.25.1 [Not Used]**

**D 3.26 $UFEC_{jxt}$ – $**

The Unaccounted for Energy Charge for Scheduling Coordinator j in Zone x in Settlement Period t. It is the cost for the Energy difference between the net Energy delivered into each utility Service Area, adjusted for utility Service Area Transmission Losses (calculated in accordance with ISO Tariff Section 27.2.1.), and the total metered Demand within that utility Service Area adjusted for distribution losses using Distribution System loss factors approved by the Local Regulatory Authority.

This Energy difference (UFE) is attributed to meter measurement errors, power flow modeling errors, energy theft, statistical Load profile errors, and distribution loss deviations.

**D 3.27 $UFE_{UDC,bkt}$ – MWh**

The Unaccounted for Energy (UFE) for utility Service Area k.

**D 3.28 UFE – MWh**

The portion of Unaccounted for Energy (UFE) allocated to metering point z.

**D 3.29 [Not Used]**

**D 3.30 [Not Used]**

**D 3.31 [Not Used]**

**D 3.32 [Not Used]**

**D 3.33 [Not Used]**

**D 3.34 [Not Used]**

**D 3.35 [Not Used]**

**D 3.36 [Not Used]**

**D 3.37 TLs,h,o – MWh**

The Transmission Losses per Settlement Interval *o* in Settlement Period hour h in utility Service Area *s*.

**D 3.38 [Not Used]**

**D 3.39 [Not Used]**

**D 3.40 [Not Used]**

**D 3.41 [Not Used]**

**D 3.42 [Not Used]**

**D 3.43 [Not Used]**

**D 3.44 [Not Used]**

**D 3.45 [Not Used]**

**D 3.46 [Not Used]**

**D 3.47 [Not Used]**

**D 3.48 [Not Used]**

**D 3.49 $EX\_POST\_PRICE_{j,h,o,k}$ – $/MWh**

The Ex-Post Price in Dispatch Interval *k* of Settlement Interval *o* in Settlement Period *h* in Zone *j.*

**D 3.50 $HRLY\_EX\_POST\_PRICE_{j,h}$ – $/MWh**

The energy-weighted Ex Post Price for Settlement Period *h* in Zone *j*.

**D 3.51 $STLMT\_PRICE_{i,h,o}$ – $/MWh**

The 10-minute Settlement price (Resource-Specific Settlement Interval Ex Post Price) for resource *i* in the Settlement Interval *o* for the Settlement Period *h.*

**D 3.52 $SE_{i,h,o}$ – MWh**

The Scheduled Energy from resource *i* during Settlement Interval *o* of Settlement Period *h.*

**D 3.53 $TOLERANCE\_BAND_{i,h,o}$ – MWh**

The Tolerance Band limit for resource *i* during Settlement Interval *o* of Settlement Period *h*.

**D 3.54 $IIE\_ECON_{i,h,o,k,m}$ – MWh**

The dispatched incremental or decremental Instructed Imbalance Energy (IIE) for resource *i* during Dispatch Interval *k* in Settlement Interval *o* of Settlement Period *h* for bid segment *m.*

Decremental Energy shall be represented as a negative quantity.

*IIE_ECON* $_{i,h,o,k,m}$ shall be comprised of any of the four *IIE_TYPE*'s: SUPP, SPIN, NSPN or RPLC and be associated with its respective IIE_PRICE $_{i,h,o,k,m}$

**D 3.55 $IIE\_PRICE_{i,h,o,k,m}$ – $/MWh**

The bid price for energy bid segment *m* for resource *i* during Dispatch Interval *k* in Settlement Interval *o* of Settlement Period *h* for bid segment *m*

**D 3.56 $IIE\_PREDISPATCH_{i,h,o,k,m}$ – MWh**

The Settlement Period pre-dispatched Energy for resource *i* during Dispatch Interval *k* of Settlement Interval *o* of Settlement Period *h* for bid segment *m* (MWh).

**D 3.57 $RIE_{i,h,o,k,m}$ – MWh**

The Residual Energy for resource *i* during Dispatch Interval *k* in Settlement Interval *o* of Settlement Period *h* for bid segment *m.*

**D 3.58 $RIE\_PRICE_{i,h,o,k,m}$ – $/MWh**

The reference bid price for the Residual Energy for resource *i* during Dispatch Interval *k* in Settlement Interval *o* of Settlement Period *h* for bid segment *m.*

**D 3.59 $OOS\_PRICE_{i,h,o,k,L}$ – $/MWh**

The Settlement price for the Instructed Out of Stack Energy for resource *i* during Dispatch Interval *k* in Settlement Interval *o* of Settlement Period *h* for index number *L.*

**D 3.60 $IIE\_REG_{i,h,o}$ – MWh**

The Regulating Energy for resource *i* during Settlement Interval *o* in Settlement Period *h.*

**D 3.61 $IIE\_PREDISPATCH_{i,h,p}$ – MWh**

The Settlement Period pre-dispatched Energy for resource *i* during Dispatch Interval *p* of Settlement Period *h*.

**D 3.62 $E_{i,h,o}$ – MWh**

Calculated as the difference of $IE_{i,h,o}$ and $IIE\_TOTAL_{i,h,o,k}$ and is equal to the sum of Uninstructed Imbalance Energy and Regulating Energy of resource *i* during Settlement Interval *o* in Settlement Period *h.*

**D 3.63 $IIEC_{i,h,o}$ – $**

The Instructed Imbalance Energy payment (charge) for resource *i* during Settlement Interval *o* of Settlement Period *h.*

**D 3.64 $IIEC\_OOS_{i,h,o}$ – $**

The total OOS Energy payment (charge) for resource *i* during Settlement Interval *o* of Settlement Period *h.*

**D 3.65 $IIEC\_OOS\_P_{i,h,o}$ – $**

The incremental Instructed OOS Imbalance Energy payment (charge) for resource *i* during Settlement Interval *o* of Settlement Period *h.*

**D 3.66 $IIEC\_OOS\_N_{i,h,o}$ – $**

The decremental Instructed OOS Imbalance Energy payment (charge) for resource *i* during Settlement Interval *o* of Settlement Period *h*.

**D 3.67 $IIE\_LOSS_{i,h,o,k}$ – MWh**

The transmission loss self-provided Energy from resource *i* during Dispatch Interval *k* in Settlement Interval *o* of Settlement Period *h*.

**D 3.68 $IIE\_ML_{i,h,o,k}$ – MWh**

The Imbalance Energy due to Minimum Load from resource *i* during Dispatch Interval *k* in Settlement Interval *o* of Settlement Period *h*.

**D 3.69 $IIE\_TOTAL_{i,h,o,k}$ – MWh**

The total Instructed Imbalance Energy from all energy sources except Regulation for resource *i* during Dispatch Interval *k* in Settlement Interval *o* of Settlement Period *h.*

**D 3.70 $IIE\_RERATE_{i,h,o,k}$ – MWh**

The SLIC derated Pmin or Pmax value as a result of a Scheduling Coordinator modifying its operating output level for a given resource *i* during Dispatch Interval *k* in Settlement Interval *o* of Settlement Period *h.*

**D 3.71** **$UIE_{i,h,o}$ – MWh**

The total Uninstructed Imbalance Energy from resource *i* during Settlement Interval *o* of Settlement Period *h.*

**D 3.72** **$UIE\_1_{i,h,o}$ – MWh**

The Uninstructed Imbalance Energy attributed to non-compliance of *IIE_ECON* from resource *i* during Settlement Interval *o* of Settlement Period *h.*

**D 3.73** **$UIE\_2_{i,h,o}$ – MWh**

The Uninstructed Imbalance Energy exclusive of UIE_1 from resource *i* during Settlement Interval *o* of Settlement Period *h.*

**D 3.74** **$UIEC_{i,h,o}$ – $**

The Uninstructed Imbalance Energy payment (charge) for resource *i* during Settlement Interval *o* of Settlement Period *h.*

**D 3.75** **$ZONAL\_EX\_POST\_PRICE_{j,h,o}$ – $/MWh**

The energy weighted average Ex Post Price for Imbalance Energy for Zone *j* in Settlement Interval *o* for Settlement Period *h.*

**D 3.76** **$ME_{i,h,o}$ – MWh**

The Metered Energy from resource *i* during Settlement Interval *o* of Settlement Period *h.*

**D 3.77** **$RED_{i,h,o,k}$ – MWh**

The Ramping Energy Deviation from resource *i* during Dispatch Interval *k* in Settlement Interval *o* of Settlement Period *h.*

**D 3.78** **$REDC_{i,h,o}$ – $**

The Ramping Energy Deviation payment (charge) for resource *i* during Settlement Interval *o* of Settlement Period *h*.

