Market Settlements Calculation Guide

(Formerly known as Attachment A)

For Operating Days after JAN-05-2009

TABLE OF CONTENTS

List of Exhibits:

A. Market Settlement Calculations

A.1 Purpose

The Market Settlement Calculations Guide defines how MISO calculates the Day-Ahead Energy and Operating Reserve, Real-Time Energy and Operating Reserve, and Financial Transmission Rights (FTRs) Market Charge Types. A Charge Type is a generic term that refers to both charges and credits for participants. This guide defines all Charge Types, how they are calculated, the calculation determinants (including those that are available to participants), and how the calculations are rounded.

For each calendar day, MISO provides every MP and Asset Owner (AO) a daily summary statement that shows the cash flow impact of each Charge Type for each Operating Day settled during that calendar day. The MP summary statement is a summation of their registered AO summary statements. For additional information on summary statements and how individual Settlement Statements tie to summary statements, please refer to the Market Settlement Process defined in the Market Settlements BPM.

Every time an Operating Day is settled, MISO provides each AO with separate Day-Ahead, Real-Time, and FTR market Settlement Statements. These Settlement Statements display Charge Type daily totals, the dollar change in each Charge Type per settlement, and determinants for validating the Charge Type.

The guide is organized into separate Day-Ahead, FTR and Real-Time sections to correspond to Charge Types on each of three market Settlement Statements.

A.2 Scope

These calculations apply to the Operating Days after January 5, 2009

A.3 Charge Type Overview

Charge Types represent specific credits and charges as authorized by the Tariff. Each Settlement Statement has separately defined Charge Types.

Settlement Charge Type totals are provided at a daily aggregate level for participants for each Operating Day settled. Depending on the Charge Type, they may be calculated hourly and summed to a daily total, or they may be calculated on a daily interval. All daily totals are rounded to the nearest cent.

Each Operating Day is settled a minimum of four times and may be settled additional times as deemed necessary by MISO. Charge Types are fully calculated every time an Operating Day is settled, with the results displayed on the Settlement Statement as the "Total." For invoicing purposes, all Settlement Statements display the original calculated Charge Type total value, with each subsequent settlement displaying any calculated difference between the current and the prior calculated settlement.

A.3.1 Day-Ahead Charge Types

The following Charge Types are utilized in the Day-Ahead Settlement Statements.

Exhibit A.3-1: Day-Ahead Charge Type Names

Day-Ahead Charge Type Name	Acronym
Day-Ahead Asset Energy Amount	DA_ASSET_EN
Day-Ahead Financial Schedule Congestion Amount	DA_FIN_CG
Day-Ahead Financial Schedule Loss Amount	DA_FIN_LS
Day-Ahead Market Administration Amount	DA_ADMIN
Day-Ahead Schedule 24 Allocation Amount	DA_SCHD_24_ALC
Day-Ahead Non-Asset Energy Amount	DA_NASSET_EN
Day Ahead Congestion Rebate on Carved-Out Grandfathered Agreements	DA_GFACO_RBT_CG
Day Ahead Losses Rebate on Carved-Out Grandfathered Agreements	DA_GFACO_RBT_LS
Day Ahead Congestion Rebate on Option B Grandfathered Agreements	DA_GFAOB_RBT_CG
Day Ahead Losses Rebate on Option B Grandfathered Agreements	DA_GFAOB_RBT_LS
Day Ahead Ramp Capability Amount	DA_RC_AMT
Day-Ahead Revenue Sufficiency Guarantee Distribution Amount	DA_RSG_DIST
Day-Ahead Revenue Sufficiency Guarantee Make Whole Payment Amount	DA_RSG_MWP
Day-Ahead Virtual Energy Amount	DA_VIRT_EN
Day-Ahead Regulation Amount	DA_ASM_REG
Day-Ahead Spinning Reserve Amount	DA_ASM_SPIN
Day-Ahead Supplemental Reserve Amount	DA_ASM_SUPP

A.3.2 Financial Transmission Rights Charge Types

The following Charge Types are utilized in the FTR Settlement Statements.

Exhibit A.3-2: Financial Transmission Rights Charge Type Names

FTR Charge Type Name	Acronym
Financial Transmission Rights Hourly Allocation Amount	FTR_HR_ALC
Financial Transmission Rights Market Administration Amount	FTR_ADMIN
Financial Transmission Rights Monthly Allocation Amount	FTR_MN_ALC
Financial Transmission Rights Transaction Amount	FTR_TXN
Financial Transmission Rights Yearly Allocation Amount	FTR_YR_ALC
Financial Transmission Rights Monthly Transaction Amount	FTR_MO_TXN
Financial Transmission Rights Full Funding Guarantee Amount	FTR_FFG
Financial Transmission Rights Guarantee Uplift Amount	FTR_GUL
Financial Transmission Rights Annual Transaction Amount	FTR_ARR_FTR_TXN
Auction Revenue Rights Transaction Amount	FTR_ARR_ARR_TXN
Auction Revenue Rights Infeasible Uplift Amount	FTR_ARR_INF_UPL
Auction Revenue Rights Stage 2 Distribution Amount	FTR_ARR_STG2_DIST

A.3.3 Real-Time Charge Types

The following Charge Types are utilized in the Real-Time Settlement Statements.

Exhibit A.3-3: Real-Time Charge Type Names

Real-Time Charge Type Name	Acronym
Real-Time Asset Energy Amount	RT_ASSET_EN
Real-Time Distribution of Losses Amount	RT_LOSS_DIST
Real-Time Financial Schedule Congestion Amount	RT_FIN_CG
Real-Time Financial Schedule Loss Amount	RT_FIN_LS
Real Time Congestion Rebate on Carved-Out Grandfathered Agreements	RT_GFACO_RBT_CG
Real Time Losses Rebate on Carved-Out Grandfathered Agreements	RT_GFACO_RBT_LS
Real-Time Market Administration Amount	RT_ADMIN
Real-Time Schedule 24 Allocation Amount	RT_SCHD_24_ALC
Real-Time Schedule 24 Distribution Amount	RT_SCHD_24_DIST
Real-Time Miscellaneous Amount	RT_MISC

Real-Time Charge Type Name	Acronym
Real-Time Net Inadvertent Distribution Amount	RT_NI_DIST
Real-Time Non-Asset Energy Amount	RT_NASSET_EN
Real-Time Ramp Capability Amount	RT_RC_AMT
Real Time Revenue Neutrality Uplift Amount	RT_RNU
Real-Time Revenue Sufficiency Guarantee First Pass Distribution Amount	RT_RSG_DIST1
Real-Time Revenue Sufficiency Guarantee Make Whole Payment Amount	RT_RSG_MWP
Real-Time Price Volatility Make Whole Payment	RT_PV_MWP
Real-Time Virtual Energy Amount	RT_VIRT_EN
Real-Time Regulation Amount	RT_ASM_REG
Real-Time Spinning Reserve Amount	RT_ASM_SPIN
Real-Time Supplemental Reserve Amount	RT_ASM_SUPP
Regulation Cost Distribution Amount	RT_ASM_REG_DIST
Spinning Reserve Cost Distribution Amount	RT_ASM_SPIN_DIST
Supplemental Reserve Cost Distribution Amount	RT_ASM_SUPP_DIST
Real Time Excessive Deficient Energy Deployment Charge Amount	RT_ASM_EXE_DFE_DEP
Non-Excessive Energy Amount	RT_ASM_NXE
Excessive Energy Amount	RT_ASM_EXE
Net Regulation Adjustment Amount	RT_ASM_NRGA
Contingency Reserve Deployment Failure Charge Amount	RT_ASM_CRDFC
Real-Time Demand Response Allocation Uplift	RT_DRR_UPL
Real-Time Resource Adequacy Auction Amount	RT_RAA

A.4 Determinant Overview

Determinants are calculation components shown on Settlement Statements that enable verification of Charge Types. There are two types of determinants provided on Settlement Statements: 1) public, and 2) private. Public determinants are non-confidential Charge Type calculation components. This data is available to all participants and represents charge rates or market wide totals needed by participants for verifying Charge Types. Private determinants represent confidential participant data related only to individual participants. Cleared transactions and cleared virtual schedule data are examples of private determinants. Participants have access to all public data, and only individual private data.

MISO provides as many determinants as possible while maintaining each participant's confidentiality. For some Charge Types, this confidentiality requirement limits the disclosure of determinants that enable participants to fully validate their charges and credits. An example would be a market wide charge to all Load based on a participant's Load Ratio Share (LRS). Although the participant knows their own Load volume, they do not have access to the volume of all other participants individually. For these situations, MISO provides the total market wide volume in lieu of confidential individual participant volumes.

A.4.1 Determinants

The following table lists all Charge Type determinants shown on statements.

Exhibit A.4-1: Charge Determinant Names

Charge Determinant Name	Acronym
Additional Regulation Mileage Volume	ADD_REG_MIL_VOL
~~Transaction Count~~	~~ADMIN_TXN_CNT~~
~~Transaction Administration Rate~~	~~ADMIN_TXN_RATE~~
Asset Owner Hourly Total Day-Ahead ELMP MWP Amount	AO_DA_ELMP_MWP_HR
Asset Owner Financial Transmission Rights Adjusted Profile Volume	AO_FTR_ADJ_PRF
Financial Transmission Rights Asset Owner Monthly Shortfall Amount for (MONTH):	AO_FTR_MN_SHORTFALL
Asset Owner Financial Transmission Rights Profile Volume	AO_FTR_PRF

Charge Determinant Name	Acronym
Financial Transmission Rights Asset Owner Yearly Shortfall Amount for (YEAR):	AO_FTR_YR_SHORTFALL
Hourly Total Asset Owner Real-Time Actual Energy Withdrawal Volume for an LBA	AO_LBA_AEW
Asset Owner Portion of Total LBA Actual Energy Withdrawal	AO_LBA_AEW_FCT
DA & RT Combined Regulation Amount	ASM_REG
ASM Regulation Exemption Flag	ASM_REG_DIST_EXEMPT
Day Ahead & Real Time Regulation Distribution Rate	ASM_REG_DIST_RATE
Regulation Distribution Volume	ASM_REG_DIST_VOL
Hourly Regulation GFA Distribution Rate	ASM_REG_GFA_DIST_RATE
DA & RT Combined Spinning Reserve Amount	ASM_SPIN
ASM Spinning Exemption Flag	ASM_SPIN_DIST_EXEMPT
Day Ahead & Real Time Spinning Reserve Distribution Rate	ASM_SPIN_DIST_RATE
Spinning Reserve Distribution Volume	ASM_SPIN_DIST_VOL
Hourly Spinning Reserve GFA Distribution Rate	ASM_SPIN_GFA_DIST_RATE
DA & RT Combined Supplemental Reserve Amount	ASM_SUPP
ASM Supplemental Exemption Flag	ASM_SUPP_DIST_EXEMPT
Day Ahead & Real Time Supplemental Reserve Distribution Rate	ASM_SUPP_DIST_RATE
Supplemental Reserve Distribution Volume	ASM_SUPP_DIST_VOL
Hourly Supplemental Reserve GFA Distribution Rate	ASM_SUPP_GFA_DIST_RATE
Constraint Management Charge Distribution	ATC_CMC_RATE
Schedule 24 Distribution Monthly Operating Cost amount for LBA	BA_SCHED_24_DIST_MN_OP_CST
Local Balancing Authority Losses Volume	CA_LOSS
~~Counter Flow Financial Transmission Rights Flag~~	~~CFTR_FL~~
CMC Deviation Volume	CMC_DEV_VOL
Constraint Management Distribution	CMC_DIST
Contingency Reserve Deployment Shortfall Volume	CRD_SHORT
~~Day 1 Net Inadvertent Payback Volume~~	~~D1_NI_PBK~~
Hourly Day-Ahead Market Administration Amount	DA_ADMIN_HR
Day-Ahead Market Administration Volume	DA_ADMIN_VOL
Day-Ahead As Offered Make Whole Payment	DA_ASOF_MWP

Charge Determinant Name	Acronym
Day-Ahead Asset Energy Amount	DA_ASSET_EN_HR
Hourly Day-Ahead Unit Control Status for Must-Run Resources	DA_CONTROL_STATUS
Day-Ahead Hourly Price Sensitive Demand Bid ELMP MWP Amount	DA_DB_ELMP_MWP
Day-Ahead Down Ramp Capability Market Clearing Price	DA_DRC_MCP
Day-Ahead Down Ramp Capability Volume	DA_DRC_VOL
Day-Ahead Economic Maximum	DA_ECON_MAX
Hourly Day-Ahead ELMP MWP Distribution Amount	DA_ELMP_MWP_DIST_HR
Day-Ahead Financial Schedule Volume	DA_FIN
Day-Ahead Financial Schedule Congestion Amount	DA_FIN_CG_HR
Day-Ahead Financial Schedule Loss Amount	DA_FIN_LS_HR
Day-Ahead Carved Out GFA Transaction Volume	DA_GFACO
Day-Ahead Congestion Rebate on Carved-Out Grandfathered Agreement Transaction Amounts	DA_GFACO_RBT_CG_HR
Day-Ahead Losses Rebate on Carved-Out Grandfathered Agreement Transaction Amounts	DA_GFACO_RBT_LS_HR
Day-Ahead Valid Option B GFA Transaction Volume	DA_GFAOB
Day-Ahead Congestion Rebate on Option B Grandfathered Agreement Financial Schedules	DA_GFAOB_RBT_CG_HR
Day-Ahead Losses Rebate on Option B Grandfathered Agreement Financial Schedules	DA_GFAOB_RBT_LS_HR
Day-Ahead IMM Make Whole Payment	DA_IMM_MWP
Day-Ahead Asset Mitigated Volume for a Resource Asset	DA_IMM_RSG_MWH
Day-Ahead Congestion Component of Locational Marginal Price	DA_LMP_CG
Day-Ahead Locational Marginal Price	DA_LMP_EN
Day-Ahead Loss Component of Locational Marginal Price	DA_LMP_LS
Hourly Day-Ahead Margin Assurance Preservation Payment	DA_MAP_HR
Day Ahead Mileage Potential Make-Whole Payment	DA_MIL_POT_MWP
Day-Ahead Non-Asset Energy Amount	DA_NASSET_EN_HR
Day-Ahead Non Voltage and Local Reliability Revenue Sufficiency Guarantee Distribution Amount	DA_NVLR_RSG_DIST_HR
Day-Ahead Physical Schedule Volume	DA_PHYS

Charge Determinant Name	Acronym
Day-Ahead Hourly Product Substitution	DA_PROD_SUB_FL
Day-Ahead Ramp Capability Amount	DA_RC_AMT_HR
Day Ahead Regulation Market Clearing Price	DA_REG_MCP
Day Ahead Regulation Volume	DA_REG_VOL
Day Ahead Regulation For Spinning Reserve Volume	DA_REG_SPIN_VOL
Hourly Daily Day-Ahead Revenue Sufficiency Guarantee Credit Amount	DA_RSG_ASSET_CR_HR
Day-Ahead Revenue Sufficiency Guarantee Distribution Amount	DA_RSG_DIST_HR
Day-Ahead Revenue Sufficiency Guarantee Distribution Volume	DA_RSG_DIST_VOL
Day-Ahead Revenue Sufficiency Guarantee Distribution Exemption	DA_RSG_DIST_XMPT
Day-Ahead Revenue Sufficiency Guarantee Eligibility	DA_RSG_ELIGIBILITY
Day-Ahead Mitigated RSG Production Cost Amount	DA_RSG_MIT_PC
Day-Ahead Revenue Sufficiency Guarantee Make Whole Payment Amount	DA_RSG_MWP_HR
Day-Ahead RSG Production Cost Amount	DA_RSG_PC
Day-Ahead Asset Schedule Volume	DA_SCHD
Day Ahead Spinning Reserve Market Clearing Price	DA_SPIN_MCP
Day Ahead Spinning Reserve Volume	DA_SPIN_VOL
Day Ahead Supplemental Reserve Market Clearing Price	DA_SUPP_MCP
Day Ahead Cleared Supplemental Reserve Volume	DA_SUPP_VOL
Day Ahead Total Regulation Volume	DA_TOT_REG_VOL
Day Ahead Unused Margin	DA_UNUSED_MARGIN
Day-Ahead Up Ramp Capability Market Clearing Price	DA_URC_MCP
Day-Ahead Up Ramp Capability Volume	DA_URC_VOL
Day-Ahead Virtual Energy Amount	DA_VIRT_EN_HR
Day-Ahead MWP Asset Credit for Voltage and Local Reliability Payable by a Discrete LBA	DA_VLR_LBA_ASSET_CR
Day-Ahead Voltage and Local Reliability Revenue Sufficiency Guarantee Distribution Amount	DA_VLR_RSG_DIST_HR
Day-Ahead Net Virtual Schedule Volume	DA_VSCHD
Day Ahead Energy Contribution	DAMAP_EN_CON

Charge Determinant Name	Acronym
Day Ahead Regulation Reserve Contribution	DAMAP_REG_CON
Day Ahead Spinning Reserve Contribution	DAMAP_SPIN_CON
DDC Deviation Volume	DDC_DEV_VOL
Real-Time Nodal Deviation Exemption	DEV_EXEMPT
Hourly Total Day-Ahead Dispatchable Interchange Schedule ELMP MWP	DISP_ELMP
Hourly Total Day-Ahead Wheel-In Dispatchable Interchange Schedule MWP Amount	DISP_WI_ELMP
Hourly Total Day-Ahead Wheel-Out Dispatchable Interchange Schedule MWP Amount	DISP_WO_ELMP
Demand Response Reduction Volume	DRR_ADJ_MTR
Failure Mileage Performance Test Flag	FMPTF
Financial Transmission Rights Market Administration Amount	FTR_ADMIN_HR
Financial Transmission Rights Hourly Allocation Amount	FTR_HR_ALC_HR
Monthly FTR Allocation of Excess Congestion Fund Occurred:	FTR_MN_ALC_FL
Financial Transmission Rights Transaction Record	FTR_TXN_RECORD
Yearly FTR Allocation of Excess Congestion Fund Occurred:	FTR_YR_ALC_FL
~~Generation Outage~~	~~GEN_OUTAGE~~
Generation Performance Volume	GEN_PERF
Generation Set Point Volume	GEN_SP
Option B Grandfathered Agreement Average Loss Rate Percentage	GFA_AVG_LOSS_PCT
IMM Mitigated Make Whole Payment Tolerance Amount:	IMM_MIT_MWP_TOL_AMT
IMM Mitigated Make Whole Payment Tolerance Percentage:	IMM_MIT_MWP_TOL_PCT
IMM RSG MITIGATION	IMM_RSG_MITIGATION
MISO Total JOA Uplift Amount	JOA_MISO_UPLIFT
Hourly Total Real-Time Actual Energy Withdrawal Volume for an LBA	LBA_AEW
Loss Pool to MISO Losses Distribution Factor at Loss Pool	LP_FCT
Real-Time Distribution Factor for an Asset Owner in a Loss Pool	LP_LRS_FCT
Nodal Exemption of Withdrawal from Load Ratio Share	LRS_XMPT
Failure Mileage Performance Test Charge Amount	MIL_CHARGE_AMT

Charge Determinant Name	Acronym
MISO Excessive Deficient Deployment Charge Allocation Rate	MISO_ASM_EXE_DFE_DEP_RT
Hourly Regulation Cost Distribution Volume for MISO	MISO_ASM_REG_DIST_VOL
MISO Constraint Management Charge Distribution	MISO_CMC_DIST
Hourly Total MISO Day-Ahead ELMP MWP Amount	MISO_DA_ELMP_MWP
MISO Day-Ahead Non Voltage and Local Reliability RSG MWP Amount	MISO_DA_NVLR_RSG_MWP
MISO Day-Ahead Revenue Sufficiency Guarantee Distribution Volume	MISO_DA_RSG_DIST_VOL
DDC_Rate	MISO_DDC_RATE
Hourly Real-Time EDEDC Uplift amount for Failure Mileage Performance Test for MISO	MISO_EDEDC_FMPT_UPL
Hourly Real-Time EDEDC Uplift amount for Regulating Reserves for MISO	MISO_EDEDC_REG_UPLIFT
MISO Real-Time Failure Mileage Performance Test Uplift	MISO_FMPT_UPL
MISO Total FTR Shortfall Amount for <Month>:	MISO_FTR_MN_SHORTFALL
MISO Total FTR Shortfall Amount for <Year>:	MISO_FTR_YR_SHORTFALL
MISO Total of Loss Rebates on Carved-Out GFAs	MISO_GFACO_LS_RBT
MISO Total Day-Ahead Losses Rebate on Option B Grandfathered Agreement Financial Schedules	MISO_GFAOB_LS_RBT
MISO Loss Surplus Amount	MISO_LOSS_SURPLUS
Asset Owner to MISO Load Ratio Share Factor	MISO_LRS_FCT
MISO Hourly Real Time Mileage Compensation Uplift	MISO_MIL_COMP_UPL
MISO Accumulated Excess Congestion <Month>:	MISO_MN_CG_FND
MISO Hourly Total Net Inadvertent Cost	MISO_NI
~~MISO Peak Hour~~	~~MISO_PEAK_HR~~
Real Time Price Volatility Make Whole Payment Uplift Amt	MISO_PV_MWP_UPLIFT
Hourly Regulation Reserve GFA Distribution Volume	MISO_RT_ASM_REG_GFA_SELLER_DIST_VOL
Total Carved-Out GFA Congestion Rebate Distribution Amount	MISO_RT_GFACO_DIST
MISO Total of Loss Rebates on Carved-Out GFAs	MISO_RT_GFACO_LS_RBT
MISO Real-Time Option B Grandfathered Agreement Congestion Rebate Dist Amount	MISO_RT_GFAOB_DIST
MISO Total of Loss Rebates on Option B GFAs	MISO_RT_GFAOB_LS_RBT

Charge Determinant Name	Acronym
Hourly MISO Real-Time Revenue Sufficiency Guarantee First Pass Distribution Rate	MISO_RT_RSG_DIST_RATE
Hourly MISO Real-Time RSG First Pass Distribution Volume	MISO_RT_RSG_DIST_VOL
MISO Hourly Real-Time RSG Second Pass Distribution Amount	MISO_RT_RSG_DIST2
Hourly MISO Real-Time Revenue Sufficiency Guarantee Make Whole Payment Amount	MISO_RT_RSG_MWP
MISO Real Time Schedule 24 Distribution Amount	MISO_RT_SCHD_24_DIST
MISO Total Schedule 24 Distribution Monthly Operating Cost	MISO_SCHED_24_DIST_MN_OP_CST
MISO Hourly Real Time Total Mileage Uplift	MISO_TOT_MIL_UPL
MISO Voltage and Local Reliability Charge Distribution Amount	MISO_VLR_DIST
MISO Voltage and Local Reliability Charge Maximum Dispatch Volume	MISO_VLR_MAX_DSP_VOL
MISO Accumulated Excess Congestion <Year>:	MISO_YR_CG_FND
Hourly Day-Ahead Must-Run Resource ELMP MWP	MR_ELMP_MWP
Hourly Day-Ahead Must-Run Resource ELMP MWP Eligibility Flag	MR_MWP_ELIG_FL
Net Benefit Price Threshold for Demand Response	NBPT
Notification Deadline Financial Schedule Volume	NDL_FIN
Notification Deadline Physical Schedule Volume	NDL_PHYS
Non-dispatchable Resource Forecast	NDL_NDSP_FCST
Daily Net Inadvertent Distribution Factor by Asset Owner	NI_DIST_FCT
Percent CPNode in Reserve Zone	PCT_CPN_IN_ZN
Regulation Pre-Order 888 Flag	PRE_888_REG
Spinning Pre-Order 888 Flag	PRE_888_SPIN
Supplemental Pre-Order 888 Flag	PRE_888_SUPP
Auction Clearing Price	RA_ACP
Zonal Benefit Rate	RA_BNFT_RATE
~~EDC Peak Demand~~	~~RA_EDC_PEAK~~
EDC Planning Reserve Margin Requirement	RA_EDC_PRMR
EDC Planning Reserve Margin Requirement Adjusted for Netting	RA_EDC_PRMR_ADJ

