

APPENDIX 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.

This Appendix 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 Appendix D of this Protocol.

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.

$$AGCRateDA_{xt} = \frac{\sum_j AGCPayTotalDA_{jxt}}{AGCObligTotal_{xt}}$$

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

$$AGCChgDA_{jxt} = AGCOblig_{jxt} * AGCRateDA_{xt}$$

(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 obligation 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:

$$SpinRateDA_{xt} = \frac{\sum_j SpinPayTotalDA_{jxt}}{SpinObligTotal_{xt}}$$

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 obligation 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:

$$NonSpinRateDA_{xt} = \frac{\sum_j NonSpinPayTotalDA_{jxt}}{NonSpinObligTotal_{xt}}$$

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:

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

(d) Replacement Reserve. The ISO will charge the zonal cost of providing Replacement 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 Replacement Reserve user rate for the Trading Interval by the Scheduling Coordinator's Replacement Reserve obligation, for which it has not self provided, for the same period.

The zonal Replacement Reserve user rate for the Day-Ahead Market is calculated by dividing the total cost to ISO of purchasing Replacement Reserve Capacity within the Zone, for the Trading Interval, by the total ISO Replacement Reserve obligation for the Trading Interval within the Zone. The Day-Ahead Replacement Reserve user rate in Zone x for Trading Interval t is calculated as follows:

$$ReplRateDA_{xt} = \frac{\sum_j ReplPayTotalDA_{jxt}}{ReplObligTotal_{xt}}$$

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

$$ReplChgDA_{jxt} = ReplOblig_{jxt} * ReplRateDA_{xt}$$

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

$$AGCRateHA_{xt} = \frac{\sum_j AGCPayTotalHA_{jxt}}{AGCObligTotal_{xt}}$$

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

$$AGCChgHA_{jxt} = (AGCOblig_{jxt} * AGCRateHA_{xt})$$

(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 obligation 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:

$$SpinRateHA_{xt} = \frac{\sum_j SpinPayTotalHA_{jxt}}{SpinObligTotal_{xt}}$$

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 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 obligation 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:

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

(d) Replacement Reserve. The ISO will charge the zonal cost of providing Replacement 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 each Trading Interval. This charge will be computed by multiplying the Replacement Reserve user rate for the Trading Interval by the Scheduling Coordinator's Replacement Reserve obligation, for which it has not self provided, for the same period.

The zonal Replacement Reserve user rate for the Hour-Ahead Market is calculated by dividing the total cost to ISO of purchasing Replacement Reserve Capacity within the Zone less any amounts 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 Replacement Reserve obligation for the Trading Interval within the Zone. The Hour-Ahead Replacement Reserve user rate in Zone x for Trading Interval t is calculated as follows:

$$ReplRateHA_{xt} = \frac{\sum_j ReplPayTotalHA_{jxt}}{ReplObligTotal_{xt}}$$

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

$$ReplChgHA_{jxt} = ReplOblig_{jxt} * ReplRateHA_{xt}$$

C 2.2.3 Real-Time Market

The ISO will charge the costs of purchasing real time instructed Energy output from Dispatched Regulation, Spinning Reserve, Non-Spinning Reserve, Replacement Reserve and Supplemental Energy resources through the Imbalance Energy settlement process.

C 3 Meaning of terms of formulae

C 3.1 AGCPayDA_{ijxt} - \$

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

C 3.2 AGCQDA_{ijxt} - MW

The total quantity of Regulation 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 PAGCDA_{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 Regulation capacity in the Day-Ahead Market for Trading Interval t in Zone x.

C 3.4 AGCPayTotalDA_{jxt} - \$

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

C 3.5 AGCPayHA_{ijxt} - \$

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

C 3.5.1 AGCReceiveHA_{ijxt} - \$

The payment from Scheduling Coordinator j for buying back from the ISO in the Hour-Ahead Regulation 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** **AGCQIHA_{ijxt} – MW**
The total quantity of incremental (additional to Day-Ahead) Regulation 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** **AGCODHA_{ijxt} – MW**
The total quantity of decremental (less than Day-Ahead) Regulation 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** **PAGCHA_{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 capacity in the Hour-Ahead Market for Trading Interval t in Zone x. On buyback condition, MCP applies.
- C 3.8** **AGCPayTotalHA_{jxt} - \$**
The total payment for incremental (additional to Day-Ahead) Regulation 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 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** **AGCRateDA_{xt} - \$/MW**
The Day-Ahead Regulation capacity user rate charged to Scheduling Coordinators by the ISO in Zone x for Trading Interval t.
- C 3.10** **AGCObligTotal_{xt} – MW**
The net total Regulation obligation in Zone x for Trading Interval t as defined in the Ancillary Services Requirements Protocol. This net total equals the total obligation minus that self-provided.
- C 3.11** **AGCChgDA_{jxt} - \$**
The Regulation charge for Scheduling Coordinator j in the Day-Ahead Market in Zone x for Trading Interval t.