**D 3.79** **$MR\_ML_{i,h,o}$ – $**

The expected Real Time Market revenue from Minimum Load Energy for resource *i* in Settlement Interval *o* for Settlement Period *h.*

**D 3.80** **$COST\_RECOVERY_{i,d}$ – $**

The Unrecovered Cost Payment for resource *i* for Trading Day *d.*

**D 3.81** **$MR\_DIFF_{i,h,o}$**

is the market revenue surplus or deficit for resource *i* in Settlement Period *h* for Settlement Interval *o.*

**D 3.82** **$MR\_DEFICIT_{i,h,o}$ – $**

The market revenue deficit for resource *i* in Settlement Period *h* for Settlement Interval *o.*

**D 3.83** **$MR\_SURPLUS_{i,h,o}$ – $**

The market revenue surplus for resource *i* in Settlement Period *h* for Settlement Interval *o.*

**D 3.84** **$PERF\_STAT_{i,h,o}$ – True/False**

The performance status of resource *i* for Settlement Interval *o* of Settlement Period *h*. The performance status is equal to 1 (compliant) or 0 (non-compliant).

**D 3.85** **$BID\_COST_{i,h,o}$ – $**

The bid costs for IIE, except OOS Energy and RIE, for resource *i* in Settlement Period *h* for Settlement interval *o*.

**D 3.86** **$BID\_COST\_RIE_{i,h,o}$ – $**

The bid costs for RIE for resource *i* in Settlement Period *h* for Settlement Interval *o.*

**D 3.87** **$PREDISPATCH\_PMT_{i,h,o}$ – $**

The unrecovered bid cost payment for a Settlement Period pre-dispatched System Resource *i* in Settlement Interval *o* for Settlement Period *h.*

**D 3.88** **$EXCESS\_COST_{i,h,o}$ – $**

The excess cost payment for resource *i* in Settlement Interval *o* for Settlement Period *h.*

**D 3.89** **$TL_{i,h,o}$ – MWh**

The Transmission Loss Obligation for resource *i* during Settlement Interval *o* of Settlement Period *h.*

**D 3.90** **$EXCESS\_COST\_ALLOC_{g,h,o}$ – $**

The excess cost allocation for Scheduling Coordinator *g* in Settlement Period *h* for Settlement Interval *o.*

**D 3.91 $REAL\_TIME\_FLOW_{i,h,o,k,v}$ – MW*h***

The real-time actual flow for intertie resource *i* during Dispatch Interval *k* during Settlement Interval *o* of Settlement Period *h* for Real Time Flow Type index v. Real Time Flow Type index *v* must be one of the following Energy types: FIRM NFIRM, SUPP, WHEEL, DYN, ESPN, ENSPN, OOM, ERPLC.

**D 3.92 $RE\_STANDARD_{i,h,o,k}$ – MWh**

The Standard Ramping Energy from resource *i* during Dispatch Interval *k* of Settlement Interval *o* of Settlement Period *h.*

**D 3.93 $OOS\_P_{i,h,o,k,L}$ – MWh**

The incremental Out of Stack Energy for resource *i* during Dispatch Interval *k* in Settlement Interval *o* of Settlement Period *h* for index number *L.*

**D 3.94 $OOS\_N_{i,h,o,k,L}$ – MWh**

The decremental Out of Stack Energy for resource *i* during Dispatch Interval *k* in Settlement Interval *o* of Settlement Period *h* for index number *L.*

**D 3.95 $URC\_ALLOC_{g,h,o}$ – $**

The unrecovered cost neutrality allocation for Scheduling Coordinator *g* in Settlement Interval *o* for Settlement Period *h.*

**D 3.96 $IIE\_TYPE_{i,h,o,k,m}$**

is the energy type for $IIE\_ECON_{i,h,o,k,m.}$ Energy type is one of the following: Supplemental, Spin, Non-Spin or Replacement Reserve Energy.

# PART E

# USAGE CHARGE COMPUTATION

## E 1 Purpose of Charge

The Usage Charge is payable by Scheduling Coordinators who schedule Energy across Congested Inter-Zonal Interfaces pursuant to Section 27.1.1.5 of the ISO Tariff. Scheduling Coordinators who counter-schedule across Congested Inter-Zonal Interfaces are entitled to Usage Charge Payments. The right to schedule across a Congested Inter-Zonal Interface is determined through the ISO's Congestion Management procedures.

The following categories of Payments and Charges are covered in this Part E:

(a) Usage Charges payable by Scheduling Coordinators for Energy transfers scheduled across Congested Inter-Zonal Interfaces and which contribute to Congestion.

(b) Usage Charge rebates payable to Scheduling Coordinators for Energy transfers scheduled across Congested Inter-Zonal Interfaces and which contribute to relieving Congestion.

(c) Credits of net Usage Charge revenues to Participating TOs and FTR Holders.

(d) Debits of net Usage Charge revenues to Participating TOs and FTR Holders.

(e) Debits and rebates of Usage Charge to Scheduling Coordinators as set out in E 2.3.3.

## E 2 Fundamental Formulae

### E 2.1 ISO Usage Charges on Scheduling Coordinators

Each Scheduling Coordinator j whose Final Schedule includes the transfer of Energy scheduled across one or more Congested Inter-Zonal Interfaces shall (save to the extent that the transfer involves the use of transmission capacity represented by Existing Rights) pay, or be paid, Usage Charges in Trading Interval t calculated in accordance with the following formulae:

In the Day-Ahead Market:

$$UC_{jtd} = \sum_{x} NetZoneImp_{jtxd} * \lambda_{dxt}$$

In the Hour-Ahead Market:

$$UC_{jth} = \sum_{x} (NetZoneImp_{jtxh} - NetZoneImp_{jtxd}) * \lambda_{hxt}$$

**E 2.2 Payments of Usage Charges to Scheduling Coordinators**

Each Scheduling Coordinator j whose Final Schedule includes the transfer of Energy from one Zone to another in a direction opposite that of Congestion shall (save to the extent that the transfer involves the use of transmission capacity represented by Existing Rights) receive a Usage Charge payment from the ISO calculated in accordance with the formulae described in Section E 2.1.

**E 2.3 ISO Credits and Debits to Transmission Owners and FTR Holders of Usage Charge Revenues**

**E 2.3.1 Day-Ahead Market**

The ISO will pay to the Participating TO n and FTR Holder n its share of the total net Usage Charge revenue for Trading Interval t in the Day-Ahead Market in accordance with the following formula:

$$PayUC_{ntd} = \sum_{y} \mu_{ytd} * K_{yn} * L_{ytd}$$

**E 2.3.2 Hour-Ahead Market**

The ISO will pay to the Participating TO n and FTR Holder n its share of the total net Usage Charge revenue for Trading Interval t in the Hour-Ahead Market in accordance with the following formula:

$$PayUC_{nth} = \sum_{y} \mu_{yth} * K_{yn} * (L_{yth} - L_{ytd})$$

Under normal operating conditions, ($L_{yth}$ - $L_{ytd}$) is positive and Participating TOs and FTR Holders will receive a refund on the net Usage Charge for the relevant Trading Interval t in the Hour-Ahead Market.