Charge Determinant Name	Acronym
Fixed Resource Adequacy Plan for Planning Reserve Margin Requirement	RA_FRAP_PRMR
Fixed Resource Adequacy Plan for Zonal Resource Credit	RA_FRAP_ZRC
Planning Reserve Margin Requirement	RA_PRMR
AO Planning Resource Netting Amount	RA_PR_NET_AO
EDC Planning Resource Netting Amount	RA_PR_NET_EDC
Zonal Resource Credit	RA_ZRC
Generation Regulation Down Volume	REG_DN
Regulating Mileage Undeployed Amount	REG_MIL_UNDP_AMT
Undeployed Regulating Mileage Volume	REG_MIL_UNDP_VOL
Generation Regulation Up Volume	REG_UP
MISO Revenue Inadequacy Uplift	RI_UPLIFT
Actually Withdrawing Energy	RSG_AWE
Real-Time Mileage Total Make-Whole Payment	RT_MIL_TOT_MWP
Real-Time Revenue Sufficiency Guarantee Exemption Flag	RSG_XMPT
Real-Time Metered Actual Volume	RT_ACT_MTR
Real-Time Residual Load Volume	RT_ADJ_MTR
Real-Time Market Administration Amount	RT_ADMIN_HR
Real-Time Market Administration Volume	RT_ADMIN_VOL
Real-Time Metered Alternate Volume	RT_ALT_MTR
Real Time Excessive Deficient Energy Deployment Charge Amount	RT_ASM_EXE_DFE_DEP
Excessive Deficient Energy Deployment Charge for Regulation Mileage Amount	RT_ASM_EXE_DFE_DEP_MIL_HR
Excessive Deficient Energy Deployment Charge for Regulating Reserve Capacity Amount	RT_ASM_EXE_DFE_DEP_REG_HR
Hourly Regulation GFA Distribution Volume	RT_ASM_REG_GFA_SELLER_DIST_VOL
Hourly Spinning Reserve GFA Distribution Volume	RT_ASM_SPIN_GFA_SELLER_DIST_VOL
Hourly Supplemental Reserve GFA Distribution Volume	RT_ASM_SUPP_GFA_SELLER_DIST_VOL
Real-Time As Offered Make Whole Payment	RT_ASOF_MWP
Real-Time Asset Energy Amount	RT_ASSET_EN_HR

Charge Determinant Name	Acronym
Real-Time Metered Billable Volume	RT_BLL_MTR
Hourly Real-Time Contingency Reserve Deployment Failure Charge Uplift Amount	RT_CRDFC_UPLIFT
Real-Time ELMP Make Whole Payment for EAR Wheel-Out Schedule	RT_DB_ELMP_MWP
Real-Time Down Ramp Capability Market Clearing Price	RT_DRC_MCP
Real Time Dispatch Target for Energy	RT_DSP_TARG_EN
Real-Time Financial Schedule Volume	RT_FIN
Real-Time Financial Schedule Congestion Amount	RT_FIN_CG_HR
Real-Time Financial Schedule Loss Amount	RT_FIN_LS_HR
Real-Time Carved Out GFA Transaction Volume	RT_GFACO
Real-Time Congestion Rebate on Carved-Out Grandfathered Agreement Transaction Amounts	RT_GFACO_RBT_CG_HR
Real-Time Losses Rebate on Carved-Out Grandfathered Agreement Transaction Amounts	RT_GFACO_RBT_LS_HR
Real-Time IMM Make Whole Payment	RT_IMM_MWP
Real-Time Asset Mitigated Volume for a Resource Asset	RT_IMM_RSG_MWH
Real-Time Congestion Component of Locational Marginal Price	RT_LMP_CG
Real-Time Locational Marginal Price	RT_LMP_EN
Real-Time Loss Component of Locational Marginal Price	RT_LMP_LS
Real-Time Distribution of Losses Amount	RT_LOSS_DIST_HR
Real-Time Maximum Dispatchable Volume	RT_MAX_DSP
Real-Time Mileage Potential Make-Whole Payment	RT_MIL_POT_MWP
Real-Time Minimum Dispatchable Volume	RT_MIN_DSP
Real-Time Miscellaneous Record	RT_MISC_RECORD
Real-Time Physical Transaction Volume	RT_PHYS
Real Time Dispatch Interval Product Substitution	RT_PROD_SUBST_FL
Hourly Real-Time Price-Volatility Make Whole Payment Amount	RT_PV_MWP_HR
Real-Time Ramp Capability Amount	RT_RC_AMT_HR
Real Time Regulating Reserve Availability Cost	RT_REG_AC
Real-Time Regulation Mileage Market Clearing Price	RT_REG_MIL_MCP

Charge Determinant Name	Acronym
Real Time Regulation Reserve Mitigated Availability Cost	RT_REG_MIT_AC
Real Time Revenue Neutrality Uplift Amount	RT_RNU_HR
Real Time RSG Credit Amount for a Generation Resource Asset	RT_RSG_ASSET_CR_HR
Real-Time RSG First Pass Distribution Volume	RT_RSG_DIST_VOL
Real-Time Revenue Sufficiency Guarantee First Pass Distribution Amount	RT_RSG_DIST1_HR
Real-Time Revenue Sufficiency Guarantee Eligibility	RT_RSG_ELIGIBILITY
Real-Time Mitigated RSG Production Cost Amount	RT_RSG_MIT_PC
Real-Time Revenue Sufficiency Guarantee Make Whole Payment Amount	RT_RSG_MWP_HR
Real-Time RSG Production Cost Amount	RT_RSG_PC
Real Time Spinning Reserve Availability Cost	RT_SPIN_AC
Real Time Spinning Reserve Market Clearing Price	RT_SPIN_MCP
Real Time Spinning Reserve Mitigated Availability Cost	RT_SPIN_MIT_AC
Real Time Supplemental Reserve Availability Cost	RT_SUPP_AC
Real Time Supplemental Reserve Market Clearing Price	RT_SUPP_MCP
Real Time Supplemental Reserve Mitigated Availability Cost	RT_SUPP_MIT_AC
Real-Time Unused Margin	RT_UNUSED_MARGIN
Real-Time Up Ramp Capability Market Clearing Price	RT_URC_MCP
Real-Time Virtual Energy Amount	RT_VIRT_EN_HR
Real-Time MWP Asset Credit for VLR Payable by a Given LBA	RT_VLR_LBA_ASSET_CR
Real-Time Net Down Ramp Capability	RTN_DRC_VOL
Real-Time Net Regulating Reserve for Spinning Reserve Substitution	RTN_REG_SPIN_VOL
Real-Time Net Up Ramp Capability Volume	RTN_URC_VOL
Real-Time Hourly Offer Revenue Sufficiency Guarantee Payment	RTORSGP_HR
Schedule 24 Allocation Rate	SCHD_24_ALC_RATE
Administrative Charge Daily Exemption	SCHEDULE_17_ASSET
Hourly ELMP MWP Amount for Day-Ahead Wheel-Out “UP-to-TUC” Interchange Schedule	TUC_WO_ELMP_MWP

Charge Determinant Name	Acronym
Hourly ELMP MWP Amount for Day-Ahead Wheel-In “UP-to-TUC” Interchange Schedule	TUC_WI_ELMP_MWP
Hourly ELMP MWP Amount for Day-Ahead Wheel-Through “UP-to-TUC” Interchange Schedule	TUC_WT_ELMP_MWP
Hourly Total Day-Ahead “UP-to-TUC” Interchange Schedule MWP Amount	TUC_ELMP_MWP
Hourly Virtual Transaction ELMP MWP Amount	VIRT_ELMP_MWP
Voltage and Local Reliability Allocation Factor	VLR_ALC_FCT
Real-Time RSG Distribution Amount for Voltage and Local Reliability	VLR_DIST

A.5 Calculations Overview

Each Charge Type has an explanation describing the basic characteristics of the charge along with its formula. The formula section is broken down into the following three components:

1) ***Calculation Inputs*** – Calculation Inputs are data determinants needed to perform the Charge Type calculation. Some of these inputs are directly provided by participants while others are provided by the Physical Scheduling System (WebTrans), Day-Ahead and Real-Time System (DART), and the FTR System. Calculation Inputs that are provided to participants on Settlement Statements are referred to as determinants.
2) ***Intermediate Calculations*** – Intermediate Calculations show how the building block data components are assembled into the larger complex components that are used in the Charge Type. The purpose of the Intermediate Calculations is to break down the calculation into easier to understand components. Intermediate Calculation results that are provided to participants on Settlement Statements are also referred to as determinants.
3) ***Charge Type Calculation*** – The Charge Type Calculation is the last mathematical formula for the Charge Type. The final Charge Type total is displayed on the Settlement Statement as a daily Operating Day total.

Calculation Inputs and Intermediate Calculation results that appear on Settlement Statement are annotated with an asterisk (*).

Within the formula sections of the Charge Types there are defined values with subscripts. These subscripts are not displayed on the Settlement Statements and are used in this guide to improve understanding. The following table displays the subscripts used:

Exhibit A.5-1: Charge Type Subscripts

Subscript Abbreviation	Full Description
AO	For an Asset Owner
AO-Assets	All Asset Owner Assets
AO-CN	Asset Owner Commercial Pricing Node
AO-FG	Asset Owner held Flowgate Rights
AO-FTR	Asset Owner held FTRs
AO-GEN	Asset Owner Generation
AO-LP	Asset Owner related to a Loss Pool.
AO-Phys-Transaction	Asset Owner Interchange Schedules including External Asynchronous Resources (EARs) Wheel_Out schedule
AO-Schedules	Asset Owner Schedules
AO-Transactions	Asset Owner Transactions
Asset	Generation, Load Zone, and Demand Response Resource Assets
Asset Owner	Asset Owner
Asset Owner-FTR	All Asset Owner held FTRs
Asset Owner-Schedules	All Schedules for an Asset Owner
AO-Phys-Transactions	All Interchange Schedules including External Asynchronous Resources (EARs) Wheel-Out schedule for an Asset Owner
BA	Local Balancing Authority
BA-Assets	All Assets in a Local Balancing Authority
Buyer	Asset Owner Buyer
CP	Commitment Period
DP	Delivery Point Commercial Pricing Node
FG	Flowgate
Gen_Assets	All generation assets for an Asset Owner.
GFAOB_Buyer	GFA Option B Buyer
GFAOB_Seller	GFA Option B Seller
H	All hours of the calendar day
Hr-Asset	All Hours per Asset
Interface Commercial Pricing Nodes	Only at Interface Commercial Pricing Nodes
JOA-FG	JOA related Flowgates

Subscript Abbreviation	Full Description
LP	Loss Pool
MISO	Midwest Independent System Operator (all of MISO)
MISO-FTR	All MISO held FTRs.
MISO_OB-FTR	MISO related FTRs for Option B Agreements
MISO_CO-FTR	MISO related FTRs for Carve-Out Agreements
Month	All days of the calendar month
Month-Asset Owner	All days of the calendar month per Asset Owner
CN	Commercial Pricing Node
NET	Net
PK_TYP	Peak Type (indicating on-peak or off-peak)
Pseudo-Buyer	Buyer for Pseudo Transaction Volume
Pseudo-Seller	Seller for Pseudo Transaction Volume
Schedule	Schedules
Seller	Asset Owner Seller
SI	Sink Commercial Pricing Node
SO	Source Commercial Pricing Node
Transactions	Transactions
Transactions-CN	Transactions with the same Commercial Pricing Node
ZN	Zone

Throughout the calculation guide the summation sign appears as the symbol "Σ." The summation sign indicates the function is a summation of the elements of the equation listed within the parenthesis located to the right of the symbol. If the summation sign is subscripted, then the summation is performed for each equation for each of the subscripted elements.

For example, the following equation indicates to sum Schedule A and Schedule B for all Hours.

Σ_H (Schedule_A + Schedule_B) = 15

Schedule_A Hour	Schedule_A Value
1	1
2	1
3	1
4	1
5	1

Schedule_B Hour	Schedule_B Value
1	2
2	2
3	2
4	2
5	2

B. Day-Ahead Charge Types

B.1 Day-Ahead Asset Energy Amount (DA_ASSET_EN)

The Day-Ahead Asset Energy Amount represents an AO's total Day-Ahead net energy cost (or credit) associated with their asset related Commercial Pricing Nodes for an Operating Day. The Day-Ahead Asset Energy Amount is the net energy costs for an AO from its assets and transactions at those assets. The hourly charge or credit is a result of the net energy volume the AO scheduled at the asset multiplied by the Locational Marginal Price (LMP) for that node. The hourly amounts are summed to determine a daily total. Virtual Schedule energy obligations and their charge/credit are calculated separately from this Charge Type.

There is only one Day-Ahead Asset Schedule per asset. The Day-Ahead Asset Schedule is the direct result of the MP providing Bids and Offers into the Day-Ahead Energy and Operating Reserve Market that get lifted by MISO. MPs can only submit Bids and Offers for their own assets.

Financial Schedules (FBTs) may be scheduled between Commercial Pricing Nodes. The MP entering FBTs with MISO determines whether the transaction is for the Day-Ahead or Real-Time Energy and Operating Reserve Market along with the Source, Sink, and Delivery Point. When the seller of an FBT has the source defined at a Commercial Pricing Node where they own an asset, the energy volume for the transaction is settled in this Charge Type. When the buyer of an FBT has the sink defined at a Commercial Pricing Node where they own an asset, the energy volume for the transaction is settled in this Charge Type.

It is the MP’s responsibility to create a new Financial Schedule contract when the existing Asset to Asset Owner relationship changes in an existing Financial Schedule contract. If the Asset to Asset Owner relationship changes during a Commercial Model update, the existing Financial Schedule contract is no longer valid and subsequent Financial Schedules for that particular contract are invalid.

Carved-Out Grandfathered Agreement (GFA) transaction energy sourced or sunk at the AO's Asset is settled in this Charge Type.

The Day-Ahead Asset Energy Amount, including billing determinants, is displayed on the Day-Ahead Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a determinant that is displayed on an AO's Day-Ahead statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

Settlement of Option B Related Day-Ahead FBTs

There are three types of Day-Ahead FBTs:

- IBS - Refers to the standard FBTs.
- Option B GFA (GFAOB) - Refers to the standard type of GFAOB related FBTs. These transactions have both the “Pre 888 Congestion Flag” and the “Pre 888 Loss Flag” equal to “B”. GFAOB transaction volumes are validated hourly, receive full congestion rebates, and are rebated half the losses charged or credited. Load served by the standard GFAOB transactions are not eligible for Real-Time Losses Rebate.
- GFAOB Expanded Congestion Cost Hedge (ECCH) - A type of GFAOB. The ECCH provides participants with a congestion hedge in Narrowly Constrained Areas (NCA) of the market. These transactions have the “Pre 888 Congestion Flag” equal to “B” and the “Pre 888 Loss Flag” equal to “N”. ECCH transaction volumes are validated hourly, receive full congestion rebates, and do not receive any loss rebates. Load served by ECCH GFAOB transactions are eligible for Real-Time Losses Rebate.

IBS FBTs

IBS FBTs can exist between any two AOs at any of the following Commercial Pricing Nodes types: Hubs (HUB), Interface (INT), Generation (GND), Load Zone (LZN), Demand Response Resource (DRR) and Aggregate Generation (FXD).

GFAOB FBTs

GFAOB FBTs are used specifically for MPs with a MISO recognized GFAOB who have chosen Section 38.8.3.b. (Option B) of the Tariff. MISO defines the transaction buying and selling AO, the source and sink Commercial Pricing Node, and the transaction (contract) date range per a participant's GFA. The transaction buyer and seller are unable to change any transaction parameter except for the hourly transaction volume, which must be provided prior to the close of the Day-Ahead Energy and Operating Reserve Market. Option B Grandfathered FBTs can only occur in the Day-Ahead Energy and Operating Reserve Market between the following Commercial Pricing Nodes:

- A generation source and a Load Zone,
- A generation source and an Interface Commercial Pricing Node, or
- An Interface Commercial Pricing Node and a Load Zone.

All Option B (GFA or ECCH) Asset to Asset Owner relationships are validated during the settlement process. If the Asset to Asset Owner relationship changes during a commercial model update, the existing Financial Schedule contract is no longer valid and subsequent Financial Schedules for that particular contract are invalid. It is the Market Participant's responsibility to inform MISO that a new Option B Financial Schedule contract needs to be created to replace the existing Financial Schedule contract to reflect the current Asset to Asset Owner relationship.

All GFAOB FBT hourly volumes are validated prior to settlement. The validation process verifies the scheduled volume of GFAOB FBTs do not exceed the available generation supply and Load consumption. Validations are performed only once and one transaction invalidation cannot then make another transaction valid.

- GFAOB FBT sellers must provide sufficient supply volume for all their transactions with a generation asset or with Interchange Schedules (PBTs).

  When the GFAOB FBT seller is supplying the volume from a generation asset, the generation volume supplied is verified to be equal to or greater than the sum of all their GFAOB FBTs sold from that generation asset for the Hour. If the generation volume is less than the total GFAOB FBT volume being supplied, then all the AO's GFAOB FBT volumes that are being supplied by that generation source for that Hour are reduced to zero.

When the GFAOB FBT seller is supplying one or more GFA FBTs from one or more PBTs where they are the seller, the total PBT volume supplied is verified to be equal to or greater than the sum of all their GFAOB FBTs sold from that Commercial Pricing Node for the Hour. The volume comparison at the Commercial Pricing Node is made only with PBTs where the AO is the seller and is not netted against any PBTs where the AO may be the buyer. If the PBT volume is less than the total GFAOB FBT volume at a Commercial Pricing Node in the Hour, then all the AO's GFAOB FBTs at the Commercial Pricing Node for the Hour are reduced to zero.

For validations associated with a Combined Cycle and Cross Compound registered generation asset, the validation is performed at the aggregate Commercial Pricing Node. All generation and GFAOB FBT volumes at any individual generation asset are rolled up to the aggregate node for the Combined Cycle and Cross Compound Asset. This allows individual offered and cleared Generators to supply a GFAOB at the aggregate Commercial Pricing Node.

- GFAOB FBT buyers must fully consume all transaction volume at a Load Zone asset (asset withdrawal volume and cleared virtual Bid volume) or through PBTs.

  When the GFAOB FBT buyer is consuming the volume at a Load Zone asset, the Load Zone asset volume consumption is verified to be equal to or greater than the sum of all their GFA FBTs provided to that Load Zone asset for the Hour. The Load Zone asset volume is equal to the cleared energy withdrawal for the asset (injections are ignored) and the net cleared energy virtual megawatts withdrawn at the asset (injections are ignored) by the AO of the Asset. If the Load Zone asset volume is less than the total GFAOB FBT volume, then all the AO's GFAOB FBT volume that is being provided to that Load Zone asset for that Hour is reduced to zero.

When the GFAOB FBT buyer is consuming the volume of one or more GFAOB FBTs with one or more PBTs where they are the buyer, the total PBT volume consumed is verified to be equal to or greater than the sum of all their GFAOB FBTs provided to that Commercial Pricing Node for the Hour. The volume comparison at the Commercial Pricing Node is made only with PBTs where the AO is the buyer and is not netted against any PBTs where the AO may be the seller. If the PBT volume is less than the total GFAOB FBT volume at a Commercial Pricing Node in the Hour, then all the AO's GFAOB FBTs at the Commercial Pricing Node for the Hour are reduced to zero.

GFAOB ECCH FBTs

Option B ECCH FBTs are used specifically for MPs defined per Section 43.2.6 of the Tariff. MISO defines the transaction buying and selling AO, the source and sink Commercial Pricing Node, and the transaction (contract) date range. The transaction buyer and seller are unable to change any transaction parameter except for the hourly transaction volume, which must be provided prior to the close of the Day-Ahead Energy and Operating Reserve Market. Option B ECCH FBTs can only occur in the Day-Ahead Energy and Operating Reserve Market between the following Commercial Pricing Nodes:

- A generation source and a Load Zone,
- A generation source and an Interface Commercial Pricing Node, or
- An Interface Commercial Pricing Node and a Load Zone.

All Option B ECCH FBT hourly volumes are validated prior to settlement. The validation process verifies the scheduled volume of Option B ECCH FBTs do not exceed the available generation supply and Load consumption. Validations are performed only once and one transaction invalidation cannot then make another transaction valid.

- Option B ECCH FBT sellers must provide sufficient supply volume for all their transactions with a generation asset or with PBTs.

  When the Option B ECCH FBT seller is supplying the volume from a generation asset, the generation volume supplied is verified to be equal to or greater than the sum of all their Option B ECCH FBTs sold from that generation asset for the Hour. If the generation volume is less than the total Option B ECCH FBT volume being supplied, then all the AO's Option B ECCH FBT volumes that are being supplied by that generation source for that Hour are reduced to zero.

When the Option B ECCH FBT seller is supplying one or more ECCH FBTs from one or more PBTs where they are the seller, the total PBT volume supplied is verified to be equal to or greater than the sum of all their Option B ECCH FBTs sold from that Commercial Pricing Node for the Hour. The volume comparison at the Commercial Pricing Node is made only with PBTs where the AO is the seller and is not netted against any PBTs where the AO may be the buyer. If the PBT volume is less than the total Option B ECCH FBT volume at a Commercial Pricing Node in the Hour, then all the AO's Option B ECCH FBTs at the Commercial Pricing Node for the Hour are reduced to zero.

For validations associated with a Combined Cycle and Cross Compound registered generation asset, the validation is performed at the aggregate Commercial Pricing Node. All generation and Option B ECCH FBT volumes at any individual generation asset are rolled up to the aggregate node for the Combined Cycle and Cross Compound Asset. This allows individual offered and cleared Generators to supply an Option B ECCH at the aggregate Commercial Pricing Node.

- Option B ECCH FBT buyers must fully consume all transaction volume at a Load Zone asset (asset withdrawal volume and cleared virtual Bid volume) or through PBTs.

  When the Option B ECCH FBT buyer is consuming the volume at a Load Zone asset, the Load Zone asset volume consumption is verified to be equal to or greater than the sum of all their ECCH FBTs provided to that Load Zone asset for the Hour. The Load Zone asset volume is equal to the cleared energy withdrawal for the asset (injections are ignored) and the net cleared energy virtual megawatts withdrawn at the asset (injections are ignored) by the AO of the Asset. If the Load Zone asset volume is less than the total Option B ECCH FBT volume, then all the AO's Option B ECCH FBT volume that is being provided to that Load Zone asset for the that Hour is reduced to zero.