C 3.12 **AGCOblig_{jxt} – MW**

The net Regulation obligation for Scheduling Coordinator j in Zone x for Trading Interval t as defined in the Ancillary Services Requirements Protocol. This net obligation equals the obligation minus that self-provided.

C 3.13 **AGCRateHA_{xt} - \$/MW**

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

C 3.14 **AGCChgHA_{jxt} - \$**

The incremental (additional to Day-Ahead) Regulation 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** **EnQ_{ijxt} – MWh**
The Instructed Imbalance Energy output in the Real Time Market from resource i represented by Scheduling Coordinator j in Zone x for Trading Interval t.
- C 3.17** **EnQPayTotal_{jxt} - \$**
The total payment to each Scheduling Coordinator j for Dispatched and Supplemental Energy output in the Real Time Market from all resources which it represents for Trading Interval t in Zone x.
- C 3.18** **P_{xt} - \$/MWh**
The Hourly Ex Post Price of Uninstructed Imbalance Energy in the Real Time Market in Zone x for Trading Interval t.
- 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 3.21** **PSpinDA_{xt} -\$/MW**
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.
- 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_{ijxt} - \$**
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 the Ancillary Services Requirements Protocol. 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 the Ancillary Services Requirements Protocol. 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

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.

C 3.36 NonSpinPayTotalDA_{ijxt} - \$

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 the Ancillary Services Requirements Protocol. 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 the Ancillary Services Requirements Protocol. 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 the Ancillary Services Requirements Protocol. 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

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.

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** **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** **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** **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 the Ancillary Services Requirements Protocol. This net total obligation is the total obligation minus that self-provided.
- C 3.61** **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** **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** **UnDispReplChg_{jxt} - \$**
The undispached 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 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 the Ancillary Services Requirements Protocol.

C 3.65 ReplQDisp_{xt} – MWh

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

The deviation between forward scheduled and Real Time adjustments to Energy exports for Scheduling Point q represented by Scheduling Coordinator j from Zone x during Trading Interval t is calculated as follows:

$$ExpDev_q = E_s - E_a - E_{adj}$$

D 2.2 Unaccounted for Energy Charge

The hourly Unaccounted for Energy Charge on Scheduling Coordinator j for Trading Interval t for each relevant Zone is calculated in the following manner:

The UFE for each utility service territory k is calculated as follows,

$$E_{UFE_UDC_k} = (I_k - E_k + G_k - (RTM_k + LPM_k) - TL_k)$$

The Transmission Loss calculation per Trading Interval t per relevant Zone for each utility service territory k is calculated as follows,

$$TL_k = \sum [G_a * (1 - GMM_{ah})] + \sum [I_a (1 - GMM_{ahq})]$$

Each metered demand point, either ISO grid connected or connected through a UDC, is allocated a portion of the UFE as follows:

$$E_{UFE_z} = \frac{D_z}{\sum_z D_z} E_{UFE_UDC_k}$$

The UFE charge for Scheduling Coordinator j per Trading Interval per relevant Zone is then,

$$UFEC_j = (\sum_z E_{UFE_z}) * P_{xt}$$

Note that this deviation is a difference between a forward Market value and a Real Time value. It is not inadvertent energy.

D 3 Meaning of terms of formulae

D 3.1 IEC_j – \$

The Imbalance Energy charge on Scheduling Coordinator j in Trading Interval t for each relevant Zone.

D 3.2 GenDev_i – MWh

The deviation between scheduled and actual Energy Generation for Generator i represented by Scheduling Coordinator j in Zone x during Trading Interval t.

D 3.3 LoadDev_i – MWh

The deviation between scheduled and actual Load consumption for Generator i represented by Scheduling Coordinator j in Zone x during Trading Interval t.

D 3.4 ImpDev_q – MWh

The deviation between forward scheduled and Real Time adjustments to Energy imports, as adjusted for losses, for Scheduling Point q represented by Scheduling Coordinator j into Zone x during Trading Interval t.

D 3.5 ExpDev_q – MWh

The deviation between forward scheduled and Real Time adjustments to Energy exports for Scheduling Point q represented by Scheduling Coordinator j from Zone x during Trading Interval t.