**E 2.3.3 Debits to Participating TOs and FTR Holders and Debits/Rebates to Scheduling Coordinators**

If, after the close of the Day-Ahead Market, Participating TOs instruct the ISO to reduce interface limits based on operating conditions or an unscheduled transmission Outage occurs and as a result of either of those events, Congestion is increased and Available Transfer Capacity is decreased in the Inter-Zonal Interface in the Hour-Ahead Market, the ($L_{yth}$ - $L_{ytd}$) will be negative. In this case:

(a) Participating TOs and FTR Holders will be charged for the Usage Charge payments they received for the relevant Trading Interval t in the Day-Ahead Market with respect to the reduced interface limits;

(b) Any Scheduling Coordinator whose Schedule was adjusted for the relevant Trading Interval t in the Hour-Ahead Market due to the reduced interface limits will be credited with $\mu_{yth}$ for each MW of the adjustment; and

(c) Each Scheduling Coordinator will be charged an amount equal to it proportionate share, based on Schedules in the Day-Ahead Market in the direction of Congestion, of the difference between $\mu_{yth}(L_{yth} - L_{ytd})$ and the total amount charged to Participating TOs and FTR Holders in accordance with item (a) above.

The ISO will issue a notice to Scheduling Coordinators of the operating hour, and extent, for which the derate will apply in the relevant Hour-Ahead Markets. The timing and form of such notices shall be set forth in ISO procedures.

**E 3 Meaning of terms of formulae**

**E 3.1 $UC_{jtd}$ ($)**

The Usage Charge payable by or to Scheduling Coordinator j for the relevant Trading Interval t in the Day-Ahead Market.

**E 3.2 $UC_{jth}$ - $**

The Usage Charge payable by or to Scheduling Coordinator j for Trading Interval t in the Hour-Ahead Market.

**E 3.3 $NetZoneImp_{jtxd}$ (MWh)**

The net Zonal import scheduled by Scheduling Coordinator j in Zone x for the relevant Trading Interval t in the Day-Ahead Market. For Zones internal to the ISO Control Area, net Zonal import equals scheduled Demand minus scheduled Generation plus transfers. For zones external to the ISO Control Area (i.e., for Scheduling Points), net zonal import equals scheduled imports (i.e., out of the ISO Control Area) minus scheduled exports (i.e., into the ISO Control Area).

**E 3.4 $NetZoneImp_{jtxh}$ (MWh)**

The net Zonal import scheduled by the Scheduling Coordinator j in Zone x for the relevant Trading Interval t in the Hour-Ahead Market. For Zones internal to the ISO Control Area, net Zonal import equals scheduled Demand minus scheduled Generation plus transfers. For Zones external to the ISO Control Area (i.e., for Scheduling Points), net zonal import equals scheduled imports (i.e., out of the ISO Control Area) minus scheduled exports (i.e., into the ISO Control Area).

**E 3.5 $\lambda_{dxt}$ ($/MWh)**

The reference Zonal marginal price for Zone x for the relevant Trading Interval t in the Day-Ahead Market, as calculated by the ISO's Congestion Management computer optimization algorithm.

**E 3.6 $\lambda_{hxt}$ ($/MWh)**

The reference Zonal marginal price for Zone x for the relevant Trading Interval t in the Hour-Ahead Market, as calculated by the ISO's Congestion Management computer optimization algorithm.

**E 3.7 $PayUC_{ntd}$ ($)**

The amount calculated by the ISO to be paid to or by the Participating TO n (in respect of its Transmission Revenue Balancing Account) and FTR Holder n for the relevant Trading Interval t in the Day-Ahead Market.

**E 3.7.1** **$PayUC_{nth}$ ($)**

The amount calculated by the ISO to be paid to the Participating TO n (in respect of its Transmission Revenue Balancing Account) and FTR Holder n for the relevant Trading Interval t in the Hour-Ahead Market.

**E 3.8** **$\mu_{ytd}$ ($/MW)**

The Day-Ahead Congestion price (shadow price) at Inter-Zonal Interface y for Trading Interval t. This price is calculated by the ISO's Congestion Management computer optimization algorithm.

**E 3.8.1** **$\mu_{yth}$ ($/MW)**

The Hour-Ahead Congestion price (shadow price) at Inter-Zonal Interface y for Trading Interval t. This price is calculated by the ISO's Congestion Management computer optimization algorithm.

**E 3.9** **$K_{ytn}$ (%)**

The percentage of the Inter-Zonal Congestion revenue allocation for Participating TO n and FTR Holder n of the Congested Inter-Zonal interface y for the relevant Trading Interval t for both Day-Ahead and Hour-Ahead Markets.

**E 3.10** **$L_{ytd}$ (MW)**

The total loading of Inter-Zonal Interface y for Trading Interval t in the Day-Ahead as calculated by the ISO's Congestion Management optimization algorithm.

**E 3.11** **$L_{yth}$ (MW)**

The total loading of Inter-Zonal Interface y for Trading Interval t in the Hour-Ahead as calculated by the ISO's Congestion Management optimization algorithm.

## PART F

## WHEELING ACCESS CHARGES COMPUTATION

**F 1 Purpose of Charge**

The Wheeling Access Charge is paid by Scheduling Coordinators for Wheeling as set forth in Section 26.1.4 of the ISO Tariff. The ISO will collect the Wheeling revenues from Scheduling Coordinators on a Trading Interval basis and repay these to the Participating TOs based on the ratio of each Participating TO's Transmission Revenue Requirement to the sum of all Participating TOs' Revenue Requirements.

**F 2 Fundamental Formulae**

**F 2.1 ISO Charges on Scheduling Coordinators for Wheeling**

The ISO will charge Scheduling Coordinators scheduling a Wheeling Out or a Wheeling Through, the product of the Wheeling Access Charge and the total of the hourly schedules of Wheeling in MWh for each Trading Interval at each Scheduling Point associated with that transaction pursuant to Section 26.1.4 of the ISO Tariff.

**F 2.1.1 Wheeling Access Charge**

The Wheeling Access Charge for each Participating TO shall be as specified in Section 26.1.4 of the ISO Tariff.

**F 2.1.2 [Not Used]**

**F 2.2 ISO Payments to Transmission Owners for Wheeling**

The ISO will pay all Wheeling revenues to Participating TOs on the basis of the ratio of each Participating TO's Transmission Revenue Requirement ("TRR") (less the TRR associated with Existing Rights) to the sum of all Participating TOs' TRRs (less the TRRs associated with Existing Rights) as specified in Section 26.1.4.3 of the ISO Tariff. The Low Voltage Wheeling Access Charge shall be disbursed to the appropriate Participating TO. The sum to be paid to Participating $TO_n$ for a Trading Interval is calculated as follows:

$$PayTO_n = \frac{TRR_n}{\sum_n TRR_n} * \sum_j totalWChrg_j$$

**F 3 Meaning of terms in formulae**

**F 3.1 $WABC_q$ ($/kWh)**

The Weighted Average Rate for Wheeling Service for Scheduling Point q.

**F 3.2** **$P_n$** **($/kWh)**

The applicable Wheeling Access Charge rate for TAC Area or Participating TO n in $/kWh as set forth in Section 26.1.4 of the ISO Tariff and Section 4.6 of the TO Tariff.