When the Option B ECCH FBT buyer is consuming the volume of one or more Option B ECCH FBTs with one or more PBTs where they are the buyer, the total PBT volume consumed is verified to be equal to or greater than the sum of all their Option B ECCH FBTs provided to that Commercial Pricing Node for the Hour. The volume comparison at the Commercial Pricing Node is made only with PBTs where the AO is the buyer and is not netted against any PBTs where the AO may be the seller. If the PBT volume is less than the total Option B ECCH FBT volume at a Commercial Pricing Node in the Hour, then all the AO's Option B ECCH FBTs at the Commercial Pricing Node for the Hour are reduced to zero.

B.1.1 Day-Ahead Option B Financial Schedule Validation

ABS	The mathematical absolute of the value within the succeeding set of parentheses.
IF	The "IF" logical statement is a conditional test and returns one value if a condition you specify evaluates to TRUE and another value if it evaluates to FALSE. { An example of the IF (logical_test, THEN value_if_true, ELSE value_if_false) }
MAX	The mathematical maximum of the series of numbers in the succeeding parentheses.
MIN	The mathematical minimum of the series of numbers in the succeeding parentheses.

*$DA\_FIN_{GFAOB\_Buyer}$	Hourly Day-Ahead Option B (GFA or ECCH) FBT Volume at a Commercial Pricing Node where the AO is the Transaction Buyer (MWh); the Buyer is defined as the AO that receives the FBT volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value.
*$DA\_FIN_{GFAOB\_Seller}$	Hourly Day-Ahead Option B (GFA or ECCH) FBT Volume at a Commercial Pricing Node where the AO is the Transaction Seller (MWh); the Seller is defined as the AO that supplies the FBT volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value.
DA_PHYS_{Buyer}	Hourly Day-Ahead PBT Volume where the AO is the Transaction Buyer (MWh); a Buyer is defined as an AO that receives energy from MISO, at a MISO defined Interface Commercial Pricing Node, for export out of MISO. The transaction volume is always presented as a positive value.
DA_PHYS_{Seller}	Hourly Day-Ahead PBT Volume where the AO is the Transaction Seller (MWh); a Seller is defined as an AO that supplies energy to MISO, at a MISO defined Interface Commercial Pricing Node, for import into MISO. The transaction volume is always presented as a positive value.
*DA_SCHD	Hourly Day-Ahead Asset Schedule Volume (MWh); the Day-Ahead Asset Schedule Volume is the market cleared offered generation, bid Load or offered DRR schedule by asset. A positive schedule represents a Load obligation and a negative schedule represents a supply obligation. There can be only a single schedule per asset.
*DA_VSCHD	Hourly Day-Ahead Net Virtual Schedule Volume at a Commercial Pricing Node (MWh); for an AO. The Day-Ahead Net Virtual Schedule Volume is the net Day-Ahead Energy and Operating Reserve Market cleared Bid and Offered Virtual Schedule volume by AO by Commercial Pricing Node by hour. A positive volume represents a net Load obligation and a negative volume represents a net supply obligation.
$TOTAL\_DA\_PHYS\_CN_{Buyer}$	Total Hourly Day-Ahead PBT Volume per AO per Commercial Pricing Node where the AO is the transaction buyer (MWh). $= \Sigma_{Transactions\text{-}CN}\ (\ DA\_PHYS_{Buyer}\ )$

$TOTAL\_GFA\_FIN\_CN_{GFAOB\_Buyer}$ — Total Hourly Day-Ahead GFA FBT Volume per AO per Commercial Pricing Node where the AO is the transaction buyer (MWh).

$= \Sigma_{Transactions\text{-}CN}$ ($DA\_FIN_{GFAOB\_Buyer}$)

LD_ZONE_ASSET_VOL — Hourly Day-Ahead Asset Withdrawal Volume for Validating Option B (GFA or ECCH) transaction (MWh); at a Commercial Pricing Node where the AO is the Option B Transaction Buyer and where the AO owns the Load Asset. A Load Zone AO may use cleared net Day-Ahead virtual bids in conjunction with their cleared withdrawal volume to validate Option B transactions. Only cleared asset withdrawal volumes and net cleared virtual bid (withdrawal) volumes are used to validate the buyer side Option B transaction at an Asset.

= IF { AO owns the Asset
THEN [MAX (DA_SCHD , 0) + MAX (DA_VSCHD , 0)] ,
ELSE 0 }

DA_FIN_INT_GFA_BUYER — Hourly Day-Ahead Option B (GFA or ECCH) FBT Intermediate Validated Volume (MWh); at a Commercial Pricing Node where the AO is the Transaction Buyer. The equation represents a single validated transaction at a single Commercial Pricing Node. The consumption volume of the Load Zone asset, or all the bought PBT volumes, at a Commercial Pricing Node is verified to be equal to or greater than the supplied Option B FBT Volume by the AO. When an asset is consuming the GFAOB transaction volume, there cannot be any Day-Ahead PBT volume. Likewise when the GFAOB transaction volume is being consumed by Day-Ahead PBTs, there cannot be any Day-Ahead Asset Schedule volume. This equation is performed for each AO Option B FBT where the AO is the transaction buyer. The following calculation is performed for each AO at each Commercial Pricing Node.

= IF { [(LD_ZONE_ASSET_VOL + $TOTAL\_DA\_PHYS\_CN_{Buyer}$) >= $TOTAL\_GFA\_FIN\_CN_{GFAOB\_Buyer}$],
THEN $DA\_FIN_{GFAOB\_Buyer}$, ELSE 0 }

$TOTAL\_DA\_PHYS\_CN_{Seller}$ — Total Hourly Day-Ahead PBT Volume per AO per Commercial Pricing Node where the AO is the transaction seller (MWh).

$= \Sigma_{Transaction\text{-}CN}$ (DA_PHYS_{Seller})

$TOTAL\_GFA\_FIN\_CN_{GFAOB\_Seller}$ — Total Hourly Day-Ahead Option B (GFA or ECCH) FBT Volume per AO per Commercial Pricing Node where the AO is the transaction seller (MWh).
$= \Sigma_{Transaction\text{-}CN} (DA\_FIN_{GFAOB\_Seller})$

DA_FIN_INT_GFA_SELLER — Hourly Day-Ahead Option B (GFA or ECCH) FBT Intermediate Validated Volume (MWh); at a Commercial Pricing Node where the AO is the Transaction Seller. The equation represents a single validated transaction at a single Commercial Pricing Node. The supplied volume of the generation asset (in absolute value), or all the sold PBT volumes, at a Commercial Pricing Node is verified to be equal to or greater than the consumed Option B FBT volume by the AO. When an asset is supplying the GFAOB transaction volume, there cannot be any Day-Ahead PBT volume. Likewise when the GFAOB transaction volume is being supplied by Day-Ahead PBTs, there cannot be any Day-Ahead Asset Schedule volume. This equation is performed for each AO Option B FBT where the AO is the transaction seller. The following calculation is performed for each AO at each Commercial Pricing Node.
$= IF [(\{ ABS [MIN (0 , DA\_SCHD)] + TOTAL\_DA\_PHYS\_CN_{Seller} \} >= TOTAL\_GFA\_FIN\_CN_{GFAOB\_Seller}), THEN\ DA\_FIN_{GFAOB\_Seller} , ELSE\ 0]$

$*DA\_GFAOB_{Buyer}$ — Hourly Day-Ahead Valid Option B (GFA or ECCH) FBT Volume (MWh); at a Commercial Pricing Node where the AO is the Transaction Buyer. The equation represents a single validated transaction at a single Commercial Pricing Node. A GFAOB FBT can be invalidated due to the transaction seller not having sufficient supply volume.
$= IF [(DA\_FIN\_INT\_GFA\_SELLER = 0) , 0 , DA\_FIN\_INT\_GFA\_BUYER]$

$*DA\_GFAOB_{Seller}$ — Hourly Day-Ahead Valid Option B (GFA or ECCH) FBT Volume (MWh); at a Commercial Pricing Node where the AO is the Transaction Seller. The equation represents a single intermediate validated transaction at a single Commercial Pricing Node. An Option B FBT can be invalidated due to the transaction buyer not having sufficient Load volume.
$= IF [(DA\_FIN\_INT\_GFA\_BUYER = 0) , 0 , DA\_FIN\_INT\_GFA\_SELLER]$

B.1.2 Calculation Inputs for DA_ASSET_EN

*DA_FINBuyer	Hourly Day-Ahead IBS FBT Volume at a Commercial Pricing Node where the AO is the Transaction Buyer and owns an Asset at the Commercial Pricing Node (MWh); the Buyer is defined as the AO that receives the FBT volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value. Note these FBTs will display on the settlement statement along with the AOs Assets. If the AO is both the buyer and seller, the FBT will be listed for each end of the transaction.
*DA_FIN_{Seller}	Hourly Day-Ahead IBS FBT Volume at a Commercial Pricing Node where the AO is the Transaction Seller and owns an Asset at the Commercial Pricing Node (MWh); the Seller is defined as the AO that supplies the FBT volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value. Note these FBTs will display on the settlement statement along with the AOs Assets. If the AO is both the buyer and seller, the FBT will be listed for each end of the transaction.
*DA_GFACO_{Buyer}	Hourly Day-Ahead Carved-Out GFA Transaction Volume where the AO is the buyer and owns an Asset at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The buyer is defined as the AO that receives the transaction volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value. Note these transactions will display on the settlement statement along with the AOs Assets. If the AO is both the buyer and seller, the transaction will be listed once for each end of the transaction.
*DA_GFACO_{Seller}	Hourly Day-Ahead Carved-Out GFA Transaction Volume where the AO is the seller and owns an Asset at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The seller is defined as the AO that provides the transaction volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value. Note these transactions will display on the settlement statement along with the AOs Assets. If the AO is both the buyer and seller, the transaction will be listed once for each end of the transaction.

*DA_GFAOB_{Buyer}	Hourly Day-Ahead Valid Option B (GFA or ECCH) FBT Volume (MWh); at a Commercial Pricing Node where the AO is the Transaction Buyer. The equation represents a single validated transaction at a single Commercial Pricing Node. An Option B FBT can be invalidated due to the transaction seller not having sufficient supply volume. Please refer to the previously defined calculation definition of this component.
*DA_GFAOB_{Seller}	Hourly Day-Ahead Valid Option B (GFA or ECCH) FBT Volume (MWh); at a Commercial Pricing Node where the AO is the Transaction Seller. The equation represents a single intermediate validated transaction at a single Commercial Pricing Node. An Option B FBT can be invalidated due to the transaction buyer not having sufficient Load volume. Please refer to the previously defined calculation definition of this component.
*DA_LMP_EN	Hourly Day-Ahead LMP ($/MWh); at a Commercial Pricing Node. The Day-Ahead Energy and Operating Reserve Market clearing price for Energy at a given Commercial Pricing Node in the Transmission Provider Region, which is equivalent to the marginal cost of serving demand at the Commercial Pricing Node. The Day-Ahead LMP includes the Marginal Congestion Component (MCC) and the Marginal Losses Component (MLC).
*DA_SCHD	Hourly Day-Ahead Asset Schedule Volume (MWh); the Day-Ahead Asset Schedule Volume is the market cleared offered generation, bid Load or offered DRR schedule by asset. A positive schedule represents a Load obligation and a negative schedule represents a supply obligation. There can be only a single schedule per asset.
DA_DRRII_SCHD_VOL	Hourly Day-Ahead DRR II Schedule Volume (MWh); the calculated volume representing injection for a DRR II Resource in the Day-Ahead. This injection volume for the DRR Type-II is calculated as minus one times the difference between the Day-Ahead dispatch maximum and the Day-Ahead Schedule withdrawal bid volume for the DRR Type-II Resource. = (DA_ECON_MAX - DA_SCHD) * -1
*DA_ECON_MAX	Hourly Day-Ahead Economic Maximum Volume (MWh); the maximum dispatchable offer volume for a generation asset.

B.1.3 Intermediate Calculations for DA_ASSET_EN

$DA\_FIN\_ASSET\_VOL_{Seller}$

The Total Hourly Day-Ahead FBT load obligation volume for an AO at a single Commercial Pricing Node where the AO is sourcing (supplying) FBTs and owns an Asset at the Commercial Pricing Node (MWh); this calculation is only performed for Commercial Pricing Nodes where the AO has a generation, Load Zone, or DRR asset.

$$= \Sigma_{Transactions\text{-}CN} (DA\_FIN_{Seller}) + \Sigma_{Transactions\text{-}CN} (DA\_GFAOB_{Seller})$$

$DA\_FIN\_ASSET\_VOL_{Buyer}$

The Total Hourly Day-Ahead FBT supply obligation volume for an AO at a single Commercial Pricing Node where the AO is sinking (receiving) FBT and owns an Asset at the Commercial Pricing Node (MWh); this calculation is only performed for Commercial Pricing Nodes where the AO has a generation, Load Zone, or DRR asset.

$$= [\Sigma_{Transactions\text{-}CN} (DA\_FIN_{Buyer}) + \Sigma_{Transactions\text{-}CN} (DA\_GFAOB_{Buyer})] * (-1)$$

$DA\_GFACO\_ASSET\_VOL_{Seller}$

The Total Hourly Carved-Out GFA Transaction Volume for an AO at a single Commercial Pricing Node where the AO is sourcing (supplying) the transactions and owns an Asset at the Commercial Pricing Node (MWh); this calculation is only performed for Commercial Pricing Nodes where the AO has a generation, Load Zone, or DRR asset.

$$= \Sigma_{Transactions\text{-}CN} (DA\_GFACO_{Seller})$$

$DA\_GFACO\_ASSET\_VOL_{Buyer}$

The Total Hourly Carved-Out GFA Transaction Volume for an AO at a single Commercial Pricing Node where the AO is sinking (receiving) the transactions and owns an Asset at the Commercial Pricing Node (MWh); this calculation is only performed for Commercial Pricing Nodes where the AO has a generation, Load Zone, or DRR asset.

$$= \Sigma_{Transactions\text{-}CN} (DA\_GFACO_{Buyer}) * (-1)$$

DA_ASSET_VOL

Hourly Day-Ahead Asset Volume (MWh); for an AO. This calculation represents the sum of all schedules and transactions, including surrogate injection volumes for DRR Type-II Resources, for a Commercial Pricing Node for the AO. This equation is performed for all Commercial Pricing Nodes where the AO has a generation, Load Zone, or DRR asset. The result represents the AO's total hourly net energy volume at each of their assets.

$$= DA\_SCHD + DA\_DRRII\_SCHD\_VOL + DA\_FIN\_ASSET\_VOL_{Seller} + DA\_FIN\_ASSET\_VOL_{Buyer} +$$

$DA\_GFACO\_ASSET\_VOL_{Seller}$ +
$DA\_GFACO\_ASSET\_VOL_{Buyer}$

B.1.4 Charge Type Calculation for DA_ASSET_EN

*^DA_ASSET_EN_HR

Hourly Day-Ahead Asset Energy Amount ($); for an AO. This calculation is only performed for Commercial Pricing Nodes where the AO has a generation, Load Zone, or DRR asset. The result represents the AO's total hourly charge or credit for all their assets and is rounded to the nearest cent. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement.

$= \Sigma_{CN} (DA\_ASSET\_VOL * DA\_LMP\_EN)$

*DA_ASSET_EN

Day-Ahead Asset Energy Amount ($); for an AO. The result represents the AO's total charge or credit for all their assets for the Operating Day. The formula result is displayed in dollars.

$= \Sigma_{H} (DA\_ASSET\_EN\_HR)$

B.2 Day-Ahead Financial Schedule Congestion Amount (DA_FIN_CG)

The Day-Ahead FBT Congestion Amount represents an AO's total FBT congestion costs and Carved-Out GFA Transaction congestion costs for an Operating Day. The amount is calculated hourly by AO for every transaction where it is buying and/or selling and then is summed to a daily total. Since transaction congestion cost is the difference between two Commercial Pricing Nodes' congestion costs multiplied by the transaction volume, this amount can result in a charge or a credit depending upon the Commercial Pricing Nodes being settled. Day-Ahead FBT Congestion Amount is calculated on FBTs (GFAOB and IBS transaction types) and Carved-Out GFA Transactions.

Each FBT and Carved-Out GFA Transaction has the following elements defined:

- Energy source Commercial Pricing Node
- Energy sink Commercial Pricing Node
- Delivery Point Commercial Pricing Node
- Buying AO
- Selling AO
- Energy volume in megawatts
- Date including hours that it is applicable

For FBTs, the concept of a Delivery Point is incorporated to provide the parties to the transaction a location other than the source or sink where responsibility for congestion is transferred from seller to buyer. The delivery point can be any Commercial Pricing Node, including either the energy source or sink Commercial Pricing Node.

- The Day-Ahead FBT seller is responsible for the congestion charge difference between the Delivery Point and the source Commercial Pricing Node. When the Delivery Point is defined as the sink Commercial Pricing Node, the seller is responsible for the congestion between the Commercial Pricing Nodes.
- The Day-Ahead FBT buyer is responsible for the congestion charge difference between the sink and Delivery Point Commercial Pricing Node. When the Delivery Point is defined as the source Commercial Pricing Node, the buyer is responsible for the congestion between the Commercial Pricing Nodes.

For Carved-Out GFA Transactions, the Delivery Point is always the source Commercial Pricing Node and as such the transaction buyer is responsible for the congestion charge difference between the sink and source Commercial Pricing Nodes.

The Day-Ahead FBT Congestion Amount, including determinants, is displayed on the Day-Ahead Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a billing determinant that is displayed on an AO's Day-Ahead statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

Settlement of GFA Related Day-Ahead FBTs

There are three types of Day-Ahead FBTs:

- IBS - Refers to the standard FBTs where congestion and losses are charged.
- GFAOB - Refers to the standard type of GFAOB related FBTs. These transactions have both the "Pre 888 Congestion Flag" and the "Pre 888 Loss Flag" equal to "B". GFAOB transaction volumes are validated hourly, receive full congestion rebates, and are rebated half the losses charged or credited. Load served by the standard GFAOB transactions are not eligible for Real-Time Losses Rebate.
- GFAOB ECCH - A type of GFAOB. The ECCH provides participants with a congestion hedge in NCAs of the market. These transactions have the "Pre 888 Congestion Flag" equal to "B" and the "Pre 888 Loss Flag" equal to "N". ECCH transaction volumes are validated hourly, receive full congestion rebates, and do not receive any loss rebates. Load served by ECCH GFAOB transactions are eligible for Real-Time Losses Rebate.

IBS FBTs

IBS FBTs can exist between any two AOs at any of the following Commercial Pricing Node types: Hubs (HUB), Interface (INT), Generation (GND), Load Zone (LZN), DRR and Aggregate Generation (FXD).

GFAOB FBTs

GFAOB FBTs are used specifically for MPs with a MISO recognized GFAOB who have chosen Section 38.8.3.b. (Option B) of the Tariff. MISO defines the transaction buying and selling AO, the source and sink Commercial Pricing Node, and the transaction (contract) date range per a participant's GFA. The transaction buyer and seller are unable to change any transaction parameter except for the hourly transaction volume, which must be provided prior to the close of the Day-Ahead Energy and Operating Reserve Market. Grandfathered FBTs can only occur in the Day-Ahead Energy and Operating Reserve Market between the following Commercial Pricing Nodes:

- A generation source and a Load Zone,
- A generation source and an Interface Commercial Pricing Node, or a
- An Interface Commercial Pricing Node and a Load Zone.

All GFAOB FBT hourly volumes are validated prior to settlement. The validation process verifies the scheduled volume of GFAOB FBTs do not exceed the available generation supply and Load consumption. Validations are performed only once and one transaction invalidation cannot then make another transaction valid.

- GFAOB FBT sellers must provide sufficient supply volume for all their transactions with a generation asset or through PBTs.

  When the GFAOB FBT seller is supplying the volume from a generation asset, the generation volume supplied is verified to be equal to or greater than the sum of all their GFAOB FBTs sold from that generation asset for the Hour. If the generation volume is less than the total GFAOB FBT volume being supplied, then all the AO's GFAOB FBT volumes that are being supplied by that generation source for that Hour are reduced to zero.

  When the GFAOB FBT seller is supplying one or more GFAOB FBTs from one or more PBTs where they are the seller, the total PBT volume supplied is verified to be equal to or greater than the sum of all their GFAOB FBTs sold from that Commercial Pricing Node for the Hour. The volume comparison at the Commercial Pricing Node is made only with PBTs where the AO is the seller and is not netted against any PBTs where the AO may be the buyer. If the PBT volume is less than the total GFAOB FBT volume at a Commercial Pricing Node in the Hour, then all the AO's GFAOB FBTs at the Commercial Pricing Node for the Hour are reduced to zero.

For validations associated with a Combined Cycle and Cross Compound registered generation asset, the validation is performed at the aggregate Commercial Pricing Node. All generation and GFAOB FBT volumes at any individual generation asset are rolled up to the aggregate node for the Combined Cycle and Cross Compound Asset. This allows individual offered and cleared Generators to supply GFAOB at the aggregate Commercial Pricing Node.

- GFAOB FBT buyers must fully consume all transaction volume with a Load Zone asset or through PBTs.

  When the GFAOB FBT buyer is consuming the volume at a Load Zone asset, the Load Zone asset volume consumption is verified to be equal to or greater than the sum of all their GFAOB FBTs provided to that Load Zone asset for the Hour. If the Load Zone asset volume is less than the total GFAOB FBT volume, then all the AO's GFAOB FBT volume that is being provided to that Load Zone asset for the that Hour is reduced to zero.

  When the GFAOB FBT buyer is consuming the volume of one or more GFAOB FBTs with one or more PBTs where they are the buyer, the total PBT volume consumed is verified to be equal to or greater than the sum of all their GFAOB FBTs provided to that Commercial Pricing Node for the Hour. The volume comparison at the Commercial Pricing Node is made only with PBTs where the AO is the buyer and is not netted against any PBTs where the AO may be the seller. If the PBT volume is less than the total GFAOB FBT volume at a Commercial Pricing Node in the Hour, then all the AO's GFAOB FBTs at the Commercial Pricing Node for the Hour are reduced to zero.

GFAOB ECCH FBTs

Option B ECCH FBTs are used specifically for MPs defined per Section 43.2.6. of the Tariff. MISO defines the transaction buying and selling AO, the source and sink Commercial Pricing Node, and the transaction (contract) date range. The transaction buyer and seller are unable to change any transaction parameter except for the hourly transaction volume, which must be provided prior to the close of the Day-Ahead Energy and Operating Reserve Market. Option B ECCH FBTs can only occur in the Day-Ahead Energy and Operating Reserve Market between the following Commercial Pricing Nodes:

- A generation source and a Load Zone,
- A generation source and an Interface Commercial Pricing Node, or
- An Interface Commercial Pricing Node and a Load Zone.

All Option B ECCH FBT hourly volumes are validated prior to settlement. The validation process verifies the scheduled volume of Option B ECCH FBTs do not exceed the available generation supply and Load consumption. Validations are performed only once and one transaction invalidation cannot then make another transaction valid.