**F 3.3** **$Q_n$** **(MW)**

The Available Transfer Capacity, whether from transmission ownership or contractual entitlements, of each Participating TO n for each ISO Scheduling Point which has been placed within the ISO Controlled Grid. Available Transfer Capacity does not include capacity associated with Existing Rights of a Participating TO as defined in Section 16.2 of the ISO Tariff.

**F 3.4** **$WChg_{jq}$** **($)**

The Wheeling Charges by the ISO on Scheduling Coordinator j for Scheduling Point q in Trading Interval t. Both Wheeling Out and Wheeling Through transactions are included in this term.

**F 3.5** **$QChargeW_{jqt}$** **(kWh)**

The summation of kWh wheeled over Scheduling Point q by Scheduling Coordinator j in Trading Interval t. Both Wheeling Out and Wheeling Through transactions are included in this term.

## PART G

## VOLTAGE SUPPORT and BLACK START CHARGES COMPUTATION

**G 1 Purpose of charge**

**G 1.1** Voltage Support (VS) and Black Start (BS) charges are the charges made by the ISO to recover costs it incurs under contracts entered into between the ISO and those entities offering to provide VS or BS. Each Scheduling Coordinator pays an allocated proportion of the VS&BS charge to the ISO so that the ISO recovers the total costs incurred.

**G 1.2** All Generating Units are required by the ISO Tariff to provide reactive power by operating within a power factor range of 0.90 lag and 0.95 lead. Additional short-term Voltage Support required by the ISO is referred to as supplemental reactive power. If the ISO requires the delivery of this supplemental reactive power by instructing a Generating Unit to operate outside its mandatory MVar range, the Scheduling Coordinator representing this Generating Unit will only receive compensation if it is necessary to reduce the MW output to achieve the MVar instructed output. Supplemental reactive power charges to Scheduling Coordinators are made on a Trading Interval basis. As of the ISO Operations Date the ISO will contract for long-term Voltage Support Service with the Owner of Reliability Must-Run Units under Reliability Must-Run Contracts.

**G 1.3** The ISO will procure Black Start capability through contracts let on an annual basis. The quantities and locations of the Black Start capability will be determined by the ISO based on system analysis studies. Charges to Scheduling Coordinators for instructed Energy output from Black Start units are made on a Trading Interval basis.

**G 2 Fundamental formulae**

**G 2.1 Payments to Scheduling Coordinators for providing Voltage Support**

Payments to Scheduling Coordinators for additional Voltage Support service comprise:

**G 2.1.1 Lost Opportunity Cost Payments (supplemental reactive power) to Scheduling Coordinators for Generating Units**

When the ISO obtains additional Voltage Support by instructing a Generating Unit to operate outside its mandatory MVar range by reducing its MW output the ISO will select Generating Units based on their Supplemental Energy Bids ($/MWh). Subject to any locational requirements the ISO will select the Generating Unit with the highest decremental Supplemental Energy Bid to reduce MW output by such amount as is necessary to achieve the instructed MVar reactive energy production. Each Trading Interval the ISO will pay Scheduling Coordinator j for that Generating Unit i in Zone x, the lost opportunity cost ($) resulting from the reduction of MW output in Trading Interval t in accordance with the following formula:

$$VSST_{xijt} = Max\{0, P_{xt} - Sup_{xdecit}\} * DEC_{xit}$$

**G 2.1.2 Long-term contract payments to Scheduling Coordinators for Reliability Must-Run Units for Generating Units and other Voltage Support Equipment**

The ISO will pay Scheduling Coordinator j for the provision of Voltage Support from its Reliability Must-Run Units located in Zone x in month m a sum ($VSLT_{xjm}$) consisting of:

(a) the total of the Ancillary Service Pre-empted Dispatch Payments if the ISO has decreased the output of the Reliability Must-Run Units for the provision of Voltage Support outside the power factor range of the Reliability Must-Run Unit in any Trading Interval in month m and/or

(b) (if applicable) the total payments for the provision of Voltage Support in month m requested by the ISO from the synchronous condensers of the Reliability Must-Run Units,

calculated in each case in accordance with the terms of the relevant Reliability Must-Run Contract. Data on these payments will not be generated by the ISO. Such data will be based on the invoices issued by the Owners of Reliability Must-Run Generating Units pursuant to their Reliability Must-Run Contracts and will be verified by the ISO.

**G 2.2 Charges to Scheduling Coordinators for Voltage Support**

**G 2.2.1 User Rate**

The user rate ($/MWh) for the lost opportunity cost for Voltage Support referred to in G 2.1.1 in Zone x for Trading Interval t will be calculated using the following formula:

$$VSSTRate_{xt} = \frac{\sum_{ij} VSST_{xijt}}{\sum_{j} QChargeVS_{xjt}}$$

The user rate ($/MWh) for month m for long-term Voltage Support referred to in G2.1.2 in Zone x will be calculated using the following formula:

$$VSSTRate_{xm} = \frac{\sum_{j} VSLT_{xjm}}{\sum_{jm} QChargeVS_{xjt}}$$

**G 2.2.2 Voltage Support Charges**

The lost opportunity cost Voltage Support charge ($) payable to recover the sums under G 2.1.1 for Zone x for Trading Interval t for Scheduling Coordinator j will be calculated using the following formula:

$$VSSTCharge_{xjt} = VSSTRate_{xt} * QChargeVS_{xjt}$$

The monthly long-term Voltage Support charge ($) payable to recover sums under G 2.1.2 for Zone x for month m for Scheduling Coordinator j will be calculated using the following formula:

$$VSLTCharge_{xjm} = VSLTRate_{xm} * \sum_{m} QChargeVS_{xjt}$$

**G 2.3 Payments to Participating Generators for Black Start**

Payments to Participating Generators that provide Black Start Energy or capability shall be made in accordance with the agreements they have entered into with the ISO for the provision of Black Start services and shall be calculated as follows:

**G 2.3.1 Black Start Energy Payments**

Whenever a Black Start Generating Unit provides a Black Start in accordance with the ISO's instructions, the ISO will pay the Black Start Generator for that Unit for the Generating Unit's energy output and start-up costs. The ISO will pay Black Start Generator for Generating Unit i, the Black Start energy and start-up costs ($) in Trading Interval t in accordance with the following formula:

$$BSEn_{ijt} = (EnQBS_{ijt} * EnBid_{ijt}) + BSSUP_{ijt}$$

**G 2.3.2 Black Start Energy Payments to Owners of Reliability Must-Run Units**

Whenever a Reliability Must-Run Unit provides a Black Start in accordance with the ISO's instructions, the ISO will pay the Scheduling Coordinator of the Reliability Must-Run Unit the Generating Unit's Energy and start-up costs. The ISO will pay Scheduling Coordinator j for Reliability Must-Run Unit i the Black Start Energy and start-up costs ($) in Trading Interval t in accordance with the following formula:

$$BSEn_{ijt} = (EnQBS_{ijt} * EnBid_{ijt}) + (BSSUP_{ijt})$$

**G 2.4 Charges to Scheduling Coordinators for Black Start**

**G 2.4.1 User Rate**

The user rate ($/MWh) for Black Start Energy payments referred to in G 2.3.1 and G 2.3.2 for Trading Interval t will be calculated using the following formula:

$$BSRate_{t} = \frac{\sum_{ij} BSEn_{ijt}}{\sum_{j} QChargeBlackStart_{jt}}$$

**G 2.4.2 Black Start Charges**

The user charge ($/MWh) for Black Start Energy to recover the costs of payments under G 2.3.1 and G 2.3.2 for Trading Interval t for Scheduling Coordinator j will be calculated using the following formula:

$$BSCharge_{jt} = BSRate_{t} * QChargeBlackStart_{jt}$$

**G 3 Meaning of Terms in the Formulae**

**G 3.1 $VSST_{xijt}$ ($)**

The lost opportunity cost paid by the ISO to Scheduling Coordinator j for Generating Unit i in Zone x, resulting from the reduction of MW output in Trading Interval t.

**G 3.2 $P_{xt}$ ($/MWh)**

The Hourly Ex Post Price for Imbalance Energy in Trading Interval t in Zone x.

**G 3.3 $Sup_{xdecit}$ ($/MWh)**

The Supplemental Energy Bid submitted by Scheduling Coordinator j for Generating Unit i in Zone x in Trading Interval t, whose output is reduced by the ISO to provide additional short-term Voltage Support.

**G 3.4 $Dec_{xit}$ (MW)**

The reduction in MW by Scheduling Coordinator j for Generating Unit i in Zone x in Trading Interval t, in order to provide short-term additional Voltage Support.

**G 3.5 $VSLT_{xjm}$ ($)**

The payment from the ISO to Scheduling Coordinator j for its Reliability Must-Run Units in Zone x for Voltage Support in month m calculated in accordance with the relevant Reliability Must-Run Contract.

**G 3.6 $VSSTRate_{xt}$ ($/MWh)**

The Trading Interval lost opportunity cost Voltage Support user rate charged by the ISO to Scheduling Coordinators for Trading Interval t for Zone x.

**G 3.7 $VSLTRate_{xm}$ ($/MWh)**

The monthly long-term Voltage Support user rate charged by the ISO to Scheduling Coordinators for month m for Zone x.

**G 3.8 $QChargeVS_{xjt}$ (MWh)**

The charging quantity for Voltage Support for Scheduling Coordinator j for Trading Interval t in Zone x equal to the total metered Demand (including exports to neighboring Control Areas) for Scheduling Coordinator j in Zone x for Trading Interval t.

**G 3.9** **$VSSTCharge_{xjt}$** **($)**

The lost opportunity cost Voltage Support user charge for Zone x for Trading Interval t for Scheduling Coordinator j.

**G 3.10** **$VSLTCharge_{xjm}$** **($)**

The long-term charge for Voltage Support for month m for Zone x for Scheduling Coordinator j.

**G 3.11** **$BSEn_{ijt}$** **($)**

The ISO payment to Scheduling Coordinator j (or Black Start Generator j) for that Generating Unit i providing Black Start Energy in Trading Interval t.

**G 3.12** **$EnQBS_{ijt}$** **(MWh)**

The energy output, instructed by the ISO, from the Black Start capability of Generating Unit i from Scheduling Coordinator j (or Participating Generator j) for Trading Interval t.

**G 3.13** **$EnBid_{ijt}$** **($/MWh)**

The price for Energy output from the Black Start capability of Generating Unit i of Scheduling Coordinator j or (Black Start Generator j) for Trading Interval t calculated in accordance with the applicable Reliability Must-Run Contract or Interim Black Start Agreement.

**G 3.14** **$BSSUP_{ijt}$** **($)**

The start-up payment for a Black Start successfully made by Generating Unit i of Scheduling Coordinator j (or Black Start Generator j) in Trading Interval t calculated in accordance with the applicable Reliability Must-Run Contract or Interim Black Start Agreement.

**G 3.15** **$BSRate_t$** **($/MWh)**

The Black Start Energy payment user rate charged by the ISO to Scheduling Coordinators for Trading Interval t.

**G 3.16** **$QChargeBlackstart_{jt}$** **(MW)**

The charging quantity for Black Start for Scheduling Coordinator j for Trading Interval t equal to the total metered Demand (excluding exports to neighboring Control Areas) of Scheduling Coordinator j for Trading Interval t.

**PART H**
**[NOT USED]**

**PART I**
**DRAFT SAMPLE OF INVOICE**

## Independent System Operator
## MARKET INVOICE

CUSTOMER 1
101 N. Harbor Blvd.
Anaheim CA 92808

Invoice: 181
Date: 20-JUN-97
Customer Number: 1000

Please send payment to:

1000 South Fremont Avenue
Building A-11
Alhambra CA 91803

For all inquiries contact:
1-800-ISO-HELP

Comments:

Charges settlement date: 20-JUN-97 to 20-JUN-97

| Charge Type | Description | Amount |
|---|---|---|
| 0001 | 0001-Day-Ahead Spinning Reserve due SC | -$845.00 |
| 0002 | 0002-Day-Ahead Non-Spinning Reserve due SC | -$1,025.00 |
| 0003 | 0003-Day-Ahead AGC/Regulation due SC | -$1,025.00 |
| 0004 | 0004-Day-Ahead Replacement Reserve due SC | -$1,385.00 |
| 0051 | 0051-Hour-Ahead Spinning Reserve due SC | -$1,565.00 |
| 0052 | 0052-Hour-Ahead Non-Spinning Reserve due SC | -$1,745.00 |
| 0053 | 0053-Hour-Ahead AGC/Regulation due SC | -$1,925.00 |
| 0054 | 0054-Hour-Ahead Replacement Reserve due SC | -$2,105.00 |
| 0101 | 0101-Day-Ahead Spinning Reserve due ISO | $22,075.00 |
| 0102 | 0102-Day-Ahead Non-Spinning Reserve due ISO | $23,935.00 |
| 0103 | 0103-Day-Ahead AGC/Regulation due ISO | $25,795.00 |
| 0104 | 0104-Day-Ahead Replacement Reserve due ISO | $27,655.00 |
| 0251 | 0251-Hour-Ahead Intra-Zonal Congestion Settlement due ISO | $385.00 |
| 0252 | 0252-Hour-Ahead Intra-Zonal Congestion Charge/Refund due ISO | $4,925.00 |
| 0253 | 0253-Hour-Ahead Inter-Zonal Congestion Settlement due ISO | $5,285.00 |
| 0301 | 0301-Ex-Post A/S Energy due SC | -$6,005.00 |
| 0302 | 0302-Ex-Post Supplemental Reactive Power due SC | -$6,365.00 |
| 0303 | 0303-Ex-Post Replacement Reserve due ISO (Dispatched) | $6,725.00 |
| 0304 | 0304-Ex-Post Replacement Reserve due ISO (Undispatched) | $7,085.00 |
| **Invoice Total** | | |

**Independent System Operator**

## FERC FEES INVOICE

CUSTOMER 1
101 N. Harbor Blvd.
Anaheim CA 92808

Invoice: 181
Date: 20-JUN-97
Customer Number: 1000

Please send payment to:

1000 South Fremont Avenue
Building A-11
Alhambra CA 91803

For all inquiries contact:
1-800-ISO-HELP

Comments:

Charges settlement date: 20-JUN-97 to 20-JUN-97

| Charge Type | Description | Amount |
|---|---|---|
| **[Charge type to be determined]** | ____ FERC Annual Charges due ISO | **[Sample charge]** |
| **Invoice Total** | | |

# PART J

# SETTLEMENT AND BILLING OF RELIABILITY MUST-RUN CHARGES AND PAYMENTS

## 1 Objectives, Definitions and Scope

### 1.1 Objectives

The objective of this Part J is to inform RMR Owners which are responsible for preparation of invoices, and Responsible Utilities, which are responsible for payment of Reliability Must-Run Charges pursuant to Section 30.6.1.2 of the ISO Tariff, of the manner in which the RMR Charges referred to in Section 30.6.1.1 of the ISO Tariff shall be verified and settled and of the procedures regarding the billing, invoicing and payment of these RMR Charges.