- Option B ECCH FBT sellers must provide sufficient supply volume for all their transactions with a generation asset or with PBTs.

  When the Option B ECCH FBT seller is supplying the volume from a generation asset, the generation volume supplied is verified to be equal to or greater than the sum of all their Option B ECCH FBTs sold from that generation asset for the Hour. If the generation volume is less than the total Option B ECCH FBT volume being supplied, then all the AO's Option B ECCH FBT volumes that are being supplied by that generation source for that Hour are reduced to zero.

  When the Option B ECCH FBT seller is supplying one or more ECCH FBTs from one or more PBTs where they are the seller, the total PBT volume supplied is verified to be equal to or greater than the sum of all their Option B ECCH FBTs sold from that Commercial Pricing Node for the Hour. The volume comparison at the Commercial Pricing Node is made only with PBTs where the AO is the seller and is not netted against any PBTs where the AO may be the buyer. If the PBT volume is less than the total Option B ECCH FBT volume at a Commercial Pricing Node in the Hour, then all the AO's Option B ECCH FBTs at the Commercial Pricing Node for the Hour are reduced to zero.

For validations associated with a Combined Cycle and Cross Compound registered generation asset, the validation is performed at the aggregate Commercial Pricing Node. All generation and Option B ECCH FBT volumes at any individual generation asset are rolled up to the aggregate node for the Combined Cycle and Cross Compound Asset. This allows individual offered and cleared Generators to supply an Option B ECCH at the aggregate Commercial Pricing Node.

- Option B ECCH FBT buyers must fully consume all transaction volume at a Load Zone asset (asset withdrawal volume and cleared virtual Bid volume) or through PBTs.

  When the Option B ECCH FBT buyer is consuming the volume at a Load Zone asset, the Load Zone asset volume consumption is verified to be equal to or greater than the sum of all their ECCH FBTs provided to that Load Zone asset for the Hour. The Load Zone asset volume is equal to the cleared energy withdrawal for the asset (injections are ignored) and the net cleared energy virtual megawatts withdrawn at the asset (injections are ignored) by the AO of the Asset. If the Load Zone asset volume is less than the total Option B ECCH FBT volume, then all the AO's Option B ECCH FBT volume that is being provided to that Load Zone asset for that Hour is reduced to zero.

  When the Option B ECCH FBT buyer is consuming the volume of one or more Option B ECCH FBTs with one or more PBTs where they are the buyer, the total PBT volume consumed is verified to be equal to or greater than the sum of all their Option B ECCH FBTs provided to that Commercial Pricing Node for the Hour. The volume comparison at the Commercial Pricing Node is made only with PBTs where the AO is the buyer and is not netted against any PBTs where the AO may be the seller. If the PBT volume is less than the total Option B ECCH FBT volume at a Commercial Pricing Node in the Hour, then all the AO's Option B ECCH FBTs at the Commercial Pricing Node for the Hour are reduced to zero.

B.2.1 Calculation Inputs for DA_FIN_CG

*DA_FIN_{Buyer}	Hourly Day-Ahead IBS FBT Volume where the AO is the Transaction Buyer (MWh); the Buyer is defined as the AO that receives the FBT volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value.
*DA_FIN_{Seller}	Hourly Day-Ahead IBS FBT Volume where the AO is the Transaction Seller (MWh); the Seller is defined as the AO that supplies the FBT volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value.
*DA_GFACO_{Buyer}	Hourly Day-Ahead Carved-Out GFA Transaction Volume where the AO is the buyer (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The buyer is defined as the AO that receives the transaction volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the FBT will be listed for each end of the transaction.
*DA_GFACO_{Seller}	Hourly Day-Ahead Carved-Out GFA Transaction Volume where the AO is the seller (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The seller is defined as the AO that provides the transaction volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the FBT will be listed for each end of the transaction.
*$DA\_LMP\_CG_{SO}$	Hourly Day-Ahead Congestion Component of the LMP at the source Commercial Pricing Node ($/MWh).
*$DA\_LMP\_CG_{SI}$	Hourly Day-Ahead Congestion Component of the LMP at the sink Commercial Pricing Node ($/MWh).

*$DA\_LMP\_CG_{DP}$	Hourly Day-Ahead Congestion Component of the LMP at the Delivery Point Commercial Pricing Node ($/MWh).

B.2.2 Intermediate Calculations for DA_FIN_CG

DA_GFAOB_{Buyer}	Hourly Day-Ahead Valid Option B (GFA or ECCH) FBT Volume (MWh); where the AO is the Transaction Buyer. The equation represents a single validated transaction at a single Commercial Pricing Node. Please refer to the previously defined calculation definition of this component.
DA_GFAOB_{Seller}	Hourly Day-Ahead Valid Option B (GFA or ECCH) FBT Volume (MWh); where the AO is the Transaction Seller. The equation represents a single validated transaction at a single Commercial Pricing Node. Please refer to the previously defined calculation definition of this component.
DA_FIN_BUY_CG	Hourly Total Day-Ahead Buyer FBT Congestion Charge ($); the amount is the hourly total calculated congestion charge for all IBS type Day-Ahead FBTs where the AO is the buyer of the transaction. The buyer is defined as an AO that receives the transaction volume at the sink Commercial Pricing Node. $= \Sigma_{Transactions} [(DA\_FIN_{Buyer}) * (DA\_LMP\_CG_{SI} - DA\_LMP\_CG_{DP})]$
DA_FIN_SELL_CG	Hourly Total Day-Ahead Seller FBT Congestion Charge ($); the amount is the hourly total calculated congestion charge for all IBS type Day-Ahead FBTs where the AO is the seller of the transaction. The seller is defined as an AO that supplies the transaction volume at the source Commercial Pricing Node. $= \Sigma_{Transactions} [(DA\_FIN_{Seller}) * (DA\_LMP\_CG_{DP} - DA\_LMP\_CG_{SO})]$
DA_FIN_GFAOB_BUY_CG	Hourly Total Day-Ahead Buyer Option B FBT Congestion Charge ($); the amount is the hourly total calculated congestion charge for all Option B type Day-Ahead FBTs where the AO is the buyer of the transaction. The buyer is defined as an AO that receives the transaction volume at the sink Commercial Pricing Node. $= \Sigma_{Transactions} [(DA\_GFAOB_{Buyer}) * (DA\_LMP\_CG_{SI} - DA\_LMP\_CG_{DP})]$
DA_FIN_GFAOB_SELL_CG	Hourly Total Day-Ahead Seller Option B FBT Congestion Charge ($); the amount is the hourly total calculated congestion charge for all Option B type Day-Ahead FBTs where the AO is the seller of the transaction. The seller is defined as an AO that supplies the transaction volume at the source Commercial Pricing Node.

$= \Sigma_{Transactions}$ [(DA_GFAOB_{Seller}) * ($DA\_LMP\_CG_{DP}$ - $DA\_LMP\_CG_{SO}$)]

DA_GFACO_BUY_CG

Hourly Total Day-Ahead Buyer Carved-Out GFA Transaction Congestion Charge ($); the amount is the hourly total calculated congestion charge for all Carved-Out GFA Transactions where the AO is the buyer of the transaction. The buyer is defined as an AO that receives the transaction volume at the sink Commercial Pricing Node.

$= \Sigma_{Transactions}$ [(DA_GFACO_{Buyer}) * ($DA\_LMP\_CG_{SI}$ - $DA\_LMP\_CG_{DP}$)]

DA_GFACO_SELL_CG

Hourly Total Day-Ahead Seller Carved-Out GFA Transaction Congestion Charge ($); the amount is the hourly total calculated congestion charge for all Carved-Out GFA Transactions where the AO is the seller of the transaction. The seller is defined as an AO that supplies the transaction volume at the source Commercial Pricing Node.

$= \Sigma_{Transactions}$ [(DA_GFACO_{Seller}) * ($DA\_LMP\_CG_{DP}$ - $DA\_LMP\_CG_{SO}$)]

B.2.3 Charge Type Calculation for DA_FIN_CG

*^DA_FIN_CG_HR

Hourly Day-Ahead FBT Congestion Hourly Amount ($); this calculation is performed for all AOs that have Day-Ahead FBTs and/or Carved-Out GFA Transactions. The result represents the AO's total hourly congestion charge or credit for all their Day-Ahead FBTs and Carved-Out GFA Transactions. The result is rounded to the nearest cent. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement.

= DA_FIN_BUY_CG + DA_FIN_SELL_CG + DA_FIN_GFAOB_BUY_CG + DA_FIN_GFAOB_SELL_CG + DA_GFACO_BUY_CG + DA_GFACO_SELL_CG

*DA_FIN_CG

Day-Ahead FBT Congestion Amount ($); is a daily total amount due MISO from an AO from all the Day-Ahead FBTs and Carved-Out GFA Transactions. The formula result is displayed in dollars.

$= \Sigma_H$ (DA_FIN_CG_HR)

B.3 Day-Ahead Financial Schedule Loss Amount (DA_FIN_LS)

The Day-Ahead FBT Loss Amount represents an AO's total FBT loss costs and Carve-Out GFA Transaction loss costs for an Operating Day. The amount is calculated hourly for each transaction buyer and seller and summed by AO into a daily total. Since transaction loss costs are the difference between two Commercial Pricing Nodes loss costs multiplied by the transaction volume, this amount can result in a charge or a credit depending upon the Commercial Pricing Nodes being settled. Day-Ahead FBT Loss Amount is calculated on FBTs (GFAOB Option B (GFA or ECCH) and IBS transaction types) and Carved-Out GFA Transactions. Each FBT and Carved-Out GFA Transaction has the following elements defined:

- Energy source Commercial Pricing Node
- Energy sink Commercial Pricing Node
- Delivery Point Commercial Pricing Node
- Buying AO
- Selling AO
- Energy volume in megawatts
- Date, including hours that it is applicable

The Delivery Point is defined as the financial location, which can also be either the source or sink, where responsibility for the cost of losses is transferred from seller to buyer. The Delivery Point can be any Commercial Pricing Node and impacts the calculation as follows:

- The seller is responsible for the loss charge difference between the Delivery Point and the source Commercial Pricing Node. When the Delivery Point is defined as the sink Commercial Pricing Node, the seller is responsible for the losses between the Commercial Pricing Nodes.
- The buyer is responsible for the loss charge difference between the sink and Delivery Point Commercial Pricing Nodes. When the Delivery Point is defined as the source Commercial Pricing Node, the buyer is responsible for losses between the Commercial Pricing Nodes.

For Carved-Out GFA Transactions, the Delivery Point is always the source Commercial Pricing Node and as such the transaction buyer is responsible for the congestion charge difference between the sink and source Commercial Pricing Node.

The Day-Ahead FBT Losses Amount, including determinants, is displayed on the Day-Ahead Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a billing determinant that is displayed on an AO's Day-Ahead statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

Settlement of GFA Related Day-Ahead FBTs

There are three types of Day-Ahead FBTs:

- IBS - Refers to the standard FBTs where congestion and losses are charged.
- GFAOB - Refers to the standard type of GFAOB related FBTs. These transactions have both the "Pre 888 Congestion Flag" and the "Pre 888 Loss Flag" equal to "B". GFAOB transaction volumes are validated hourly, receive full congestion rebates, and are rebated half the losses charged or credited. Load served by the standard GFAOB transactions are not eligible for Real-Time Losses Rebate.
- GFAOB ECCH - A type of GFAOB transaction. The ECCH provides participants with a congestion hedge in NCAs of the market. These transactions have the "Pre 888 Congestion Flag" equal to "B" and the "Pre 888 Loss Flag" equal to "N". ECCH transaction volumes are validated hourly, receive full congestion rebates, and do not receive any loss rebates. Load served by ECCH GFAOB transactions are eligible for Real-Time Losses Rebate.

IBS FBTs

IBS FBTs can exist between any two AOs at any of the following Commercial Pricing Nodes types: Hubs (HUB), Interface (INT), Generation (GND), Load Zone (LZN), DRR and Aggregate Generation (FXD).

GFAOB FBTs

GFAOB FBTs are used specifically for MPs with a MISO recognized GFAOB who have chosen (Option B) of the Tariff. MISO defines the transaction buying and selling AO, the source and sink Commercial Pricing Node, and the transaction (contract) date range per a participant's GFA. The transaction buyer and seller are unable to change any transaction parameter except for the hourly transaction volume, which must be provided prior to the close of the Day-Ahead Energy and Operating Reserve Market. Grandfathered FBTs can only occur in the Day-Ahead Energy and Operating Reserve Market between the following Commercial Pricing Nodes:

- A generation source and a Load Zone,
- A generation source and an Interface Commercial Pricing Node, or
- An Interface Commercial Pricing Node and a Load Zone.

All GFAOB FBT hourly volumes are validated prior to settlement. The validation process verifies the scheduled volume of GFAOB FBTs do not exceed the available generation supply and Load consumption. Validations are performed only once and one transaction invalidation cannot then make another transaction valid.

- GFAOB FBT sellers must provide sufficient supply volume for all their transactions with a generation asset or through PBTs.

  When the GFAOB FBT seller is supplying the volume from a generation asset, the generation volume supplied is verified to be equal to or greater than the sum of all their GFAOB FBTs sold from that generation asset for the Hour. If the generation volume is less than the total GFAOB FBT volume being supplied, then all the AO's GFAOB FBT volumes that are being supplied by that generation source for that Hour are reduced to zero.

  When the GFAOB FBT seller is supplying one or more GFAOB FBTs from one or more PBTs where they are the seller, the total PBT volume supplied is verified to be equal to or greater than the sum of all their GFAOB FBTs sold from that Commercial Pricing Node for the Hour. The volume comparison at the Commercial Pricing Node is made only with PBTs where the AO is the seller and is not netted against any PBTs where the AO may be the buyer. If the PBT volume is less than the total GFAOB FBT volume at a Commercial Pricing Node in the Hour, then all the AO's GFAOB FBTs at the Commercial Pricing Node for the Hour are reduced to zero.

For validations associated with a Combined Cycle and Cross Compound registered generation asset, the validation is performed at the aggregate Commercial Pricing Node. All generation and GFAOB FBT volumes at any individual generation asset are rolled up to the aggregate node for the Combined Cycle and Cross Compound Asset. This allows individual offered and cleared Generators to supply GFAOB at the aggregate Commercial Pricing Node.

- GFAOB FBT buyers must fully consume all transaction volume with a Load Zone asset or through PBTs.

  When the GFAOB FBT buyer is consuming the volume at a Load Zone asset, the Load Zone asset volume consumption is verified to be equal to or greater than the sum of all their GFAOB FBTs provided to that Load Zone asset for the Hour. If the Load Zone asset volume is less than the total GFAOB FBT volume, then all the AO's GFAOB FBT volume that is being provided to that Load Zone asset for that Hour is reduced to zero.

  When the GFAOB FBT buyer is consuming the volume of one or more GFAOB FBTs with one or more PBTs where they are the buyer, the total PBT volume consumed is verified to be equal to or greater than the sum of all their GFAOB FBTs provided to that Commercial Pricing Node for the Hour. The volume comparison at the Commercial Pricing Node is made only with PBTs where the AO is the buyer and is not netted against any PBTs where the AO may be the seller. If the PBT volume is less than the total GFAOB FBT volume at a Commercial Pricing Node in the Hour, then all the AO's GFAOB FBTs at the Commercial Pricing Node for the Hour are reduced to zero.

GFAOB ECCH FBTs

MISO defines the transaction buying and selling AO, the source and sink Commercial Pricing Node, and the transaction (contract) date range. The transaction buyer and seller are unable to change any transaction parameter except for the hourly transaction volume, which must be provided prior to the close of the Day-Ahead Energy and Operating Reserve Market. Option B ECCH FBTs can only occur in the Day-Ahead Energy and Operating Reserve Market between the following Commercial Pricing Nodes:

- A generation source and a Load Zone,
- A generation source and an Interface Commercial Pricing Node, or
- An Interface Commercial Pricing Node and a Load Zone.

All Option B ECCH FBT hourly volumes are validated prior to settlement. The validation process verifies the scheduled volume of Option B ECCH FBTs do not exceed the available generation supply and load consumption. Validations are performed only once and one transaction invalidation cannot then make another transaction valid.

- Option B ECCH FBT sellers must provide sufficient supply volume for all their transactions with a generation asset or with PBTs.

  When the Option B ECCH FBT seller is supplying the volume from a generation asset, the generation volume supplied is verified to be equal to or greater than the sum of all their Option B ECCH FBTs sold from that generation asset for the Hour. If the generation volume is less than the total Option B ECCH FBT volume being supplied, then all the AO's Option B ECCH FBT volumes that are being supplied by that generation source for that Hour are reduced to zero.

  When the Option B ECCH FBT seller is supplying one or more ECCH FBTs from one or more PBTs where they are the seller, the total PBT volume supplied is verified to be equal to or greater than the sum of all their Option B ECCH FBTs sold from that Commercial Pricing Node for the Hour. The volume comparison at the Commercial Pricing Node is made only with PBTs where the AO is the seller and is not netted against any PBTs where the AO may be the buyer. If the PBT volume is less than the total Option B ECCH FBT volume at a Commercial Pricing Node in the Hour, then all the AO's Option B ECCH FBTs at the Commercial Pricing Node for the Hour are reduced to zero.

For validations associated with a Combined Cycle and Cross Compound registered generation asset, the validation is performed at the aggregate Commercial Pricing Node. All generation and Option B ECCH FBT volumes at any individual generation asset are rolled up to the aggregate node for the Combined Cycle and Cross Compound Asset. This allows individual offered and cleared Generators to supply an Option B ECCH at the aggregate Commercial Pricing Node.

- Option B ECCH FBT buyers must fully consume all transaction volume at a Load Zone asset (asset withdrawal volume and cleared virtual Bid volume) or through PBTs.

  When the Option B ECCH FBT buyer is consuming the volume at a Load Zone asset, the Load Zone asset volume consumption is verified to be equal to or greater than the sum of all their ECCH FBTs provided to that Load Zone asset for the Hour. The Load Zone asset volume is equal to the cleared energy withdrawal for the asset (injections are ignored) and the net cleared energy virtual megawatts withdrawn at the asset (injections are ignored) by the AO of the Asset. If the Load Zone asset volume is less than the total Option B ECCH FBT volume, then all the AO's Option B ECCH FBT volume that is being provided to that Load Zone asset for the that Hour is reduced to zero.

  When the Option B ECCH FBT buyer is consuming the volume of one or more Option B ECCH FBTs with one or more PBTs where they are the buyer, the total PBT volume consumed is verified to be equal to or greater than the sum of all their Option B ECCH FBTs provided to that Commercial Pricing Node for the Hour. The volume comparison at the Commercial Pricing Node is made only with PBTs where the AO is the buyer and is not netted against any PBTs where the AO may be the seller. If the PBT volume is less than the total Option B ECCH FBT volume at a Commercial Pricing Node in the Hour, then all the AO's Option B ECCH FBTs at the Commercial Pricing Node for the Hour are reduced to zero.

B.3.1 Calculation Inputs for DA_FIN_LS

*DA_FIN_{Buyer}	Hourly Day-Ahead IBS FBT Volume at a where the AO is the Transaction Buyer (MWh); the Buyer is defined as the AO that receives the FBT volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value.
*DA_FIN_{Seller}	Hourly Day-Ahead IBS FBT Volume at a where the AO is the Transaction Seller (MWh); the Seller is defined as the AO that supplies the FBT volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value.
*DA_GFACO_{Buyer}	Hourly Day-Ahead Carved-Out GFA Transaction Volume where the AO is the buyer (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carve-Out Transaction. The buyer is defined as the AO that receives the transaction volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the FBT will be listed for each end of the transaction.
*DA_GFACOSeller	Hourly Day-Ahead Carved-Out GFA Transaction Volume where the AO is the seller (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The seller is defined as the AO that provides the transaction volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the FBT will be listed for each end of the transaction.
*$DA\_LMP\_LS_{SO}$	Hourly Day-Ahead Loss Component of the LMP at the source Commercial Pricing Node ($/MWh).
*$DA\_LMP\_LS_{SI}$	Hourly Day-Ahead Loss Component of the LMP at sink Commercial Pricing Node ($/MW).
*$DA\_LMP\_LS_{DP}$	Hourly Day-Ahead Loss Component of the LMP at Delivery Point Commercial Pricing Node ($/MW).

B.3.2 Intermediate Calculations for DA_FIN_LS

*DA_GFAOB_{Buyer} — Hourly Day-Ahead Valid Option B (GFA or ECCH) FBT Volume (MWh); where the AO is the Transaction Buyer. The equation represents a single validated transaction at a single Commercial Pricing Node. Please refer to the previously defined calculation definition of this component.

*DA_GFAOB_{Seller} — Hourly Day-Ahead Valid Option B (GFA or ECCH) FBT Volume (MWh); where the AO is the Transaction Seller. The equation represents a single validated transaction at a single Commercial Pricing Node. Please refer to the previously defined calculation definition of this component.

DA_FIN_BUY_LS — Hourly Total Day-Ahead Buyer FBT Loss Charge ($); the amount is the hourly total calculated loss charge for all IBS type Day-Ahead FBTs where the AO is the buyer of the transaction. The buyer is defined as an AO that receives the transaction volume at the sink Commercial Pricing Node.

$= \Sigma_{Transactions} [(DA\_FIN_{Buyer}) * (DA\_LMP\_LS_{SI} - DA\_LMP\_LS_{DP})]$

DA_FIN_SELL_LS — Hourly Total Day-Ahead Seller FBT Loss Charge ($); the amount is the hourly total calculated loss charge for all IBS type Day-Ahead FBTs where the AO is the seller of the transaction. The seller is defined as an AO that supplies the transaction volume at the source Commercial Pricing Node.

$= \Sigma_{Transactions} [(DA\_FIN_{Seller}) * (DA\_LMP\_LS_{DP} - DA\_LMP\_LS_{SO})]$

DA_FIN_GFAOB_BUY_LS — Hourly Total Day-Ahead Buyer Option B FBT Loss Charge ($); the amount is the hourly total calculated loss charge for all Option B type Day-Ahead FBTs where the AO is the buyer of the transaction. The buyer is defined as an AO that receives the transaction volume at the sink Commercial Pricing Node.

$= \Sigma_{Transactions} [(DA\_GFAOB_{Buyer}) * (DA\_LMP\_LS_{SI} - DA\_LMP\_LS_{DP})]$

DA_FIN_GFAOB_SELL_LS — Hourly Total Day-Ahead Seller Option B FBT Loss Charge ($); the amount is the hourly total calculated loss charge for all Option B type Day-Ahead FBTs where the AO is the seller of the transaction. The seller is defined as an AO that supplies the transaction volume at the source Commercial Pricing Node.

$= \Sigma_{Transactions} [(DA\_GFAOB_{Seller}) * (DA\_LMP\_LS_{DP} - DA\_LMP\_LS_{SO})]$

DA_GFACO_BUY_LS — Hourly Total Day-Ahead Buyer Carved-Out GFA Transaction Loss Charge ($); the amount is the hourly total calculated losses charge for all Carved-Out GFA Transactions where the AO is the buyer of the transaction. The buyer is defined as an AO that receives the transaction volume at the sink Commercial Pricing Node.