### 1.2 Definitions

#### 1.2.1 Master Definitions Supplement

Unless the context otherwise requires, any word or expression defined in the Master Definitions Supplement to the ISO Tariff shall have the same meaning where used in this Part J. A reference to a paragraph is to a paragraph of this Part J. References to Parts are to Parts of Appendix N.

#### 1.2.3 Special Definitions for this Part J

In this Part J the following words and expressions shall have the following meanings:

“Adjusted RMR Invoice” means the monthly invoice issued by the RMR Owner to the ISO for adjustments made to the Revised Estimated RMR Invoice pursuant to the RMR Contract, reflecting actual data for the billing month.

“Business Day” shall have the meaning ascribed to it in the RMR Contract.

“Estimated RMR Invoice” means the monthly invoice issued by the RMR Owner to the ISO for estimated RMR Payments or Refunds pursuant to the RMR Contract.

“Facility Trust Account” means, for each RMR Contract, the account established and operated by the ISO to and from which all payments under this Part J shall be made. Each Facility Trust Account will have two segregated commercial bank accounts, a RMR Owner Facility Trust Account and a Responsible Utility Facility Trust Account.

“Prior Period Change” means any correction, surcharge, credit, refund or other adjustment pertaining to a billing month which is discovered after the Revised Adjusted RMR Invoice for such billing month has been issued.

"Prior Period Change Worksheet" means a worksheet prepared by the RMR Owner and submitted to the ISO following discovery of a necessary change to an RMR invoice after the Revised Adjusted RMR Invoice for the billing month has been issued.

"Responsible Utility Facility Trust Account" means a segregated commercial bank account under the Facility Trust Account containing funds held in trust for the Responsible Utility.

"RMR Invoice" means any Estimated RMR Invoice, Revised Estimated RMR Invoice, Adjusted RMR Invoice, or Revised Adjusted RMR Invoice.

"RMR Owner Facility Trust Account" means a segregated commercial bank account under the Facility Trust Account containing funds held in trust for the RMR Owner.

"RMR Payment" means any amounts which the ISO is obligated to pay to RMR Owners under RMR Contracts, net of any applicable credits under RMR Contracts.

"RMR Payments Calendar" means the Payments Calendar issued by the ISO pursuant to Section 3 of this Part J.

"RMR Refund" means any amounts which RMR Owners are obligated to pay the ISO and the ISO is obligated to pay Responsible Utilities under RMR Contracts, or resulting from an order by the Federal Energy Regulatory Commission, for deposit into the Responsible Utility Facility Trust Account.

"RMR Security" means the form of security provided by a Responsible Utility to cover its liability under this Part J pursuant to Section 30.6.1.1.3 of the ISO Tariff.

### 1.2.4 Rules of Interpretation and Other Terms and Conventions

The rules of interpretation set out in the ISO Tariff.

### 1.3 Scope of Application to Parties

This Part J applies to the RMR Payments owed RMR Owners by the ISO, the RMR Charges owed by the Responsible Utilities to the ISO and the RMR Refunds owed to the ISO by RMR Owners and owed to the Responsible Utilities by the ISO for costs incurred under the RMR Contract.

For the avoidance of doubt, this Part J shall not apply to charges for Energy or Ancillary Services which are payable by the ISO under Sections 8 and 11 of the ISO Tariff to Scheduling Coordinators representing RMR Owners. Such payments shall be made by the ISO to such Scheduling Coordinators pursuant to Section 11 of the ISO Tariff and the provisions of Appendix N. The RMR Owners shall account for such payments received by or due to their Scheduling Coordinators in each RMR Invoice.

### 1.4 Relationship of this Part J with Appendix N

Parts B, G and H of Appendix N shall apply as appropriate to this Part J. Unless otherwise specified, other provisions of Appendix N shall not apply to this Part J.

### 1.5 Relationship of this Part J *w*ith the ISO Tariff

For the avoidance of doubt, Sections 11.3 to 11.24 inclusive of the ISO Tariff shall not apply to this Part J.

## 2 Accounts

### 2.1 Facility Trust Account

The ISO shall establish a Facility Trust Account for each RMR Contract. Each Facility Trust Account shall consist of two segregated commercial bank accounts: an RMR Owner Facility Trust Account, which will be held in trust for the RMR Owner, and a Responsible Utility Facility Trust Account, which will be held in trust for the Responsible Utility. RMR Charges paid by the Responsible Utility to the ISO in connection with the RMR Contract will be deposited into the RMR Owner Facility Trust Account and RMR Payments from the ISO to the RMR Owner will be withdrawn from such Account, all in accordance with this Part J, Section 30.6.1.1 of the ISO Tariff and the RMR Contract. RMR Refunds received by the ISO from the RMR Owner in accordance with the RMR Contract will be deposited into the Responsible Utility Facility Trust Account and such RMR Refunds will be withdrawn from such Account and paid to the Responsible Utility in accordance with this Part J., Section 30.6.1.1 of the ISO Tariff, and the RMR Contract. The RMR Owner Facility Trust Account and the Responsible Utility Facility Trust Account shall have no other funds commingled in them at any time.

### 2.2 RMR Owner's Settlement Accounts

Each RMR Owner shall establish and maintain a settlement account at a commercial bank located in the United States and reasonably acceptable to the ISO which can effect money transfers via Fed-Wire where payments to and from the Facility Trust Accounts shall be made in accordance with this Part J. Each RMR Owner shall notify the ISO of its settlement account details upon entering into its RMR Contract with the ISO and may notify the ISO from time to time of any changes by giving at least 15 days notice before the new account becomes operational.

## 3 RMR Payments Calendar

The ISO shall issue an RMR Payments Calendar for the purposes of this Part J which shall contain those dates set forth in Section 9.1 (b) of the RMR Contract and the following information:

(a) the date on which RMR Owners are required to issue to the ISO, with a copy to the Responsible Utility, their Estimated RMR Invoice pursuant to their RMR Contract;

(b) the date on which the ISO is required to initiate proposed adjustments to the Estimated RMR Invoice to the Responsible Utility and to the RMR Owner;

(c) the date by which the RMR Owners are required to issue their Revised Estimated RMR Invoice reflecting appropriate revisions to the original Estimated RMR Invoice agreed upon by the Responsible Utility and the RMR Owner (In the event no revisions are required, Owner shall submit an e-mail to the ISO and Responsible Utility stating there are no revisions and the Estimated RMR Invoice should be deemed as the Revised Estimated RMR Invoice.);

(d) the date on which the ISO is required to issue to the Responsible Utility or RMR Owner, with an e-mail notification to both parties, the ISO Invoice based on the Revised Estimated RMR Invoice;

(e) the date on which RMR Owners are required to issue to the ISO, with a copy to the Responsible Utility, their Adjusted RMR Invoice pursuant to their RMR Contract;

(f) the date on which the ISO is required to initiate proposed adjustments to the Adjusted RMR Invoice to the Responsible Utility and the RMR Owner;

(g) the date by which the RMR Owners are required to issue their Revised Adjusted RMR Invoice reflecting appropriate revisions to the original Adjusted RMR Invoice agreed upon by the Responsible Utility and the RMR Owner. (In the event no revisions are required, Owner shall submit an e-mail to the ISO and Responsible Utility stating there are no revisions and the Adjusted RMR Invoice should be deemed as the Revised Adjusted RMR Invoice.);

(h) the date on which the ISO is required to issue to the Responsible Utility or the RMR Owner, with an e-mail notification to both parties, the ISO Invoice based on the Revised Adjusted RMR Invoice;

(i) the dates by which the Responsible Utility and RMR Owner must have notified the ISO of any dispute in relation to the ISO Invoice, Estimated or Adjusted RMR Invoices (including the Revised Estimated and Revised Adjusted RMR Invoice) or the ISO's proposed adjustments;

(j) the date and time by which Responsible Utilities or RMR Owners are required to have made payments into the RMR Owner Facility Trust Account or Responsible Utility Facility Trust Account in payment of the ISO Invoices relating

to each Revised Estimated RMR Invoice and each Revised Adjusted RMR Invoice;

(k) the date and time by which the ISO is required to have made payments into the RMR Owners' Facility Trust Accounts or Responsible Utilities' Facility Trust Accounts in payment of the Revised Estimated RMR Invoice and the Revised Adjusted RMR Invoice pursuant to their RMR Contract;

If the day on which any ISO Invoice, any RMR Invoice, or payment is due, is not a Business Day, such statement or invoice shall be issued or payment shall be due on the next succeeding Business Day.