$= \Sigma_{Transactions} [(DA\_GFACO_{Buyer}) * (DA\_LMP\_LS_{SI} - DA\_LMP\_LS_{DP})]$

DA_GFACO_SELL_LS — Hourly Total Day-Ahead Seller Carved-Out GFA Transaction Loss Charge ($); the amount is the hourly total calculated losses charge for all Carved-Out GFA Transactions where the AO is the seller of the transaction. The seller is defined as an AO that supplies the transaction volume at the source Commercial Pricing Node.

$= \Sigma_{Transactions} [(DA\_GFACO_{Seller}) * (DA\_LMP\_LS_{DP} - DA\_LMP\_LS_{SO})]$

B.3.3 Charge Type Calculation for DA_FIN_LS

*^DA_FIN_LS_HR — Hourly Day-Ahead FBT Loss Hourly Amount ($); this calculation is performed for all AOs that have Day-Ahead FBTs and/or Carved-Out GFA Transactions. The result represents the AO's total hourly loss charge or credit for all their Day-Ahead FBTs and Carved-Out GFA Transactions. The result rounded to the nearest cent. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement.

= DA_FIN_BUY_LS + DA_FIN_SELL_LS + DA_FIN_GFAOB_BUY_LS + DA_FIN_GFAOB_SELL_LS + DA_GFACO_BUY_LS + DA_GFACO_SELL_LS

*DA_FIN_LS

Day-Ahead FBT Loss Amount ($); is a daily total amount due MISO from an AO from all the Day-Ahead FBTs and Carved-Out GFA Transactions. The formula result is displayed in dollars.

$= \Sigma_H (DA\_FIN\_LS\_HR)$

B.4 Day-Ahead Market Administration Amount (DA_ADMIN)

The Day-Ahead Market Administration Amount in conjunction with the Real-Time Market Administration Amount, collectively referred to as Tariff Schedule 17, are designed to recover the cost of operating the Day-Ahead and Real-Time Energy and Operating Reserves Markets. The Day-Ahead and Real-Time Market Administration Amounts are charged separately.

~~The Day-Ahead Market Administration Amount consists of a charge on transactions and a charge on market participation.~~

~~The transactional charge applies to Day-Ahead Virtual Bid and Offer Schedules only. A transaction is defined as a single Bid or Offer by hour by AO. On an hourly basis by AO, the number of transactions are counted and multiplied by the Administration Transaction Rate and added to the hourly charge calculated for hourly market participation. Until further notice, the transactional charge rate is set to zero.~~

For each AO for an Operating Day, Market Settlements assesses an administration charge on the AO's participation in the Day-Ahead Energy and Operating Reserve Market. The AO's Day-Ahead Energy and Operating Reserve Market participation volume is calculated at each Commercial Pricing Node for each hour and summed for the entire Operating Day. The resulting daily market participation volume is multiplied by the hourly Energy and Operating Reserve Markets Administration Rate. An AO's Day-Ahead hourly participation volume at a Commercial Pricing Node is based on the total directional energy volume into and out of the Commercial Pricing Node, by the AO.

AOs can utilize IBS type FBTs, validated Option B (GFA or ECCH) type FBTs in conjunction with PBT and only be assessed an administration charge on the FBT volume, and not the PBT volume.

AOs can utilize IBS type FBTs, validated Option B (GFA or ECCH) type FBTs, and Carved-Out GFA Transactions in conjunction with their asset (generation, Load Zone, or DRR) schedule and only be assessed an administration charge on the FBT volume and Carved-Out GFA Transaction volumes.

The use of FBTs and Carved-Out GFA Transactions do not increase an AO's administration charge at a Commercial Pricing Node provided:

1) The AO generates electricity and sells FBTs and/or Carved-Out GFA Transactions. (Asset schedules in excess of the sold FBT and Carved-Out GFA Transaction volume increase an AO's market participation volume and are subject to Day-Ahead market administration charge).
2) The AO buys FBTs and/or Carved-Out GFA Transactions and then consumes the electricity as Load. (The Load consumed in excess of the bought transaction volume increase an AO's market participation volume and is subject to Day-Ahead market administration charge).
3) The AO sells PBTs and sells FBTs. (The PBTs sold in excess of the sold FBT volume increase an AO's market participation volume and is subject to Day-Ahead market administration charge).
4) The AO buys FBTs and then buys PBTs. (The PBTs bought in excess of the purchased FBT volume increase an AO's market participation volume and is subject to Day-Ahead market administration charge).

All Option B (GFA or ECCH) FBT hourly volumes are validated prior to settlement. The validation process verifies the scheduled volume of Option B FBTs do not exceed the available generation supply and Load consumption. Transactions that are invalidated are not subject to MISO administration charges. Validations are performed only once, and one transaction invalidation cannot then make another transaction valid.

- Option B FBT sellers must provide sufficient supply volume for all their transactions with a generation asset or through PBTs.
- Option B FBT buyers must fully consume all transaction volume with a Load Zone asset or through PBTs.

Combined Cycle and Cross Compound registered generation assets consist of more than one generation asset at a single location. Although each generation asset has a separately defined Commercial Pricing Node, an aggregate Commercial Pricing Node is also created that represents all the Combined Cycle or Cross Compound generation asset. AOs can submit generation Offers by Hour at the individual Generator or at the aggregate level. For settlements, all individual Combined Cycle and Cross Compound generation asset information is summed to the aggregate node representing the entire

Combined Cycle or Cross Compound asset. Whether an AO has submitted individual or aggregate Offers, all asset related settlements is performed at the aggregate level. The directional volume methodology related to a Combined Cycle or Cross Compound registered generation asset is performed at the aggregate Commercial Pricing Node. All generation and GFAOB FBT volumes at any individual generation asset are rolled up to the aggregate node. This allows individually offered and cleared Generators to supply FBTs, standard (IBS) and GFAOB related, at the aggregate Commercial Pricing Node without being assessed additional administration charges.

In accordance with the Tariff, all assets meeting the administrative charge exemption is not subject to the Day-Ahead Market Administrative Amount charge type. All transactions and schedules originating at, or terminating at, the asset Commercial Pricing Node is subject to this charge type.

Market Settlements uses the Energy Markets Administration Rate in effect for the Operating Day to calculate the Day-Ahead Market Administration Amount.

The Day-Ahead Market Administration Amount, including determinants, is displayed on the Day-Ahead Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a determinant that is displayed on an AO's Day-Ahead statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

B.4.1 Calculation Inputs for DA_ADMIN

~~*ADMIN_TXN_CNT~~	~~Daily Day-Ahead Virtual Transaction Count by AO (Integer); for each Operating Day, MISO counts the number of Day-Ahead Virtual Bids and Offers by AO. Transactions are defined as Day-Ahead Virtual Bid and Offers by Commercial Pricing Node by hour.~~
~~*ADMIN_TXN_RATE~~	~~Transaction Administration Rate ($/Transaction); Tariff Schedule 17 fee for specified transactions. Until further notice this rate is to be set at zero.~~

DA_DRRII_SCHD_VOL	Hourly Day-Ahead DRR II Schedule Volume (MWh); the calculated volume representing injection for a DRR Type-II in the Day-Ahead Market. This injection volume for the DRR Type-II is calculated as minus one times the difference between the Day-Ahead dispatch maximum and the Day-Ahead Schedule withdrawal bid volume for the DRR Type-II. Please refer to the previously defined calculation definition of this component.
*DA_FIN_{Buyer}	Hourly Day-Ahead FBT Volume at a Commercial Pricing Node where the AO is the Buyer (MWh); the Buyer is defined as the AO that receives the FBT volume at the sink Commercial Pricing Node.
*DA_FIN_{Seller}	Hourly Day-Ahead FBT Volume at a Commercial Pricing Node where the AO is the Seller (MWh); the Seller is defined as the AO that supplies the FBT volume at the source Commercial Pricing Node.
*DA_GFACO_{Buyer}	Hourly Day-Ahead Carved-Out GFA Transaction Volume where the AO is the buyer and owns an Asset at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The buyer is defined as the AO that receives the transaction volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the FBT will be listed for each end of the transaction.
*DA_GFACO_{Seller}	Hourly Day-Ahead Carved-Out GFA Transaction Volume where the AO is the seller and owns an Asset at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The seller is defined as the AO that provides the transaction volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the FBT will be listed for each end of the transaction.
*DA_GFAOBBuyer	Hourly Day-Ahead Valid Option B (GFA or ECCH) FBT Volume (MWh); at a Commercial Pricing Node where the AO is the Transaction Buyer. The equation represents a single validated transaction at a single Commercial Pricing Node. Please refer to the previously defined calculation definition of this component.

*DA_GFAOB$_{Seller}$	Hourly Day-Ahead Valid Option B (GFA or ECCH) FBT Volume (MWh); at a Commercial Pricing Node where the AO is the Transaction Seller. The equation represents a single validated transaction at a single Commercial Pricing Node. Please refer to the previously defined calculation definition of this component.
*DA_PHYS$_{Buyer}$	Hourly Day-Ahead PBT Volume where the AO is the Transaction Buyer (MWh); a Buyer is defined as an AO that receives energy from MISO, at a MISO defined interface Commercial Pricing Node or EAR Commercial Pricing Node, for export out of MISO. The transaction volume is always presented as a positive value.
*DA_PHYSSeller	Hourly Day-Ahead PBT Volume where the AO is the Transaction Seller (MWh); a Seller is defined as an AO that supplies energy to MISO, at a MISO defined Interface Commercial Pricing Node, for import into MISO. The transaction volume is always presented as a positive value.
*DA_SCHD	Hourly Day-Ahead Asset Schedule Volume per schedule (MWh); the Day-Ahead Asset Schedule Volume is the market cleared bid and offered generation or Load schedule by asset. A positive schedule represents a load obligation and a negative schedule represents a supply obligation.
*DA_VSCHD	Hourly Day-Ahead Net Virtual Schedule Volume (MWh); the Day-Ahead Net Virtual Schedule Volume is the net market cleared Bid and Offered Virtual Schedules by AO by Commercial Pricing Node. A positive volume represents a net Load obligation and a negative volume represents a net supply obligation.
*ENERGY_MKT_RATE	Hourly Energy Markets Administration Rate ($/MWh)
*SCHEDULE_17_ASSET	Administrative Charge Daily Exemption Flag for an Asset ("Exempt" or not shown); whenever an asset is exempt from the administrative schedule 17 charges, this flag will display as an attribute of the asset on the Day-Ahead and Real-Time statements and is equal to "EXEMPT". When an asset is not exempted, this tag will not be shown and it is to be assumed that the asset is subject to Day-Ahead and Real-Time Administrative Amount charge types.

B.4.2 Intermediate Calculations for DA_ADMIN

ABS — The mathematical absolute of the value within the succeeding set of parentheses.

IF — The “IF” logical statement is a conditional test and returns one value if a condition you specify evaluates to TRUE and another value if it evaluates to FALSE. { An example of the IF (logical_test, THEN value_if_true, ELSE value_if_false) }

MAX — The mathematical maximum of the series of numbers in the succeeding parentheses.

MIN — The mathematical minimum of the series of numbers in the succeeding parentheses.

DA_NET_BUY_ADMIN — An AO's Hourly Administration Volume resulting from buying FBTs and Carve-Out GFA Transactions at a Non-Interface Commercial Pricing Nodes (MWh); this equation is performed for each Commercial Pricing Node that is not defined as an Interface Commercial Pricing Node for each Hour for an AO.

= IF [SCHEDULE_17_ASSET = "EXEMPT" for the AO's asset , THEN 0 ,
ELSE (MAX { MAX (0 ,
DA_SCHD – DA_DRRII_SCHD_VOL) ,
[Σ (DA_FIN_{Buyer}) + Σ (DA_GFAOB_{Buyer}) + Σ (DA_GFACO_{Buyer})] })]

DA_NET_BUY_ADMIN_INT — An AO's Hourly Administration Volume resulting from buying FBTs and Carve-Out GFA Transactions Interface Commercial Pricing Nodes (MWh); this equation is performed for each Commercial Pricing Node that is defined as an Interface Commercial Pricing Node for an AO.

= MAX { [Σ (DA_FIN_{Buyer}) + Σ (DA_GFAOB_{Buyer})] , Σ (DA_PHYS_{Buyer}) } +
Σ (DA_GFACO_{Buyer})

DA_NET_SELL_ADMIN — An AO's Hourly Administration Volume resulting from selling FBTs, PBTs, and Carve-Out GFA Transactions at Non-Interface Commercial Pricing Nodes (MWh); this equation is performed for each Commercial Pricing Node that is not defined as an Interface Commercial Pricing Node for each Hour for an AO.

= IF [SCHEDULE_17_ASSET = "EXEMPT" for the AO's asset , THEN 0 ,
ELSE (MAX (ABS { MIN (0 , DA_SCHD – DA_DRRII_SCHD_VOL) ,
[Σ (DA_FINSeller) + Σ (DA_GFAOBSeller) + Σ (DA_GFACOSeller)] })]

DA_NET_SELL_ADMIN_INT

An AO's Hourly Administration Volume resulting from selling FBTs PBTs, and Carve-Out GFA Transactions at Interface Commercial Pricing Nodes (MWh); this equation is performed for each Commercial Pricing Node that is defined as an Interface Commercial Pricing Node.

= MAX { [Σ (DA_FIN_{Seller}) + Σ (DA_GFAOB_{Seller})] , Σ (DA_PHYS_{Seller}) } + Σ (DA_GFACO_{Seller})

DA_VSCHD_VOL

The Hourly Day-Ahead Net Virtual Schedule Volume at a Commercial Pricing Node for an AO (MWh); All Virtual Schedules volumes, whether Bid or Offer, are summed for each AO at each Commercial Pricing Node.

= Σ [ABS (DA_VSCHD)]

*DA_ADMIN_VOL

Day-Ahead Market Administration Volume for an AO (MWh)

= Σ_{CN} (DA_NET_SELL_ADMIN + DA_NET_SELL_ADMIN_INT + DA_NET_BUY_ADMIN + DA_NET_BUY_ADMIN_INT + DA_VSCHD_VOL)

B.4.3 Charge Type Calculation for DA_ADMIN

*^DA_ADMIN_HR

Hourly Day-Ahead Market Participation Administration Amount ($); per AO. The result represents the AO's total hourly Day-Ahead Administration charge or credit for their Day-Ahead Energy and Operating Reserve Market Participation and rounded to the nearest cent. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement.

= (DA_ADMIN_VOL) * ENERGY_MKT_RATE

^*DA_ADMIN	Day-Ahead Market Administration Amount ($); per AO. The result represents the AO's total Operating Day Day-Ahead Administration charge or credit for their Day-Ahead Energy and Operating Reserve Market Participation and their hourly transactions. The formula result is displayed in dollars and is rounded to the nearest cent. = Σ_H (DA_ADMIN_HR) ~~+ (ADMIN_TXN_CNT * ADMIN_TXN_RATE)~~

B.5 DA Schedule 24 Allocation Amount (DA_SCHD_24_ALC)

MISO's Tariff filing includes Schedule 24 – a cost mechanism by which "Local Balancing Authorities (LBAs)" recover the cost of labor and material associated with market operations. "Local Balancing Authority" shall mean all entities performing the LBA functions listed in the Amended BA Agreement either directly or indirectly through an agent or contractor, and which are signatories to the aforementioned agreement (other than the Transmission Provider).

The Day-Ahead Schedule 24 Allocation amount constitutes the collected monies, from the Day-Ahead Energy and Operating Reserve Market, used to fund Schedule 24 distribution back to the LBAs. This charge type is calculated by multiplying the Day Ahead Schedule 24 Administrative volume (in MWh-) by the Schedule 24 Rate (in $/MWh) to obtain an hourly dollar amount.

For each AO for an Operating Day, Market Settlements assesses an administration charge on the AO's participation in the Day-Ahead Energy and Operating Reserve Market. The AO's Day-Ahead Energy and Operating Reserve Market participation volume is calculated at each Commercial Pricing Node for each hour. An AO's Day-Ahead hourly participation volume at a Commercial Pricing Node is based on the total directional energy volume into and out of the Commercial Pricing Node. Transaction volumes associated with Carved-Out Grandfathered Agreements are excluded from this calculation. The resulting hourly market participation volume is multiplied by the hourly Schedule 24 Allocation Rate and then summed to a daily total.

In accordance with the Tariff, all assets meeting the Day-Ahead Market Administration Amount (Schedule 17) charge exemption are not subject to the Day-Ahead Schedule 24 Allocation Amount charge type. All transactions and schedules originating at, or terminating at, the exempt asset Commercial Pricing Node are not subject to this charge type.

The aggregation of Day-Ahead and Real-Time Schedule 24 Allocation amounts equals the full daily distribution of Schedule 24 funds back to the LBAs.

Market Settlements uses the Schedule 24 Allocation Rate in effect for the Operating Day to calculate the Day-Ahead Schedule 24 Allocation Amount.

The Day-Ahead Schedule 24 Allocation Amount, including determinants, is displayed on the Day-Ahead Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a determinant that is displayed on an AO's Day-Ahead statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

B.5.1 Calculation Inputs for DA_SCHD_24_ALC

*^ SCHD_24_ALC_RATE	Hourly Schedule 24 Allocation Rate ($/MWh);
DA_DRRII_SCHD_VOL	Hourly Day-Ahead DRR II Schedule Volume (MWh); the calculated volume representing injection for a DRR Type-II in the Day-Ahead Market. This injection volume for the DRR Type-II is calculated as minus one times the difference between the Day-Ahead dispatch maximum and the Day-Ahead Schedule withdrawal bid volume for the DRR Type-II~~. ~~. Please refer to the previously defined calculation definition of this component.
*DA_FIN_{Buyer}	Hourly Day-Ahead FBT Volume at a Commercial Pricing Node where the AO is the Buyer (MWh); the Buyer is defined as the AO that receives the FBT volume at the sink Commercial Pricing Node.
*DA_FIN_{Seller}	Hourly Day-Ahead FBT Volume at a Commercial Pricing Node where the AO is the Seller (MWh); the Seller is defined as the AO that supplies the FBT volume at the source Commercial Pricing Node.
*DA_GFACO_{Buyer}	Hourly Day-Ahead Carved-Out GFA Transaction Volume where the AO is the buyer and owns an Asset at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The buyer is defined as the AO that receives the transaction volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value. If

	the AO is both the buyer and seller, the FBT will be listed for each end of the transaction.
*DA_GFACO_{Seller}	Hourly Day-Ahead Carved-Out GFA Transaction Volume where the AO is the seller and owns an Asset at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The seller is defined as the AO that provides the transaction volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the FBT will be listed for each end of the transaction.
*DA_GFAOB_{Buyer}	Hourly Day-Ahead Valid Option B (GFA or ECCH) FBT Volume (MWh); at a Commercial Pricing Node where the AO is the Transaction Buyer. The equation represents a single validated transaction at a single Commercial Pricing Node. Please refer to the previously defined calculation definition of this component.
*DA_GFAOB_{Seller}	Hourly Day-Ahead Valid Option B (GFA or ECCH) FBT Volume (MWh); at a Commercial Pricing Node where the AO is the Transaction Seller. The equation represents a single validated transaction at a single Commercial Pricing Node. Please refer to the previously defined calculation definition of this component.
*DA_PHYS_{Buyer}	Hourly Day-Ahead PBT Volume where the AO is the Transaction Buyer (MWh); a Buyer is defined as an AO that receives energy from MISO, at a MISO defined interface Commercial Pricing Node or EAR Commercial Pricing Node, for export out of MISO. The transaction volume is always presented as a positive value.
*DA_PHYS_{Seller}	Hourly Day-Ahead PBT Volume where the AO is the Transaction Seller (MWh); a Seller is defined as an AO that supplies energy to MISO, at a MISO defined Interface Commercial Pricing Node, for import into MISO. The transaction volume is always presented as a positive value.
*DA_SCHD	Hourly Day-Ahead Asset Schedule Volume per schedule (MWh); the Day-Ahead Asset Schedule Volume is the market cleared bid and offered generation or Load schedule by asset. A positive schedule represents a load obligation and a negative schedule represents a supply obligation.

*DA_VSCHD — Hourly Day-Ahead Net Virtual Schedule Volume (MWh); the Day-Ahead Net Virtual Schedule Volume is the net market cleared Bid and Offered Virtual Schedules by AO by Commercial Pricing Node. A positive volume represents a net Load obligation and a negative volume represents a net supply obligation.

*SCHEDULE_17_ASSET — Administrative Charge Daily Exemption Flag for an Asset ("Exempt" or not shown); whenever an asset is exempt from administrative (Schedule 17 and 24) charges, this flag will display as an attribute of the asset on the Day-Ahead and Real-Time statements and is equal to "EXEMPT". When an asset is not exempted, this tag will not be shown and it is to be assumed that the asset is subject to Day-Ahead and Real-Time administrative charges.

B.5.2 Intermediate Calculations for DA_SCHD_24_ALC

ABS — The mathematical absolute of the value within the succeeding set of parentheses.

IF — The “IF” logical statement is a conditional test and returns one value if a condition you specify evaluates to TRUE and another value if it evaluates to FALSE. { An example of the IF (logical_test, THEN value_if_true, ELSE value_if_false) }

MAX — The mathematical maximum of the series of numbers in the succeeding parentheses.

MIN — The mathematical minimum of the series of numbers in the succeeding parentheses.

DA_NET_BUY_S24_ADMIN — An AO's Hourly S24 Administration Volume at Non-Interface Commercial Pricing Nodes (MWh); this equation is performed for each Commercial Pricing Node that is not defined as an Interface Commercial Pricing Node, for each Hour for an AO. Carved-Out Grandfathered Transaction volumes are removed from the Day Ahead Schedule and therefore not subject to Schedule 24 Administrative charges.

= IF [SCHEDULE_17_ASSET = "EXEMPT" for the AO's asset,
THEN 0 ,
ELSE (MAX { MAX (0 ,
DA_SCHD – DA_DRRII_SCHD_VOL - Σ (DA_GFACO_{Buyer})) ,
(Σ (DA_FIN_{Buyer}) + Σ (DA_GFAOB_{Buyer})) })]

DA_NET_BUY_S24_ADMIN_INT — An AO's Hourly Administration Volume at Interface Commercial Pricing Nodes (MWh); this equation is performed for each Commercial Pricing Node that is defined as an Interface Commercial Pricing Node, for each Hour for an AO. GFACO volumes, which are treated like PBTs, are excluded from the calculation and therefore not subject to Schedule 24 Administrative charges.

$= MAX \{ [\Sigma (DA\_FIN_{Buyer}) + \Sigma (DA\_GFAOB_{Buyer})] , \Sigma (DA\_PHYS_{Buyer}) \}$

DA_NET_SELL_S24_ADMIN — An AO's Hourly S24 Administration Volume at Non-Interface Commercial Pricing Nodes (MWh); this equation is performed for each Commercial Pricing Node that is not defined as an Interface Commercial Pricing Node, for each Hour for an AO. Carved-Out Grandfathered Transaction volumes are removed from the Day Ahead Schedule and therefore not subject to Schedule 24 Administrative charges.