Information relating to charges for Energy or Ancillary Services which are payable by the ISO pursuant to Sections 8 and 11 of the ISO Tariff and Appendix N to the Scheduling Coordinators representing the RMR Owners will be contained in the RMR Payments Calendar pursuant to Section 11.24.

## 4 Information to be provided by RMR Owners to the ISO

Each RMR Invoice and any Prior Period Change Worksheet shall include, or be accompanied by, information about RMR Payments and RMR Refunds in sufficient detail to enable the ISO to verify all RMR Charges and all RMR Refunds, and such information shall be copied to the Responsible Utility. Each RMR Invoice shall separately show the amounts due for services from each Reliability Must-Run Unit.

This information shall be provided in an electronic form in accordance with the RMR Invoice template developed jointly and agreed to by the ISO, Responsible Utilities and RMR Owners in accordance with the RMR Contracts and the principles in Schedule O to those Contracts, and maintained on the ISO Home Page.

## 5 Validation of RMR Charges and RMR Refunds

The ISO shall validate, based on information provided by each RMR Owner pursuant to paragraph 4, the amount due form the relevant Responsible Utility for RMR Charges and the amount due to the relevant Responsible Utility for RMR Refunds applicable to the Reliability Must-Run Generation and Ancillary Services of that RMR Owner, but shall not represent or warrant the accuracy or completeness of the information provided by the RMR Owner. The ISO shall provide copies of its exception report and information to the relevant Responsible Utility and RMR Owner.

The ISO shall not be obligated to pay the Responsible Utility any RMR Refunds unless and until the ISO has received corresponding RMR Refunds into the Responsible Utility Facility Trust Account from the RMR Owner.

## 6 Description of the Billing Process

### 6.1 Issuance of RMR Invoices by the RMR Owner

Each RMR Owner shall provide any RMR Invoice to the ISO in the electronic form, mutually agreed by the parties, which may be updated

by agreement of the ISO, Responsible Utilities and RMR Owners from time to time in accordance with the requirements of Schedule O of the RMR Contract, on each of the days specified in the RMR Payments Calendar, and shall send to the relevant Responsible Utility a copy of that invoice on the day of issue.

### 6.2 Review of the RMR Invoice by the ISO

The ISO shall review each RMR Invoice within the period specified in the RMR Payments Calendar and is required to initiate proposed adjustments to that invoice to the RMR Owner and the relevant Responsible Utility. Once the ISO initiates proposed adjustments, the RMR Owner shall issue a Revised Estimated RMR Invoice or Revised Adjusted RMR Invoice.

### 6.3 Issuance of ISO Invoices by the ISO

The ISO shall provide to the Responsible Utility and the RMR Owner on the dates specified in the RMR Payments Calendar ISO Invoices showing:

(a) the amounts which, on the basis of the Revised Estimated RMR Invoice or the Revised Adjusted RMR Invoice, as the case may be, and pursuant to paragraph 5 of this Part J, are to be paid by or to the relevant Responsible Utility and RMR Owner;

(b) the Payment Date, being the date on which such amounts are to be paid and the time for such payment;

(c) details (including the account number, bank name and Fed-Wire transfer instructions) of the RMR Owner Facility Trust Account to which any amounts owed by the Responsible Utility are to be paid, or of the RMR Responsible Utility Facility Trust Account to which any amounts owed by the RMR Owner are to be paid.

### 6.4 Resolving Disputes Relating to Invoices

#### 6.4.1 Review of the Invoices by the Responsible Utility

Each Responsible Utility shall have the review period specified in the RMR Payments Calendar to review RMR Invoices, and ISO Invoices, validate, and propose adjustments to such invoices and notify the ISO of any dispute. Notwithstanding the above, each Responsible Utility shall have the review time specified in ISO Tariff Section 30.6.1.1 to dispute such invoice.

#### 6.4.2 Dispute Notice

If a Responsible Utility disputes any item or calculation relating to any Revised RMR Invoice, or any ISO Invoice, it shall provide the ISO, with a copy to the RMR Owner, via email or such other communication mode as the parties may mutually agree upon, a notice of dispute at any time from the receipt of the copy of such invoice from the RMR Owner or the ISO to the expiration of the period for review set out in Section 6.4.1. The ISO shall initiate a corresponding dispute with the RMR Owner under the RMR Contract.

#### 6.4.3 Contents of Dispute Notice

The notice of dispute shall state clearly the Revised Estimated RMR Invoice, Revised Adjusted RMR Invoice, or ISO Invoice in dispute, the item disputed (identifying specific Reliability Must-Run Units and time periods), the reasons for the dispute, and the proposed amendment (if appropriate) and shall be accompanied by all available evidence reasonably required to support the claim.

#### 6.4.4 Prior Period Change Agreed to by the RMR Owner

Subject to paragraph 6.4.5 or 6.4.6 of this Part J, if the RMR Owner agrees with the proposed change, the change shall be shown in a Prior Period Change Worksheet and included in the next appropriate May or December Estimated RMR Invoice as specified in Article 9.1 of the RMR Contract.

#### 6.4.5 Dispute Involving the RMR Owner

If the dispute relates to an item originating in any RMR Invoice the applicable provisions of the RMR Contract and Section 30.6.1.1.1 of the ISO Tariff shall apply.

#### 6.4.6 Dispute Involving an Alleged Error or Breach or Default of the ISO's Obligations Under Section 5.2.7 of the ISO Tariff

If the dispute relates to an alleged error or breach or default of the ISO's obligations under Section 30.6.1.1. of the ISO Tariff, the applicable provisions of the RMR Contract and Section 30.6.1.1.1 of the ISO Tariff shall apply.

#### 6.4.7 Payment Pending Dispute

Subject to Section 30.6.1.1.1 of the ISO Tariff, if there is any dispute relating to an item originating in an RMR Invoice that is not resolved prior to the Payment Date, the Responsible Utility shall be obligated to pay any amounts shown in the relevant ISO Invoice on the Payment Date irrespective of whether any such dispute has been resolved or is still pending. The Responsible Utility may notify the ISO that the

payment is made under protest, in which case the ISO shall notify the RMR Owner that payment is made under protest. In accordance with Section 9.6 of the RMR Contract, if such dispute is subsequently resolved in favor of the Responsible Utility that made the payment under protest, then any amount agreed or determined to be owed by the RMR Owner to the ISO shall be repaid by the RMR Owner to the ISO, with interest at the interest rate specified in the RMR Contract from the date of payment by the ISO to the RMR Owner of the disputed amount to the date of repayment by the RMR Owner, as specified in Section 6.4.4 of this Part J. If RMR Owner does not agree to make the change pursuant to Section 6.4.4, then such repayment shall be made by ISO's deduction of such amount from the next ISO Invoices until extinguished, or if the RMR Contract has terminated, by paying a RMR Refund in such amount to the Responsible Utility Facility Trust Account, subject to the limitation of Section 30.6.1.1.1.1 of the ISO Tariff.