= IF [SCHEDULE_17_ASSET = "EXEMPT" for the AO's asset,
THEN 0 ,
ELSE (MAX (ABS { MIN (0 ,
$DA\_SCHD - DA\_DRRII\_SCHD\_VOL + \Sigma (DA\_GFACO_{Seller})) \}$
,
$[\Sigma (DA\_FIN_{Seller}) + \Sigma (DA\_GFAOB_{Seller})]))]$

DA_NET_SELL_S24_ADMIN_INT — An AO's Hourly Administration Volume at Interface Commercial Pricing Nodes (MWh); this equation is performed for each Commercial Pricing Node that is defined as an Interface Commercial Pricing Node, for each Hour for an AO. GFACO volumes, which are treated like PBTs, are excluded from the calculation and therefore not subject to Schedule 24 Administrative charges.

$= MAX \{ [\Sigma (DA\_FIN_{Seller}) + \Sigma (DA\_GFAOB_{Seller})] , \Sigma (DA\_PHYS_{Seller}) \}$

DA_VSCHD_VOL — The Hourly Day-Ahead Net Virtual Schedule Volume at a Commercial Pricing Node for an AO (MWh); All Virtual Schedules volumes, whether Bid or Offer, are summed for each AO at each Commercial Pricing Node.

$= \Sigma [ABS (DA\_VSCHD)]$

*DA_S24_ADMIN_VOL — Day-Ahead Market Schedule 24 Administration Volume for an AO (MWh)

$= \Sigma_{CN} (DA\_NET\_SELL\_S24\_ADMIN + DA\_NET\_SELL\_S24\_ADMIN\_INT + DA\_NET\_BUY\_S24\_ADMIN + DA\_NET\_BUY\_S24\_ADMIN\_INT + DA\_VSCHD\_VOL)$

B.5.3 Charge Type Calculation for DA_SCHD_24_ALC

*^DA_SCHD_24_ALC_HR

Hourly Day-Ahead Schedule 24 Allocation Amount ($); per AO. The result represents the AO's hourly Day-Ahead Schedule 24 Allocation charge for their Day-Ahead Energy and Operating Reserve Market Participation and rounded to the nearest cent. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement.

= DA_S24_ADMIN_VOL * SCHD_24_ALC_RATE

*^DA_SCHD_24_ALC

Day-Ahead Schedule 24 Allocation Amount ($); per AO. The result represents the AO's total Operating Day Day-Ahead Schedule 24 Allocation charge for their Day-Ahead Energy and Operating Reserve Market Participation. The formula result is displayed in dollars and is rounded to the nearest cent.

= Σ_H (DA_SCHD_24_ALC_HR)

B.6 Day-Ahead Non-Asset Energy Amount (DA_NASSET_EN)

The Day-Ahead Non-Asset Energy Amount represents an AO's daily Day-Ahead net energy cost (or credit) related to Commercial Pricing Nodes where the AO does not own assets for that Operating Day. This Day-Ahead Non-Asset Energy Amount is calculated hourly for each AO at each Commercial Pricing Node where the AO does not own generation, Load Zone, or DRR. The AO's hourly energy obligation volume at each Commercial Pricing Node is calculated, multiplied by the LMP for the Commercial Pricing Node, and is summed into an Operating Day amount. In addition, energy wheeled across High-Voltage Direct-Current (HVDC) transmission facilities contributes to the AO’s energy obligation. These transactions are represented by an energy purchase at the transaction source CPNode and a sale at the transaction sink CPNode during the operating hour. Virtual Schedule energy obligations and their charge/credit are calculated separately from this Charge Type. The hourly energy obligation volume at a Commercial Pricing Node where the AO does not own an asset is equal to:

1) Day-Ahead PBT purchases, less
2) Day-Ahead PBT sales, plus
3) Day-Ahead FBTs sales, less
4) Day-Ahead FBTs purchases, plus
5) Day-Ahead Carved-Out GFA Transaction sales at non-interface Commercial Pricing Nodes, minus
6) Day-Ahead Carved-Out GFA Transaction purchases at non-interface Commercial Pricing Nodes.

PBTs can only be scheduled at Interface Commercial Pricing Nodes or EAR Commercial Pricing Nodes and represent energy being sold into or purchased out of MISO by an AO. At the close of the Day-Ahead Energy and Operating Reserve Market, all Day-Ahead PBTs are evaluated, possibly modified, and cleared by the Day-Ahead Energy and Operating Reserve Market. PBTs can be modified by the clearing of the Day-Ahead Energy and Operating Reserve Market based on the type of transaction submitted and the quantity of Bids/Offers in the market. All Day-Ahead PBTs cleared, even if they are cleared to zero volume, are sent to Market Settlements and settled in this charge type. No participant can make changes to Day-Ahead PBTs after the Day-Ahead Energy and Operating Reserve Market closes.

FBTs may be scheduled between most Commercial Pricing Nodes. The MP entering FBT with MISO determines whether the transaction is for the Day-Ahead or Real-Time Energy and Operating Reserve Market along with the Source and Sink. When the seller of an FBT has the source defined at a Commercial Pricing Node where does not own an asset, the energy volume for the transaction is settled in this Charge Type. When the buyer of an FBT has the sink defined at a Commercial Pricing Node where it does not own an asset, the energy volume for the transaction is settled in this Charge Type.

Day-Ahead Carved-Out Grandfathered Transactions allow a participant to deliver energy into MISO, receive energy out of MISO, or move energy within MISO. With PBTs, energy is brought into or out MISO at defined Interfaces Commercial Pricing Nodes or EAR Commercial Pricing Nodes. The energy moved in PBTs is settled at the Interface Commercial Pricing Nodes and MISO is assumed to be the counterparty to the transaction. Carved-Out Grandfathered Transactions are not PBTs because there is always a source and sink along with a buyer and seller. Characteristics of Carved-Out Grandfathered Transactions are:

- There is a specifically defined buyer and seller,
- The transaction source and sink can be any settlement Commercial Pricing Node,
- The transaction has a Delivery Point for settling congestion and losses like FBTs, but the Delivery Point is always defined as the source Commercial Pricing Node. This results in the transaction buyer being charged congestion and losses between the sink and source.
- All congestion and losses charges between the sink and source are rebated.
- When an Interface Commercial Pricing Node is defined as the sink or source, it is assumed that the transaction continues beyond that Commercial Pricing Node. For example if there is a transaction between a Generator and an Interface Commercial Pricing Node, it is assumed that the energy is received at the Generator Commercial Pricing Node, travels to the Interface Commercial Pricing Node, and then continues out of MISO. This results in the energy being settled only at the Generator.
- Transactions are scheduled through the WebTrans.

- Transactions entered in the Day-Ahead Market flow through to the Real-Time Market similar to PBTs.

When an AO has a Carved-Out GFA Transaction with a sink or source defined at a Commercial Pricing Node where the AO owns the asset, the energy is settled in the Asset Energy Charge Type. When an AO has a Carved-Out GFA Transaction with a sink or source at a Commercial Pricing Node where the AO does not own the asset, the energy is settled in the Non-Asset Energy Charge Type.

The Day-Ahead Non-Asset Energy Amount, including determinants, is displayed on the Day-Ahead Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a determinant that is displayed on an AO's Day-Ahead statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

Settlement of GFAOB Related Day-Ahead FBTs

There are three types of Day-Ahead FBTs:

- IBS - Refers to the standard FBTs.
- GFAOB - Refers to the standard type of GFAOB related FBTs. These transactions have both the "Pre 888 Congestion Flag" and the "Pre 888 Loss Flag" equal to "B". GFAOB transaction volumes are validated hourly, receive full congestion rebates, and are rebated half the losses charged or credited. Load served by the standard GFAOB transactions are not eligible for Real-Time Losses Rebate.
- GFAOB ECCH - A type of GFAOB transaction. The ECCH provides participants with a congestion hedge in NCAs of the market. These transactions have the "Pre 888 Congestion Flag" equal to "B" and the "Pre 888 Loss Flag" equal to "N". ECCH transaction volumes are validated hourly, receive full congestion rebates, and do not receive any loss rebates. Load served by ECCH GFAOB transactions are eligible for Real-Time Losses Rebate.

IBS FBTs

IBS FBTs can exist between any two AOs at any of the following Commercial Pricing Nodes types: Hubs (HUB), Interface (INT), generation (GND), Load Zone (LZN), DRR and Aggregate Generation (FXD).

GFAOB FBTs

GFAOB FBTs are used specifically for MPs with a MISO recognized GFAOB who have chosen (Option B) of the Tariff. MISO defines the transaction buying and selling AO, the source and sink Commercial Pricing Node, and the transaction (contract) date range per a participant's GFA. The transaction buyer and seller are unable to change any transaction parameter except for the hourly transaction volume, which must be provided prior to the close of the Day-Ahead Energy and Operating Reserve Market. Option B Grandfathered FBTs can only occur in the Day-Ahead Energy and Operating Reserve Market between the following Commercial Pricing Nodes:

- A generation source and a Load Zone,
- A generation source and an Interface Commercial Pricing Node, or
- An Interface Commercial Pricing Node and a Load Zone.

All GFAOB FBT hourly volumes are validated prior to settlement. The validation process verifies the scheduled volume of GFAOB FBTs do not exceed the available generation supply and Load consumption. Validations are performed only once and one transaction invalidation cannot then make another transaction valid.

- GFAOB FBT sellers must provide sufficient supply volume for all their transactions with a generation asset or through PBTs.

  When the GFAOB FBT seller is supplying the volume from a generation asset, the generation volume supplied is verified to be equal to or greater than the sum of all their GFAOB FBTs sold from that generation asset for the Hour. If the generation volume is less than the total GFAOB FBT volume being supplied, then all the AO's GFAOB FBT volumes that are being supplied by that generation source for that Hour are reduced to zero.

When the GFAOB FBT seller is supplying one or more GFAOB FBTs from one or more PBTs where they are the seller, the total PBT volume supplied is verified to be equal to or greater than the sum of all their GFAOB FBTs sold from that Commercial Pricing Node for the Hour. The volume comparison at the Commercial Pricing Node is made only with PBTs where the AO is the seller and is not netted against any PBTs where the AO may be the buyer. If the PBT volume is less than the total GFAOB FBT volume at a Commercial Pricing Node in the Hour, then all the AO's GFAOB FBTs at the Commercial Pricing Node for the Hour are reduced to zero.

For validations associated with a Combined Cycle and Cross Compound registered generation asset, the validation is performed at the aggregate Commercial Pricing Node. All generation and GFAOB FBT volumes at any individual generation asset are rolled up to the aggregate node for the Combined Cycle and Cross Compound Asset. This allows individual offered and cleared Generators to supply a GFAOB at the aggregate Commercial Pricing Node.

- GFAOB FBT buyers must fully consume all transaction volume with a Load Zone asset or through PBTs.

  When the GFAOB FBT buyer is consuming the volume at a Load Zone asset, the Load Zone asset volume consumption is verified to be equal to or greater than the sum of all their GFAOB FBTs provided to that Load Zone asset for the Hour. If the Load Zone asset volume is less than the total GFAOB FBT volume, then all the AO's GFAOB FBT volume that is being provided to that Load Zone asset for that Hour is reduced to zero.

  When the GFAOB FBT buyer is consuming the volume of one or more GFAOB FBTs with one or more PBTs where it is the buyer, the total PBT volume consumed is verified to be equal to or greater than the sum of all its GFAOB FBTs provided to that Commercial Pricing Node for the Hour. The volume comparison at the Commercial Pricing Node is made only with PBTs where the AO is the buyer and is not netted against any PBTs where the AO may be the seller. If the PBT volume is less than the total GFAOB FBT volume at a Commercial Pricing Node in the Hour, then all the AO's GFAOB FBTs at the Commercial Pricing Node for the Hour are reduced to zero.

GFAOB ECCH FBTs

MISO defines the transaction buying and selling AO, the source and sink Commercial Pricing Node, and the transaction (contract) date range. The transaction buyer and seller are unable to change any transaction parameter except for the hourly transaction volume, which must be provided prior to the close of the Day-Ahead Energy and Operating Reserve Market. Option B ECCH FBTs can only occur in the Day-Ahead Energy and Operating Reserve Market between the following Commercial Pricing Nodes:

- A generation source and a Load Zone,
- A generation source and an Interface Commercial Pricing Node, or
- An Interface Commercial Pricing Node and a Load Zone.

All Option B ECCH FBT hourly volumes are validated prior to settlement. The validation process verifies the scheduled volume of Option B ECCH FBTs do not exceed the available generation supply and Load consumption. Validations are performed only once and one transaction invalidation cannot then make another transaction valid.

- Option B ECCH FBT sellers must provide sufficient supply volume for all their transactions with a generation asset or with PBTs.

  When the Option B ECCH FBT seller is supplying the volume from a generation asset, the generation volume supplied is verified to be equal to or greater than the sum of all their Option B ECCH FBTs sold from that generation asset for the Hour. If the generation volume is less than the total Option B ECCH FBT volume being supplied, then all the AO's Option B ECCH FBT volumes that are being supplied by that generation source for that Hour are reduced to zero.

  When the Option B ECCH FBT seller is supplying one or more ECCH FBTs from one or more PBTs where it is the seller, the total PBT volume supplied is verified to be equal to or greater than the sum of all its Option B ECCH FBTs sold from that Commercial Pricing Node for the Hour. The volume comparison at the Commercial Pricing Node is made only with PBTs where the AO is the seller and is not netted against any PBTs where the AO may be the buyer. If the PBT volume is less than the total Option B ECCH FBT volume at a Commercial Pricing Node in the Hour, then all the AO's Option B ECCH FBTs at the Commercial Pricing Node for the Hour are reduced to zero.

For validations associated with a Combined Cycle and Cross Compound registered generation asset, the validation is performed at the aggregate Commercial Pricing Node. All generation and Option B ECCH FBT volumes at any individual generation asset are rolled up to the aggregate node for the Combined Cycle and Cross Compound Asset. This allows individual offered and cleared Generators to supply an Option B ECCH at the aggregate Commercial Pricing Node.

- Option B ECCH FBT buyers must fully consume all transaction volume at a Load Zone asset (asset withdrawal volume and cleared virtual bid volume) or through PBTs.

  When the Option B ECCH FBT buyer is consuming the volume at a Load Zone asset, the Load Zone asset volume consumption is verified to be equal to or greater than the sum of all their ECCH FBTs provided to that Load Zone asset for the Hour. The Load Zone asset volume is equal to the cleared energy withdrawal for the asset (injections are ignored) and the net cleared energy virtual megawatts withdrawn at the asset (injections are ignored) by the AO of the Asset. If the Load Zone asset volume is less than the total Option B ECCH FBT volume, then all the AO's Option B ECCH FBT volume that is being provided to that Load Zone asset for the that Hour is reduced to zero.

  When the Option B ECCH FBT buyer is consuming the volume of one or more Option B ECCH FBTs with one or more PBTs where they are the buyer, the total PBT volume consumed is verified to be equal to or greater than the sum of all their Option B ECCH FBTs provided to that Commercial Pricing Node for the Hour. The volume comparison at the Commercial Pricing Node is made only with PBTs where the AO is the buyer and is not netted against any PBTs where the AO may be the seller. If the PBT volume is less than the total Option B ECCH FBT volume at a Commercial Pricing Node in the Hour, then all the AO's Option B ECCH FBTs at the Commercial Pricing Node for the Hour are reduced to zero.

Settlement of HVDC Energy Transactions

For transactions involving energy wheeled across a High-Voltage Direct-Current (HVDC) transmission line the Day-Ahead Non-Asset Energy amount is calculated in the following manner: a purchase and offsetting sale are calculated by multiplying the Day-Ahead hourly transaction volume by the LMP at the transaction source CPNode and by the inverse of the LMP at the transaction sink CPNode. The net amount is added to the Day-Ahead Non-Asset energy amount for the hour.

B.6.1 Calculation Inputs for DA_NASSET_EN

*DA_FIN_{Buyer}	Hourly Day-Ahead IBS FBT Volume at a Commercial Pricing Node where the AO is the Transaction Buyer and does not own an Asset at the Commercial Pricing Node (MWh); the Buyer is defined as the AO that receives the FBT volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value. Note these FBTs will display on the settlement statement above the AO's Assets. If the AO is both the buyer and seller, the FBT will be listed once for each end of the transaction.
*DA_FIN_{Seller}	Hourly Day-Ahead IBS FBT Volume at a Commercial Pricing Node where the AO is the Transaction Seller and does not own an Asset at the Commercial Pricing Node (MWh); the Seller is defined as the AO that supplies the FBT volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value. Note these FBTs will display on the settlement statement above the AO's Assets. If the AO is both the buyer and seller, the FBT will be listed once for each end of the transaction.

*DA_GFACO_{Buyer}	Hourly Day-Ahead Carved-Out GFA Transaction Volume where the AO is the buyer and does not own an Asset at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The buyer is defined as the AO that receives the transaction volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value. Note these transactions will display on the settlement statement above the AO's Assets. If the AO is both the buyer and seller, the transaction will be listed once for each end of the transaction.
*DA_GFACO_{Seller}	Hourly Day-Ahead Carved-Out GFA Transaction Volume where the AO is the seller and does not own an Asset at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The seller is defined as the AO that provides the transaction volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value. Note these transactions will display on the settlement statement above the AO's Assets. If the AO is both the buyer and seller, the transaction will be listed once for each end of the transaction.
*DA_LMP_EN	Hourly Day-Ahead LMP ($/MWh); at a Commercial Pricing Node. The Day-Ahead Energy and Operating Reserve Market clearing price for Energy at a given Commercial Pricing Node in the Transmission Provider Region, which is equivalent to the marginal cost of serving demand at the Commercial Pricing Node. The Day-Ahead Locational Margin Price includes the MCC and the MLC.
*DA_PHYS_{Buyer}	Hourly Day-Ahead PBT Volume where the AO is the Transaction Buyer (MWh); a Buyer is defined as an AO that receives energy from MISO, at a MISO defined Interface Commercial Pricing Node or EAR Commercial Pricing Node, for export out of MISO. The transaction volume is always presented as a positive value.
*DA_PHYS_{Seller}	Hourly Day-Ahead PBT Volume where the AO is the Transaction Seller (MWh); a Seller is defined as an AO that supplies energy to MISO, at a MISO defined Interface Commercial Pricing Node, for import into MISO. The transaction volume is always presented as a positive value.

*DA_PHYS$_{HVDC}$ — Hourly Day-Ahead PBT Volume where the AO is wheeling energy across a HVDC transmission line. Applicable volume corresponds to Physical Bilateral transactions with Schedule Type of "HVDC".

*DA_LMP_EN$_{HVDC_SRC}$ — Hourly Day-Ahead LMP ($/MWh); at a Commercial Pricing Node, which is the source of HVDC transaction.

*DA_LMP_EN$_{HVDC_SNK}$ — Hourly Day-Ahead LMP ($/MWh); at a Commercial Pricing Node, which is the sink of HVDC transaction.

B.6.2 Intermediate Calculations for DA_NASSET_EN

*DA_GFAOB$_{Buyer}$ — Hourly Day-Ahead Valid Option B (GFA or ECCH) Transaction Volume (MWh); at a Commercial Pricing Node where the AO is the Transaction Buyer. The equation represents a single validated transaction at a single Commercial Pricing Node. Please refer to the previously defined calculation definition of this component.

DA_GFAOB$_{Seller}$ — Hourly Day-Ahead Valid Option B (GFA or ECCH) Transaction Volume (MWh); at a Commercial Pricing Node where the AO is the Transaction Seller. The equation represents a single validated transaction at a single Commercial Pricing Node. Please refer to the previously defined calculation definition of this component.

DA_FIN_NASSET_VOL$_{Seller}$ — Total Hourly Day-Ahead FBT Load obligation volume for an AO at a single Commercial Pricing Node where the AO is sourcing (supplying) FBTs (MWh); this calculation is only performed for Commercial Pricing Nodes where the AO does not own an asset.

$= \Sigma_{\text{Transactions-CN}} (\text{DA\_FIN}_{Seller}) + \Sigma_{\text{Transactions-CN}} (\text{DA\_GFAOB}_{Seller})$

DA_FIN_NASSET_VOL$_{Buyer}$ — Total Hourly Day-Ahead FBT supply obligation volume for an AO at a single Commercial Pricing Node where the AO is sinking (receiving) FBT (MWh); this calculation is only performed for Commercial Pricing Nodes where the AO does not own an asset.

$= [\Sigma_{\text{Transactions-CN}} (\text{DA\_FIN}_{Buyer}) + \Sigma_{\text{Transactions-CN}} (\text{DA\_GFAOB}_{Buyer})] * (-1)$

$DA\_GFACO\_NASSET\_VOL_{Seller}$ The Total Hourly Carved-Out GFA Transaction Volume for an AO at a single Commercial Pricing Node where the AO is sourcing (supplying) the transactions and does not own an Asset at the Commercial Pricing Node (MWh); This calculation is only performed for non-Interface defined Commercial Pricing Nodes where the AO does not own generation, Load Zone, or DRR assets. If the source Commercial Pricing Node is defined as an Interface Commercial Pricing Node, it is assumed the energy is being delivered to MISO to the defined sink Commercial Pricing Node; hence, the energy volume at the Interface Commercial Pricing Node is not settled.

= IF [Commercial Pricing Node Type = Interface , THEN 0 , ELSE $\Sigma_{\text{Transactions-CN}}$ (DA_GFACO_{Seller})]

$DA\_GFACO\_NASSET\_VOL_{Buyer}$ The Total Hourly Carved-Out GFA Transaction Volume for an AO at a single Commercial Pricing Node where the AO is sinking (receiving) the transactions and does not own an Asset at the Commercial Pricing Node (MWh); This calculation is only performed for non-Interface defined Commercial Pricing Nodes where the AO does not own generation, Load Zone, or DRR assets. If the sink Commercial Pricing Node is defined as an Interface Commercial Pricing Node, it is assumed the energy is being removed from MISO at the defined source Commercial Pricing Node; hence, the volume at the Interface Commercial Pricing Node is not settled.

= IF { Commercial Pricing Node Type = Interface , THEN 0 ,
ELSE [$\Sigma_{\text{Transactions-CN}}$ (DA_GFACO_{Buyer}) * (-1)] }

$DA\_PHYS\_VOL_{Buyer}$ Total Hourly Day-Ahead PBT load obligation volume for an AO at a single Interface Commercial Pricing Node or EAR Commercial Pricing Node where the AO is buying PBTs from MISO (MWh).

= $\Sigma_{\text{Transactions-CN}}$ (DA_PHYS_{Buyer})

$DA\_PHYS\_VOL_{Seller}$ Total Hourly Day-Ahead PBT supply obligation volume for an AO at a single Interface Commercial Pricing Node where the AO is selling PBTs to MISO (MWh).

= $\Sigma_{\text{Transactions-CN}}$ [(-1) * DA_PHYS_{Seller}]

DA_NASSET_VOL Hourly Day-Ahead Non-Asset Energy Volume (MWh); for an AO. This calculation represents the sum of all schedules and transactions for a Commercial Pricing Node for the AO. This equation is performed for all Commercial Pricing Nodes where the AO does not have an asset. The result represents the AO's total hourly net non-asset market energy activity other than Virtual Schedules at each Commercial Pricing Node.