## 7 Payment Procedures

### 7.1 Payment Date

The Payment Date for RMR Payments to and RMR Refunds from RMR Owners shall be the Due Date specified in the RMR Contract and in the RMR Payments Calendar and the same shall be the Payment Date for the ISO and Responsible Utilities in relation to RMR Charges, provided that the RMR Owner has furnished the Responsible Utility and the ISO with the Revised Estimated RMR Invoice or the Revised Adjusted RMR Invoice no less than 9 calendar days before the Due Date. The Payment Date shall be stated on the ISO Invoice.

### 7.2 Payment Method

All payments and refunds by the ISO to RMR Owners and Responsible Utilities shall be made via Fed-Wire.

However, if the RMR Owner is also the Responsible Utility, at the discretion of the RMR Owner, payments and refunds may be made by memorandum account instead of wire transfer.

### 7.3 Payment by RMR Owners and Responsible Utilities

Each RMR Owner shall remit to the Responsible Utility Facility Trust Account the amount shown on the relevant ISO Invoice as payable by that RMR Owner not later than 10:00 am on the Payment Date.

Subject to Section 30.6.1.1 of the ISO Tariff, each Responsible Utility shall remit to the RMR Owner Facility Trust Account the amount shown on the relevant ISO Invoice not later than 10:00 am on the Payment Date.

### 7.4 Payment by the ISO

The ISO shall verify the amounts available for distribution to Responsible Utilities and/or RMR Owners on the Payment Date and shall give instructions to the ISO Bank to remit from the relevant Facility Trust Account to the relevant settlement account maintained by each Responsible Utility or RMR Owner the amounts determined by the ISO to be available for payment to each Responsible Utility or RMR Owner.

### 7.5 Payment Default by RMR Owner or Responsible Utility

If by 10.00 am on a Payment Date the ISO, in its reasonable opinion, believes that all or any part of any amount due to be remitted to the relevant Facility Trust Account by the RMR Owner or the Responsible Utility will not or has not been remitted ("the Default Amount") the ISO shall immediately notify the RMR

Owner and the Responsible Utility. Where the Default Amount was due from the Responsible Utility, the ISO and RMR Owner shall proceed as set forth in Section 30.6.1.1 of the ISO Tariff and the applicable provision of the RMR Contract. Where the Default Amount was due from the RMR Owner, the ISO and the

Responsible Utility shall proceed as set forth in the applicable provision of the RMR Contract.

**7.5.1 Default relating to Market Payments**

For the avoidance of doubt, non payment to RMR Owners, or their respective Scheduling Coordinators, of charges for Energy or Ancillary Services which are payable by the ISO to Scheduling Coordinators representing such RMR Owners shall be dealt with pursuant to Sections 11.3 to 11.24 (inclusive) of the ISO Tariff and the provisions of Appendix N.

**7.6 Set-off**

**7.6.1 Set-off in the case of a defaulting Responsible Utility**

The ISO is authorized to apply any amount to which any defaulting Responsible Utility is or will be entitled from the Responsible Utility Facility Trust Account in or towards the satisfaction of any amount owed by that Responsible Utility to the RMR Owner Facility Trust Account arising under the settlement and billing process set out in this Part J.

For the avoidance of doubt, neither the ISO nor any Responsible Utility will be authorized to set off any amounts owed by that Responsible Utility in respect of one Facility Trust Account against amounts owed to that Responsible Utility in respect of another Facility Trust Account or any amounts owed by that Responsible Utility under this Part J against amounts owed to that Responsible Utility except as provided by Section 30.6.1.1 of the ISO Tariff.

**7.6.2 Set-off in the case of a defaulting RMR Owner**

The ISO is authorized to apply any amount to which any defaulting RMR Owner is or will be entitled from the RMR Owner Facility Trust Account in or towards the satisfaction of any amount owed by that RMR Owner to the Responsible Utility Facility Trust Account in accordance with Article 9 of the RMR Contract and Sections 30.6.1.1 and 8.12 of the ISO Tariff.

For the avoidance of doubt, neither the ISO nor any RMR Owner will be authorized to set off any amounts owed by that RMR Owner in respect of one Facility Trust Account against amounts owed to that RMR Owner in respect of another Facility Trust Account or any amounts owed by that RMR Owner under this Part J against amounts owed to that RMR Owner under the RMR Contract.

**7.7 Default Interest**

Responsible Utilities shall pay interest on Default Amounts to the ISO at the interest rate specified in the RMR Contract for the period from the relevant Payment Date to the date on which the payment is received by the ISO.

RMR Owners shall pay interest to the ISO on Default Amounts at the interest rate specified in the RMR Contract for the period from the date on which payment was due to the date on which the payment is received by the ISO.

The ISO shall pay interest to RMR Owners at the interest rate specified in the RMR Contract for the period from the date on which payment is due under the RMR Contract to the date on which the payment is received by the RMR Owner.

The ISO shall pay interest to Responsible Utilities at the interest rate specified in the relevant RMR Contract for the period from the date following the date it received an RMR Refund from the relevant RMR Owner to the date in which the payment is received by the relevant Responsible Utility.

Where payment of a Default Amount is made by exercise of a right of set-off or deduction, payments shall be deemed received when payment of the sum which takes that set-off or deduction into account is made.

## 8 Overpayments

The provisions of Sections 11.18.2.a and 11.18.2.b shall apply to RMR Owners and Responsible Utilities which have been overpaid by the ISO and references to "ISO Creditors" in these sections and in the relevant Sections of the ISO Tariff shall be read, for the purposes of this Part J, to mean RMR Owners and Responsible Utilities as applicable. Disputed amounts shall not be considered to be overpayments until and unless the dispute is resolved.

## 9 Communications

### 9.1 Method of Communication

ISO Invoices will be issued by the ISO via Electronic Data Interchange ("EDI"). RMR Invoices and Prior Period Change Worksheets will be issued by the RMR Owner in an electronic form mutually agreed by the parties and maintained on the ISO's Home Page. ISO shall also post prior period change examples and prior period change guidelines as specified in Article 9.1 of the RMR Contract.

### 9.2 Emergency Procedures

#### 9.2.1 Emergency Affecting the ISO

In the event of an emergency or a failure of any of the ISO software or business systems, the ISO may deem any Estimated RMR Invoice or any Adjusted RMR Invoice to be correct without thorough verification and may implement any temporary variation of the timing requirements relating to the settlement and billing process contained in this Part J.

#### 9.2.2 Emergency Affecting the RMR Owner

In the event of an emergency or a failure of any of the RMR Owner's systems, the RMR Owner may use Estimated RMR Invoices as provided in the applicable section of the RMR Contract or may implement any temporary variation of the timing requirements relating to the settlement and billing process contained in this Part J and its RMR Contract. Details of the variation will be published on the ISO Home Page.

Communications of an emergency nature on a Due Date or a Payment Date relating to payments shall be made by the fastest practical means including by telephone.

**10 Confidentiality**

The provisions of Sections 11.9A, 20.5, and 11 shall apply to this Part J between and among the RMR Owners, the ISO and Responsible Utilities.

Except as may otherwise be required by applicable Law, all information and data provided by RMR Owner or the ISO to the Responsible Utility pursuant to the RMR Contract, Section 30.6.1.1 of the ISO Tariff or this Part J ("confidential information") shall be treated as confidential and proprietary to the providing party to the extent required by Section 12.5 and Schedule N of the RMR Contract and will be used by the receiving party only as permitted by such Section 12.5 and Schedule N.

**11 Amendments to this Part J**

If the ISO determines a need for an amendment to this Part J, the ISO shall follow the requirements as set forth in Section 22.11 of the ISO Tariff, provided that ISO may not modify Part J as it applies to any RMR contract without the consent of the relevant RMR Owner and Responsible Utility.