= $DA\_PHYS\_VOL_{Buyer}$ + $DA\_PHYS\_VOL_{Seller}$ + $DA\_FIN\_NASSET\_VOL_{Seller}$ + $DA\_FIN\_NASSET\_VOL_{Buyer}$ + $DA\_GFACO\_NASSET\_VOL_{Seller}$ + $DA\_GFACO\_NASSET\_VOL_{Buyer}$

B.6.3 Charge Type Calculation for DA_NASSET_EN

*^DA_NASSET_EN_HR

Hourly Day-Ahead Non-Asset Energy Amount ($); for an AO. This calculation is only performed for Commercial Pricing Nodes where the AO does not have an asset. The result represents the AO's total hourly charge or credit for all their Non-Asset Market energy activity other than Virtual Schedules and is rounded to the nearest cent. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement.

$= \Sigma_{CN}(DA\_NASSET\_VOL * DA\_LMP\_EN) + [(DA\_PHYS_{HVDC} * DA\_LMP\_EN_{HVDC\_SRC}) - (DA\_PHYS_{HVDC} * DA\_LMP\_EN_{HVDC\_SNK})]$

*DA_NASSET_EN

Day-Ahead Non-Asset Energy Amount ($); for an AO. The result represents the AO's total Operating Day charge or credit for all their transactions and schedules at Commercial Pricing Nodes where they do not own an asset. The formula result is displayed in dollars.

$= \Sigma_{H} (DA\_NASSET\_EN\_HR)$

B.7 Day-Ahead Congestion Rebate on Carved-Out Grandfathered Agreements (DA_GFACO_RBT_CG)

The Day-Ahead Congestion Rebate on Carved-Out GFAs Amount represents an AO's total Operating Day rebate of all congestion charges and credits paid in the Day-Ahead FBT Congestion Amount charge type related to Carved-Out GFAs Transactions. The rebate amount is calculated hourly by AO for every valid Carved-Out GFA Transaction where they are buying and/or selling and then is summed to a daily total. Since the original congestion amount can be a charge or credit, likewise the rebate can be a charge or credit depending upon the Commercial Pricing Nodes that are being settled.

For additional information on Carved-Out GFAs Transactions, please refer to the Market Settlements BPM.

The Day-Ahead Congestion Rebate on Carved-Out GFAs Amount, including determinants, is displayed on the Day-Ahead Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a determinant that is displayed on an AO's Day-Ahead statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

B.7.1 Calculation Inputs for DA_GFACO_RBT_CG

*DA_GFACO_{Buyer}	Hourly Day-Ahead Carved-Out GFA Transaction Volume where the AO is the buyer (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The buyer is defined as the AO that receives the transaction volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value.

$*DA\_GFACO_{Seller}$ — Hourly Day-Ahead Carved-Out GFA Transaction Volume where the AO is the seller (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The seller is defined as the AO that provides the transaction volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value.

$*DA\_LMP\_CG_{SO}$ — Hourly Day-Ahead Congestion Component of the LMP at the source Commercial Pricing Node ($/MWh).

$*DA\_LMP\_CG_{SI}$ — Hourly Day-Ahead Congestion Component of the LMP at the sink Commercial Pricing Node ($/MWh).

$*DA\_LMP\_CG_{DP}$ — Hourly Day-Ahead Congestion Component of the LMP at the Delivery Point Commercial Pricing Node ($/MWh).

B.7.2 Intermediate Calculations for DA_GFACO_RBT_CG

DA_GFACO_BUY_CG — Hourly Total Day-Ahead Carved-Out GFA Buyer Transaction Congestion Charges ($); the amount is the hourly total calculated congestion charges for all Carved-Out GFA Transactions where the AO is the buyer of the transaction. The buyer is defined as an AO that receives the transaction volume at the sink Commercial Pricing Node.

$$= \Sigma_{Transactions} [(DA\_GFACO_{Buyer}) * (DA\_LMP\_CG_{SI} - DA\_LMP\_CG_{DP})]$$

DA_GFACO_SELL_CG — Hourly Total Day-Ahead Carved-Out GFA Seller Transaction Congestion Charges ($); the amount is the hourly total calculated congestion charges for all Carved-Out GFA Transactions where the AO is the seller of the transaction. The seller is defined as an AO that supplies the transaction volume at the source Commercial Pricing Node.

$$= \Sigma_{Transactions} [(DA\_GFACO_{Seller}) * (DA\_LMP\_CG_{DP} - DA\_LMP\_CG_{SO})]$$

B.7.3 Charge Type Calculation for DA_GFACO_RBT_CG

*^DA_GFACO_RBT_CG_HR — Hourly Day-Ahead Congestion Rebate on Carved-Out GFA Transaction Amounts ($); This calculation is performed for Commercial Pricing Nodes where the AO has Day-Ahead Carved-Out GFA Transactions. The result represents the AO's total hourly congestion rebate of charges and credits that were assessed in the Day-Ahead FBT Congestion Amount charge type related to Day-Ahead Carved-Out GFA Transactions. The result is

rounded to the nearest cent. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement.
= (DA_GFACO_BUY_CG + DA_GFACO_SELL_CG) * (-1)

*DA_GFACO_RBT_CG — Day-Ahead Congestion Rebate on Carved-Out GFA Transaction Amount ($); is a daily total amount due MISO from an AO from all rebates of congestion on Day-Ahead Carved-Out GFA Transactions.
= Σ_H (DA_GFACO_RBT_CG_HR)

B.8 Day-Ahead Losses Rebate on Carved-Out Grandfathered Agreements (DA_GFACO_RBT_LS)

The Day-Ahead Losses Rebate on Carved-Out GFAs Amount represents an AO's total Operating Day rebate of all loss charges and credits paid in the Day-Ahead FBT Loss Amount charge type related to Carved-Out GFAs Transactions. The rebate amount is calculated hourly by AO for every valid Carved-Out GFA Transaction where it is buying and/or selling and then is summed to a daily total. Since the original losses amount can be a charge or credit, likewise the rebate can be a charge or credit depending upon the Commercial Pricing Nodes that are being settled.

For additional information on Carved-Out GFAs Transactions, please refer to the Market Settlements BPM.

The Day-Ahead Losses Rebate on Carved-Out GFAs Amount, including determinants, is displayed on the Day-Ahead Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a determinant that is displayed on an AO's Day-Ahead statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

B.8.1 Calculation Inputs for DA_GFACO_RBT_LS

*DA_GFACO_{Buyer}	Hourly Day-Ahead Carved-Out GFA Transaction Volume where the AO is the buyer (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The buyer is defined as the AO that receives the transaction volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value.

$*DA\_GFACO_{Seller}$ — Hourly Day-Ahead Carved-Out GFA Transaction Volume where the AO is the seller (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The seller is defined as the AO that provides the transaction volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value.

$*DA\_LMP\_LS_{SO}$ — Hourly Day-Ahead Losses Component of the LMP at the source Commercial Pricing Node ($/MWh).

$*DA\_LMP\_LS_{SI}$ — Hourly Day-Ahead Losses Component of the LMP at the sink Commercial Pricing Node ($/MWh).

$*DA\_LMP\_LS_{DP}$ — Hourly Day-Ahead Losses Component of the LMP at the Delivery Point Commercial Pricing Node ($/MWh).

B.8.2 Intermediate Calculations for DA_GFACO_RBT_LS

DA_GFACO_BUY_LS — Hourly Total Day-Ahead Carved-Out GFA Buyer Transaction Losses Charges ($); the amount is the hourly total calculated Loss charges for all Carved-Out GFA Transactions where the AO is the buyer of the transaction. The buyer is defined as an AO that receives the transaction volume at the sink Commercial Pricing Node.

$$= \Sigma_{Transactions} [(DA\_GFACO_{Buyer}) * (DA\_LMP\_LS_{SI} - DA\_LMP\_LS_{DP})]$$

DA_GFACO_SELL_LS — Hourly Total Day-Ahead Carved-Out GFA Seller Transaction Losses Charges ($); the amount is the hourly total calculated loss charges for all Carved-Out GFA Transactions where the AO is the seller of the transaction. The seller is defined as an AO that supplies the transaction volume at the source Commercial Pricing Node.

$$= \Sigma_{Transactions} [(DA\_GFACO_{Seller}) * (DA\_LMP\_LS_{DP} - DA\_LMP\_LS_{SO})]$$

B.8.3 Charge Type Calculation for DA_GFACO_RBT_LS

*^DA_GFACO_RBT_LS_HR — Hourly Day-Ahead Losses Rebate on Carved-Out GFA Transaction Amounts ($); This calculation is performed for Commercial Pricing Nodes where the AO has Day-Ahead Carved-Out GFA Transactions. The result represents the AO's total hourly losses rebate of charges and credits that were assessed in the Day-Ahead FBT Loss Amount charge type related to Day-Ahead Carved-Out GFA Transactions. The result is rounded to the nearest cent. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement.

= (DA_GFACO_BUY_LS + DA_GFACO_SELL_LS) * (-1)

*DA_GFACO_RBT_LS — Day-Ahead Losses Rebate on Carved-Out GFA Transaction Amount ($); is a daily total amount due MISO from an AO from all rebates of losses on Day-Ahead Carved-Out GFA Transactions.

= Σ_{H} (DA_GFACO_RBT_LS_HR)

B.9 Day-Ahead Congestion Rebate on Option B Grandfathered Agreements (DA_GFAOB_RBT_CG)

The Day-Ahead Congestion Rebate on Option B (GFA or ECCH) FBTs Amount represents an AO's total Operating Day rebate of all congestion charges and credits paid in the Day-Ahead FBT Congestion Amount charge type related to Option B (GFA or ECCH) FBTs. The rebate amount is calculated hourly by AO for every valid Option B FBT where it is buying and/or selling and then is summed to a daily total. Since the original congestion amount can be a charge or credit, likewise the rebate can be a charge or credit depending upon the Commercial Pricing Nodes that are being settled.

Option B FBT that did not pass validation in the Day-Ahead Option B Financial Schedule Validation described in the Market Settlements BPM are not assessed any congestion charges and credits and as such are not assessed any rebates in this charge type.

For additional information on Option B FBTs, please refer to the Market Settlements BPM.

The Day-Ahead Congestion Rebate on GFAOBs Amount, including determinants, is displayed on the Day-Ahead Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a determinant that is displayed on an AO's Day-Ahead statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

B.9.1 Calculation Inputs for DA_GFAOB_RBT_CG

*$DA\_LMP\_CG_{SO}$	Hourly Day-Ahead Congestion Component of the LMP at the source Commercial Pricing Node ($/MWh).
*$DA\_LMP\_CG_{SI}$	Hourly Day-Ahead Congestion Component of the LMP at the sink Commercial Pricing Node ($/MWh).

*DA_LMP_CG$_{DP}$	Hourly Day-Ahead Congestion Component of the LMP at the Delivery Point Commercial Pricing Node ($/MWh).

B.9.2 Intermediate Calculations for DA_GFAOB_RBT_CG

*DA_GFAOB$_{Buyer}$	Hourly Day-Ahead Valid Option B (GFA or ECCH) FBT Volume (MWh); at a Commercial Pricing Node where the AO is the Transaction Buyer. The equation represents a single validated transaction at a single Commercial Pricing Node. Please refer to the previously defined calculation definition of this component.
*DA_GFAOB$_{Seller}$	Hourly Day-Ahead Valid Option B (GFA or ECCH) FBT Volume (MWh); at a Commercial Pricing Node where the AO is the Transaction Seller. The equation represents a single validated transaction at a single Commercial Pricing Node. Please refer to the previously defined calculation definition of this component.
DA_FIN_GFAOB_BUY_CG	Hourly Total Day-Ahead Option B Buyer FBT Congestion Charge ($); the amount is the hourly total calculated congestion charge for all Option B type Day-Ahead FBTs where the AO is the buyer of the transaction. The buyer is defined as an AO that receives the transaction volume at the sink Commercial Pricing Node. $= \Sigma_{\text{Transactions}} [(DA\_GFAOB_{Buyer}) * (DA\_LMP\_CG_{SI} - DA\_LMP\_CG_{DP})]$
DA_FIN_GFAOB_SELL_CG	Hourly Total Day-Ahead Option B (GFA or ECCH) Seller FBT Congestion Charge ($); the amount is the hourly total calculated congestion charge for all Option B type Day-Ahead FBTs where the AO is the seller of the transaction. The seller is defined as an AO that supplies the transaction volume at the source Commercial Pricing Node. $= \Sigma_{\text{Transactions}} [(DA\_GFAOB_{Seller}) * (DA\_LMP\_CG_{DP} - DA\_LMP\_CG_{SO})]$

B.9.3 Charge Type Calculation for DA_GFAOB_RBT_CG

*^DA_GFAOB_RBT_CG_HR	Hourly Day-Ahead Congestion Rebate on GFAOB Transaction Amount ($); this calculation is performed for Commercial Pricing Nodes where the AO has Day-Ahead Option B FBTs. The result represents the AO's total hourly rebate of charges and credits that were assessed in the Day-Ahead FBT Congestion Amount on GFAOBs. The result is rounded to the nearest cent.

	= (DA_FIN_GFAOB_BUY_CG + DA_FIN_GFAOB_SELL_CG) * (-1)
*DA_GFAOB_RBT_CG	Day-Ahead Congestion Rebate on GFAOB Transactions Amount ($); is a daily total amount due MISO from an AO from all rebates of congestion on Option B Day-Ahead FBTs. The formula result is displayed in dollars. = Σ_H (DA_GFAOB_RBT_CG_HR)

B.10 Day-Ahead Losses Rebate on Option B Grandfathered Agreements (DA_GFAOB_RBT_LS)

The Day-Ahead Losses Rebate on GFAOBs Amount represents an AO's total Operating Day rebate of the difference between Marginal Losses and System Losses paid in the Day-Ahead FBT Loss Amount charge type related to GFAOBs FBTs. Note that Option B ECCH FBTs do not qualify for the losses rebate. All valid GFAOB FBTs are assessed the full loss charge or credit per the Day-Ahead FBT Loss Amount and receive a rebate of the difference between Marginal Losses and System Average Losses. The rebate amount is calculated hourly by AO for every valid GFAOB FBT where it is buying and/or selling and then is summed to a daily total. Since the original loss amount can be a charge or credit, likewise the rebate can be a charge or credit depending upon the Commercial Pricing Nodes that are being settled.

GFAOB FBT seller Marginal Losses is equal to the transaction volume multiplied by the difference between the MLC of the LMP at the Delivery Point and source Commercial Pricing Nodes. GFA FBT buyer Marginal Losses is equal to the transaction volume multiplied by the difference between the MLC of the LMP at the sink and Delivery Point Commercial Pricing Nodes.

The buying and selling MPs of GFAOBs are refunded a portion of their loss charges (and credits). The refund rate is fixed in the Tariff and is set in the Market Settlement System as a factor that displays on the Day-Ahead Settlement Statement. MISO funds the loss rebates from Day-Ahead Over-Collected Losses fund.

GFAOB FBTs that did not pass the Day-Ahead Option B Financial Schedule Validation described in the Market Settlements BPM , are not assessed any loss charges and credits and as such are not assessed any rebates in this charge type.

For additional information on GFAOBs FBTs, please refer to the Market Settlements BPM.

The Day-Ahead Losses Rebate on GFAOBs Amount, including determinants, is displayed on the Day-Ahead Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a determinant that is displayed on an AO's Day-Ahead statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

B.10.1Calculation Inputs for DA_GFAOB_RBT_LS

*$DA\_LMP\_LS_{SO}$	Hourly Day-Ahead Loss Component of the LMP at the source Commercial Pricing Node ($/MW).
*$DA\_LMP\_LS_{SI}$	Hourly Day-Ahead Loss Component of the LMP at sink Commercial Pricing Node ($/MW).
*$DA\_LMP\_LS_{DP}$	Hourly Day-Ahead Loss Component of the LMP at Delivery Point Commercial Pricing Node ($/MW).
*GFA_AVG_LOSS_PCT	GFA Average Loss Rate Percentage (%); is the percentage of MISO system average loss rate divided by MISO average marginal loss rate.

B.10.2Intermediate Calculations for DA_GFAOB_RBT_LS

*DA_GFAOB_{Buyer}	Hourly Day-Ahead Valid GFAOB FBT Volume (MWh); at a Commercial Pricing Node where the AO is the Transaction Buyer. The equation represents a single validated transaction at a single Commercial Pricing Node. Please refer the previously defined calculation definition of this component.
*DA_GFAOB_{Seller}	Hourly Day-Ahead Valid GFAOB FBT Volume (MWh); at a Commercial Pricing Node where the AO is the Transaction Seller. The equation represents a single validated transaction at a single Commercial Pricing Node. Please refer to the previously defined calculation definition of this component.
DA_FIN_GFAOB_BUY_LS	Hourly Total Day-Ahead Buyer GFAOB FBT Loss Charge ($); the amount is the hourly total calculated loss charge for all GFAOB type Day-Ahead FBTs where the AO is the buyer of the transaction. The

buyer is defined as an AO that receives the transaction volume at the sink Commercial Pricing Node.

= Σ Transactions [(IF (Pre 888 Loss Flag = "B" ,
THEN DA_GFAOB_{Buyer} ,
ELSE 0)
* ($DA\_LMP\_LS_{SI}$ - $DA\_LMP\_LS_{DP}$)]

DA_FIN_GFAOB_SELL_LS

Hourly Total Day-Ahead Seller GFAOB FBT Loss Charge ($); the amount is the hourly total calculated loss charge for all GFAOB type Day-Ahead FBTs where the AO is the seller of the transaction. The seller is defined as an AO that supplies the transaction volume at the source Commercial Pricing Node.

= Σ Transactions [(IF (Pre 888 Loss Flag = "B" ,
THEN DA_GFAOB_{Seller} ,
ELSE 0)
* ($DA\_LMP\_LS_{DP}$ - $DA\_LMP\_LS_{SO}$)]

B.10.3 Charge Type Calculation for DA_GFAOB_RBT_LS

*^DA_GFAOB_RBT_LS_HR

Hourly Day-Ahead Losses Rebate on GFAOB FBTs ($); the sum of all the loss charges and credits that an AO was assessed for GFAOB FBTs in Day-Ahead FBT Loss Amount and calculates the AO's hourly rebate amount. The formula result is per Hour and rounded to the nearest cent. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement.

= (DA_FIN_GFAOB_BUY_LS + DA_FIN_GFAOB_SELL_LS) *
[1 - (GFA_AVG_LOSS_PCT / 100)] * (-1)

*DA_GFAOB_RBT_LS

Day-Ahead Losses Rebate on GFAOB FBTs ($); a daily total amount for GFAOB FBT loss rebates for an AO. The formula result is displayed in dollars.

= Σ_H (DA_GFAOB_RBT_LS_HR)

B.11 Day-Ahead Revenue Sufficiency Guarantee Distribution Amount (DA_RSG_DIST)

The Day-Ahead Revenue Sufficiency Guarantee Make Whole Payment Amount (DA_RSG_MWP) is funded hourly by MISO using the Day-Ahead RSG Distribution Amount (DA_RSG_DIST) charge type.

The total Day-Ahead RSG MWP Amount is summed for each Hour for all AOs and is funded through the Day-Ahead RSG Distribution Amount. The Day-Ahead RSG MWP Amount comprises payments for Resources that are a Voltage and Local Reliability Commitment (VLRC) and other payments for Resources that are not a VLRC.

For a Day-Ahead RSG MWP that is not the result of a VLRC, the distribution amount is charged to each AO in proportion to its daily total Day-Ahead withdrawal volume compared to the total MISO Day-Ahead withdrawal volume. The Day-Ahead withdrawal volume includes: cleared Day-Ahead fixed demand Bids and price sensitive demand Bids (DA_SCHD), cleared virtual demand Bids (DA_VSCHD), and cleared Day-Ahead export PBTs (DA_PHYS_{Buyer}). Demand Bid volume is, however, reduced by the GFA Carved-Out Load volume (*DA_GFACO_{Buyer}) when the transaction sinks at a node owned by the AO. Both demand volume and virtual demand Bid volume are ignored when the Asset Owner is exempt from DA_RSG_DIST at the Commercial Pricing Node.

For Day-Ahead RSG MWP that is the result of a VLRC, the distribution amount is charged to each AO within the benefited Local Balancing Authority(s) (LBA), in proportion to its total Real-Time withdrawal value compared to the total Real-Time withdrawal volume for all AOs in the benefited LBA(s).

The Day-Ahead RSG Distribution Amount, including determinants, is displayed on the Day-Ahead Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a billing determinant that is displayed on an AO's Day-Ahead statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

B.11.1Calculation Inputs for DA_RSG_DIST

*DA_PHYS_{Buyer}	Hourly Day-Ahead PBT Volume where the AO is the Transaction Buyer (MWh); a Buyer is defined as an AO that receives energy from MISO, at a MISO defined Interface Commercial Pricing Node or EAR Commercial Pricing Node, for export out of MISO. The transaction volume is always presented as a positive value.
*DA_PHYS_{Seller}	Hourly Day-Ahead PBT Volume where the AO is the Transaction Seller (MWh); a Seller is defined as an AO that supplies energy to MISO, at a MISO defined Interface Commercial Pricing Node, for import into MISO. The transaction volume is always presented as a positive value.
DA_ELMP_MWP_HR	Hourly Total Day-Ahead ELMP MWPs Credit Amount ($); for a given Asset Owner at a Commercial Pricing Node. Please refer to the previous definition.
DA_RSG_ASSET_CR_HR	Hourly Daily Day-Ahead RSG Credit Amount for a Generation Resource asset ($); Please refer to the calculation of this component located elsewhere in this document.
*DA_SCHD	Hourly Day-Ahead Asset Schedule Volume (MWh); the Day-Ahead Asset Schedule Volume is the market cleared offered generation, bid Load or offered DRR schedule by asset. A positive schedule represents a Load obligation and a negative schedule represents a supply obligation. There can be only a single schedule per asset.
*DA_VSCHD	Hourly Day-Ahead Net Virtual Schedule Volume for a Commercial Pricing Node (MWh); the Day-Ahead Net Virtual Schedule Volume is the net Day-Ahead Energy and Operating Reserve Market cleared Bid and Offered Virtual Schedule volume by AO by Commercial Pricing Node by Hour. A positive volume represents a net Load obligation and a negative volume represents a net supply obligation.
*DA_GFACO_{Buyer}	Hourly Day-Ahead Carved-Out Grandfathered Agreement Transaction Volume where the Asset Owner is the buyer and owns an Asset at the Commercial Pricing Node (MWh); a transaction related to a contract that

has been specifically classified as a Grandfathered Carved-Out Transaction. The buyer is defined as the Asset Owner that receives the transaction volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value. Note these transactions will display on the Settlement Statement along with the Asset Owner's Assets. If the Asset Owner is both the buyer and seller, the transaction will be listed once for each end of the transaction. For additional information on Carved-Out Grandfathered Agreements Transactions, please refer to Business Practice Manual for Market Settlements.

*DA_RSG_DIST_XMPT	Day-Ahead Revenue Sufficiency Guarantee Exemption for a Commercial Pricing Node (flag); a "Y" value indicates the Commercial Pricing Node is exempt from DA_RSG_DIST charges for the Operating Day.
ICPSL_FCT	Daily Internally Commercially Pseudo-tied Load Factor (FCT); The Daily Load Weighing Factor for an EP Node internally commercially pseudo tied to a CP Node. This factor is calculated in DART.
*LRS_XMPT	Nodal Exemption of Withdrawal from Load Ratio Share (Flag); a "Y" value indicates that withdrawal at the Commercial Pricing Node is not included in an AO's Load Ratio Share for the Operating Day.
*RT_ICPSL_ACT_MTR	Hourly Real-Time Internally Commercially Pseudo-tied Load Metered Actual Volume (MWh); Hourly meter volume for an EP Node which is internally commercially pseudo tied into an internal LBA different than the associated CP Node's internal LBA. Metered volume may be actual or estimated provided by the MDMA.
*RT_GFACO	Hourly Real-Time Carved-Out GFA Transaction Volume where the AO is the Buyer or Seller at a Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. All Day-Ahead Carved-Out GFA Transaction must have a corresponding Real-Time Carved-Out GFA Transaction, but a Real-Timed Carve-Out Grandfathered Transaction does not need to have a corresponding Day-Ahead Transaction. The buyer is defined as the AO that receives the transaction volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the transaction will be listed once for each end of the transaction.

* VLR_ALC_FCT	Voltage and Local Reliability Allocation Factor; represents the percentage that a given MWP is attributable to a Voltage and Local Reliability Commitment and that will be allocated to Voltage and Local Reliability.
VLR_LBA_DIST_FCT	Voltage and Local Reliability Local Balancing Authority Distribtuion Factor; represents for a given, studied Voltage and Local Reliability Issue, the percentage that a given MWP is attributable to a Voltage and Local Reliability Commitment, adjusted for the VLR_ALC_FCT, and that will be allcoated to a given Local Banalcing Authority.
VLR_FL	Hourly Day-Ahead Voltage and Local Reliability Flag (flag): A value of "1" indicates an hourly MWP amount which is the result of a Resource called on for a Voltage and Local Reliability Commitment. A value of "0" indicates the hourly MWP amount is not the result of a Voltage and Local Reliability Commitment.

B.11.2 Intermediate Calculations for DA_RSG_DIST

MAX	The mathematical maximum of the series of numbers in the succeeding parentheses.
MIN	The mathematical minimum of the series of numbers in the succeeding parentheses.
AEW	Hourly Actual Energy Withdrawal (MWh); this value represents the billable meter volume, which is actual meter volume, or, if unavailable, Metered Alternate Volume, less LBA residual load volume (RT_ADJ_MTR)~~ and Day 1 Net Inadvertent Payback (D1_NI_PBK) volume~~. = MAX(RT_BLL_MTR – RT_ADJ_MTR~~ – D1_NI_PBK~~,0)
*MISO_DA_NVLR_RSG_MWP	(Hourly) MISO Day-Ahead Non Voltage and Local Reliability RSG MWP Amount ($); represents the sum of all Day-Ahead RSG MWPs made to generation resources that result from a Non Voltage and Local Reliability Commitment for a specific Hour. $= \Sigma_{MISO}$ IF VLR_FL = 1 THEN DA_RSG_ASSET_CR_HR * (1 – VLR_ALC_FCT) ELSE DA_RSG_ASSET_CR_HR

DA_ASSET_DEMD	Hourly Total Day-Ahead Cleared Asset Schedule Withdrawal Demand Volume by Asset Owner (MWh); The cleared Asset Schedule withdrawal demand volume represents the sum of all of an Asset Owner's Day-Ahead Assets that act as a Load on the system reduced by the GFACO transactions Volume at a Commercial Pricing Node owned by the Asset Owner. $= \Sigma_{AO\text{-}CN}$ MAX { [MAX (DA_SCHD, 0) - $\Sigma_{Transactions}$ (DA_GFACO_{Buyer})], 0 } * IF { DA_RSG_DIST_XMPT="Y", THEN 0, ELSE 1 }
DA_VIRT_DEMD	Hourly Total Day-Ahead Cleared Virtual Withdrawal Demand Volume by Asset Owner (MWh); the cleared virtual withdrawal demand volume represents the sum of all of an Asset Owner's net Virtual Schedules that act as a Load on the system. $= \Sigma_{CN}$ [MAX (DA_VSCHD, 0)] * IF [DA_RSG_DIST_XMPT="Y", THEN 0, ELSE 1]
DA_PHYS_TRNS	Hourly Day-Ahead PBT Volume per AO by Transaction (MWh); Transactions that only import into MISO result in a negative total. Transactions that only export from MISO result in a positive total. Wheel through transactions (through and out) result in a zero net total. $= DA\_PHYS_{Buyer}$ + [DA_PHYS_{Seller} * (-1)]
DA_PHYS_EXP	Hourly Total Day-Ahead Physical Export Volume for an AO (MWh); the daily sum of PBT export volumes originating inside of MISO. This total results in the exclusion of wheel through transactions and imports. $= \Sigma_{Transaction}$ [MAX (DA_PHYS_TRNS, 0)]
*DA_RSG_DIST_VOL	Hourly Total Day-Ahead RSG Distribution Volume (MWh); for an AO. = DA_ASSET_DEMD + DA_VIRT_DEMD + DA_PHYS_EXP
*MISO_DA_RSG_DIST_VOL	Hourly MISO Day-Ahead RSG Distribution Volume (MWh) $= \Sigma_{MISO}$ (DA_RSG_DIST_VOL)
DA_RSG_DIST_FCT	Hourly Day-Ahead RSG Distribution Factor by AO (factor); the sum of MWPs for the Day-Ahead Energy and Operating Reserve Market in each Hour is allocated and charged to AOs in proportion to the hourly sum of their Day-Ahead Load Obligations (cleared DA Fixed Demand Bids and Price Sensitive Demand Bids, cleared Virtual Demand Bids, and cleared DA exports) for the Hour. = (DA_RSG_DIST_VOL / MISO_DA_RSG_DIST_VOL)

* DA_NVLR_RSG_DIST_HR — Hourly Day-Ahead RSG Distribution Amount ($); by AO by Hour, represents the AO's total hourly revenue allocation of the Non Voltage and Local Reliability charge for the DA RSG MWP Amount.
= MISO_DA_NVLR_RSG_MWP * DA_RSG_DIST_FCT * (-1)

B.11.3 Intermediate Calculation for Day-Ahead Voltage and Local Reliability Revenue Sufficiency Guarantee Distribution (DA_VLR_RSG_DIST)

*RT_ ICPSL_BLL_MTR — Hourly Real-Time Internally Commercially Pseudo-tied Load Billable Metered Volume (MWh); Hourly billable meter volume for an EP Node which is internally commercially pseudo tied into an internal LBA different than the associated CP Node's internal LBA. Actual meter data will be used if available; otherwise an alternate meter volume will be calculated using the ICPSL_FCT and the associated CP Node(s) RT_BLL_MTR data.
= IF (RT_ICPSL_ACT_MTR is Null, THEN RT_BLL_MTR * ICPSL_FCT, ELSE RT_ICPSL_ACT_MTR)

* AO_LBA_AEW — Hourly Total Asset Owner Real-Time Actual Energy Withdrawal Volume for an LBA (MW): for a given AO in a given LBA. . For an EP Node which is internally commercially pseudo tied into an internal LBA different than the associated CP Node's internal LBA, the ICPSL_BLL_MTR will be subtracted from the CP Node's AO_LBA_AEW and added to the EP Node's AO_LBA_AEW.
= $\sum_{AO\ LBA}$ [IF LRS_XMPT = "Y", THEN 0, ELSE MAX(AEW – RT_GFACO_{Buyer} + (IF EP Node LBA = AO LBA, THEN ICPSL_BLL_MTR, ELSE - ICPSL_BLL_MTR), 0)]

* LBA_AEW — Hourly Total Real-Time Actual Energy Withdrawal Volume for an LBA (MW): for a given LBA.
= $\sum_{LBA}$ (AO_LBA_AEW)

DA_VLR_ASSET_CR — Hourly Day-Ahead RSG Credit Amount for a Generation Resource committed for Voltage and Local Reliability. ($); for a given Resource and Voltage or Local Reliability Issue, the portion of the MWP that is allocated to Voltage and Local Reliability.
= IF VLR_FL =1
THEN DA_RSG_ASSET_CR_HR * VLR_ALC_FCT
ELSE 0

* DA_VLR_LBA_ASSET_CR	Hourly Day-Ahead MWP Asset Credit for VLR Payable by a Discrete LBA ($/MWh); the portional amount of LBA credits one Asset Credit attributable to VLR for which a given LBA's load is liable. $= \sum_{LBA} (VLR_LBA_DIST_FCT_{VLR_LBA} * DA_VLR_ASSET_CR)$
*AO_LBA_AEW_FCT	Hourly Asset Owner Portion of Total LBA AEW (factor); for a given AO and a given LBA. = AO_LBA_AEW / LBA_AEW
DA_VLR_AO_DIST	Hourly Real-Time RSG Distribution Amount for Voltage and Local Reliability ($); that portion of an LBAs credits for Voltage and Local Reliability Commitment, for which a given AO in one LBA is liable. = DA_VLR_LBA_ASSET_CR * AO_LBA_AEW_FCT
* DA_VLR_RSG_DIST_HR	Hourly Day-Ahead Voltage and Local Reliability RSG Distribution Amount ($): for an AO. Total Amount for all VLR commitment Asset Credits payable by an Asset Owner. $= \sum_{AO} (DA_VLR_AO_DIST) * (-1)$

B.11.4 Intermediate Calculations for DA_ELMP_MWP_DIST

*MISO_DA_ELMP_MWP — Hourly Total MISO Day-Ahead ELMP MWPs Amount ($); represents the sum of all Day-Ahead RSG MWPs made to those price sensitive transactions that result from Day-Ahead Must-Run Commitment, Price Sensitive Demand Bid, Virtual Transaction, Dispatchable Import and Export Schedules including EAR Dispatchable Export Schedules, and UP-to-TUC Interchange Schedules for a specific Hour.
$= \Sigma_{MISO}$ (DA_ELMP_MWP_HR)

* DA_ELMP_MWP_DIST_HR — Hourly Day-Ahead ELMP MWP Distribution Amount ($); by AO by Hour, represents the AO's total hourly revenue allocation of the Non Voltage and Local Reliability charge for the DA ELMP MWP Amount.
= MISO_DA_ELMP_MWP * DA_RSG_DIST_FCT * (-1)

B.11.5 Charge Type Calculation for Day-Ahead Revenue Sufficiency Guarantee Distribution (DA_RSG_DIST)

*^DA_RSG_DIST_HR — Hourly Day-Ahead RSG Distribution Amount ($); by AO by Hour. The result represents the AO's total hourly revenue allocation of the charge for RSG MWP Amount. The formula result is per Hour and rounded to the nearest cent. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement.
= (DA_NVLR_RSG_DIST_HR + DA_VLR_RSG_DIST_HR + DA_ELMP_MWP_DIST_HR)

*DA_RSG_DIST — Day-Ahead RSG Distribution Amount ($); is the sum of all hours of an Operating Day for an AO.
$= \Sigma_H$ (DA_RSG_DIST_HR)

B.12 Day-Ahead Revenue Sufficiency Guarantee Make Whole Payment Amount (DA_RSG_MWP)

Generation Resources and Demand Response Resources – Type II that are economically committed by MISO and scheduled in the Day-Ahead Energy and Operating Reserve Market are guaranteed recovery of their Start-Up, No-Load, Energy, and Operating Reserve Costs, collectively referred to as Total Production Costs. Demand Response Resources – Type I that are committed by MISO and scheduled in the Day-Ahead Energy and Operating Reserve Market are guaranteed recovery of their Shut-Down, Hourly Curtailment, and Energy Costs, collectively referred to as Total Production Costs. On an hourly basis, the Market Settlements Post Operating Processor process determines whether a Resource has met the eligibility requirements to have their Production Costs and Operating Reserve Costs guaranteed. The Day-Ahead settlement calculation compares whether the asset's combined Energy, Regulating Reserve, Spinning Reserve, Supplemental Reserve, and Ramp Capability market value for all of the eligible hours for the Operating Day exceeds the combined value of the Production Costs and Operating Reserve Costs for those same hours. The asset's value is calculated without regard to FBTs. If the total daily value is less than the total daily Production Cost amount, the difference is credited to the AO as a Day-Ahead RSG MWP Amount.

Day-Ahead RSG MWP Amounts for economic commitment purposes other than Voltage and Local Reliability Commitments (VLRC) may be mitigated for Generation Resources by asset by day when production Offer and Operating Reserve Offer for the Operating Day exceed the Independent Market Monitor's (IMM's) pre-determined reference tolerances. These actions prevent AOs from exercising undue influence when their Generation Resources are known to be in demand for reliability in a local area. There is no mitigation of Day-Ahead RSG MWP Amounts for Demand Response Resources – Type I and Type II.

Day-Ahead RSG MWP Amounts may also be mitigated for Generation Resources by asset by day for Voltage and Local Reliability Commitment (VLRC) requirements. Mitigation may be warranted when any of the following values exceed the Independent Market Monitor's (IMM's) pre-determined reference tolerances:

- Generation Offers
- Economic Minimum
- Minimum Run Time

The settlement statement displays an "IMM RSG MITIGATION" flag indicating when a particular Generation Resource asset Day-Ahead RSG MWP Amount has been mitigated. The IMM will not always provide a mitigated reference production Offer and Operating Reserve Offer. For non-VLRC purposes, when no IMM production Offer and Operating Reserve Offer has been provided to MISO for the entire Operating Day, the IMM Production Costs and Operating Reserve Costs are not displayed on the Settlement Statement and the IMM mitigation comparison is not performed. Additionally, the IMM will not always provide mitigated VLRC Generation Offer, Economic Minimum, and/or Minimum Run Time values. When no IMM VLRC Generation Offer, Economic Minimum, and/or Minimum Run Time values have been provided to MISO for the entire Operating Day, the IMM values are not displayed on the Settlement Statement and the IMM mitigation comparison is not performed.

An IMM RSG MITIGATION value of "N" indicates no mitigation had been performed; a value of "Y" indicates that the Day-Ahead RSG MWP was mitigated for the Operating Day.

The Day-Ahead RSG MWP Amount, including determinants, is displayed on the Day-Ahead Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a billing determinant that is displayed on an AO's Day-Ahead statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

B.12.1 Calculation Inputs for DA_RSG_MWP

*DA_RSG_PC	Day-Ahead RSG Production Cost (Offer) Amount ($); hourly production Offer calculated by DART that includes Start-Up, No-Load, Energy and Operating Reserve Offer for a Generation Resource and Demand Response Resource – Type II or Shut-Down, Hourly Curtailment and Energy Offer for a Demand Response Resource – Type I. DART averages the awarded production Offer across all eligible hours of the Operating Day. Eligible periods spanning midnight have the Start-Up (Shut-Down) value averaged across the prior day to midnight period only. DART determines each Resource's eligibility for full or partial Start-Up (Shut-Down) Offer based upon any previous status including whether it is a hot, intermediate or cold start condition. The total hourly eligible production cost value is calculated by DART for each Resource and provided to Market Settlements. Production Offers are shown as positive values. Day-Ahead production Offers only display on statements when values have been provided by the DART. In the absence of any displayed values, the participant can assume they are zero for every Hour.
*DA_RSG_MIT_PC	Day-Ahead Mitigated RSG Production Cost (Offer) Amount ($); hourly mitigated Start-Up cost, No-Load costs, Energy Offer and Operating Reserve cost amount provided by the IMM for a Generation Resource. Mitigated Production Costs are shown as positive values. Day-Ahead IMM Production Costs only display on statements when values have been provided by the DART or the IMM System. In the absence of any displayed values, the participant can assume they are zero for every Hour.
*DA_RSG_ELIGIBILITY	(Hourly) Day-Ahead RSG Eligibility (flag); an hourly flag that indicates whether an asset is eligible to receive their Production Costs for the Hour. The eligibility is determined by DART when the Day-Ahead Energy and Operating Reserve Market is cleared. A "Y" indicates the asset is eligible for the Hour and an "N" indicates the asset is not eligible for the Hour. Day-Ahead RSG eligibility status only displays on statements when Production Cost values have been provided by DART or the IMM System. In the absence of any displayed values, the participant assumes the unit eligibility is “N”. The DA_RSG_ELIGIBILITY is set to “Y” whenever the asset has been guaranteed to receive their production costs.

*DA_SCHD$_{Gen}$	Hourly Day-Ahead Asset Schedule Volume for a Resource asset (MWh); the Day-Ahead Asset Schedule Volume for a Resource asset is the market cleared Day-Ahead Asset schedule. Only Resource schedules, excluding DRR Type-II Resources, are considered in this charge type. A positive schedule represents a Load obligation and a negative schedule represents a Resource obligation.
*DA_IMM_RSG_MWH	Hourly Day-Ahead Asset Mitigated Volume for a Resource asset (MWh); hourly mitigated Economic Minimum volume provided by the IMM for a Generation Resource. Day-Ahead IMM RSG MWH values are only displayed on statements when the values have been provided by the IMM. In the absence of any displayed values, the participant can assume they are zero for every Hour.
*DA_LMP_EN	Hourly Day-Ahead LMP ($/MWh); at a Commercial Pricing Node. The Day-Ahead Energy and Operating Reserve Market clearing price for Energy at a given Commercial Pricing Node in the Transmission Provider Region, which is equivalent to the marginal cost of serving demand at the Commercial Pricing Node. The Day-Ahead Locational Margin Price includes the MCC and the MLC.
*DA_REG_VOL	Hourly Day-Ahead Cleared Regulation Volume (MWh); the amount of Regulating Reserve cleared in the Day-Ahead Energy and Operating Reserve Market by a qualified Resource.
*DA_REG_MCP	Hourly Day-Ahead Regulation Market Clearing Price ($/MWh); the hourly Regulating Reserve Market Clearing Price at a Commercial Pricing Node.
*DA_SPIN_VOL	Hourly Day-Ahead Cleared Spinning Reserve Volume (MWh); the amount of Spinning Reserve cleared in the Day-Ahead Energy and Operating Reserve Market by a qualified Resource.
*DA_SPIN_MCP	Hourly Day-Ahead Spinning Reserve Market Clearing Price ($/MWh); the hourly Spinning Reserve Market Clearing Price at a Commercial Pricing Node.
*DA_SUPP_VOL	Hourly Day-Ahead Cleared Supplemental Reserve Volume (MWh); the amount of Supplemental Reserve cleared in the Day-Ahead Energy and Operating Reserve Market by a qualified Resource.

*DA_SUPP_MCP	Hourly Day-Ahead Supplemental Reserve Market Clearing Price ($/MWh); the hourly Supplemental Reserve Market Clearing Price at a Commercial Pricing Node.
*DA_DRC_VOL	Hourly Day-Ahead Cleared Down Ramp Capability Volume (MWh); the amount of Down Ramp Capability cleared in the Day-Ahead Energy and Operating Reserve Market by a participating Resource.
*DA_DRC_MCP	Hourly Day-Ahead Down Ramp Capability Market Clearing Price ($/MWh); please refer to the previously defined calculation definition of this component.
*DA_URC_VOL	Hourly Day-Ahead Cleared Up Ramp Capability Volume (MWh); the amount of Up Ramp Capability cleared in the Day-Ahead Energy and Operating Reserve Market by a participating Resource.
*DA_URC_MCP	Hourly Day-Ahead Up Ramp Capability Market Clearing Price ($/MWh); please refer to the previously defined calculation definition of this component.

B.12.2 Intermediate Calculations for DA_RSG_MWP

IF	The "IF" logical statement is a conditional test that returns one value if a condition you specify evaluates to TRUE and another value if it evaluates to FALSE. { An example of the IF (logical_test, THEN value_if_true, ELSE value_if_false) }
DA_DRRII_SCHD_VOL	Hourly Day-Ahead DRR II Schedule Volume (MWh); the calculated volume representing injection for a DRR Type-II in the Day-Ahead Market. This injection volume for the DRR Type-II is calculated as minus one times the difference between the Day-Ahead dispatch maximum and the Day-Ahead Schedule withdrawal bid volume for the DRR Type-II. Please refer to the previously defined calculation definition of this component.
DA_IMM_RSG_MWH_TOTAL	Daily Day-Ahead Asset Mitigated Volume for a Resource asset (MWh); the hourly summation of Day-Ahead Asset Mitigated Volume for a Resource. = Σ_H (DA_IMM_RSG_MWH)
DA_RSG_EN_VAL	Hourly Day-Ahead Revenue Sufficiency Market Energy Amount ($); this amount represents the hourly cleared Day-Ahead asset schedule energy

value of an asset when it is committed by MISO combined with the revenue obtained for Operating Reserve clearing volume and Ramp Capability clearing volume in the Day-Ahead Energy and Operating Reserve Market. The calculation is performed for every Hour where the DART has determined the asset has met the eligibility requirement for the Hour. The value is calculated by multiplying the cleared asset energy schedule by the LMP at the Commercial Pricing Node without regard for FBTs and then adding the Operating Reserve revenue.

= IF {
(DA_RSG_ELIGIBILITY = "Y") ,
THEN [(MIN (DA_SCHD$_{GEN}$ + DA_DRRII_SCHD_VOL, 0) * DA_LMP_EN) +
(((DA_REG_VOL * DA_REG_MCP) +
(DA_SPIN_VOL * DA_SPIN_MCP) +
(DA_SUPP_VOL * DA_SUPP_MCP) +
(DA_URC_VOL * DA_URC_MCP) +
(DA_DRC_VOL * DA_DRC_MCP)) * (-1))] ,
ELSE 0 }

DA_RSG_EN_VAL_TOTAL

Daily Day-Ahead Revenue Sufficiency Market Energy Amount for a Resource asset ($); the daily summation of hourly Day-Ahead Revenue Sufficiency Market Energy Amount.

= Σ $_{H}$ (DA_RSG_EN_VAL)

DA_SCHD_TOTAL

Daily Day-Ahead Asset Schedule Volume for a Resource asset (MWh).

= Σ $_{H}$ IF { DA_RSG_ELIGIBILITY = "Y",
THEN [(MIN (DA_SCHD$_{GEN}$ + DA_DRRII_SCHD_VOL, 0) * (-1))] ,
ELSE 0 }

DA_PC_AMT

Hourly Day-Ahead RSG Production Cost Amount for a Resource asset ($); the hourly Day-Ahead RSG Production Cost credit amount.

= IF { DA_RSG_ELIGIBILITY = "Y",
THEN [(DA_RSG_PC) * (-1)],
ELSE 0 }

DA_PC_AMT_MIT

Hourly Day-Ahead Mitigated RSG Production Cost Amount for a Generation Resource asset ($); the hourly Day-Ahead Mitigated RSG Production Cost credit amount for a Generation Resource.

= IF { DA_IMM_RSG_MWH > 0
THEN [(DA_RSG_MIT_PC) * (-1)],

ELSE IF (DA_IMM_RSG_MWH_TOTAL = 0 AND
DA_RSG_ELIGIBILITY = "Y"),
THEN [(DA_RSG_MIT_PC) * (-1)],
ELSE 0 }

DA_PC_AMT_TOTAL

Daily Day-Ahead RSG Production Cost Amount ($); the daily summation of the Hourly Day-Ahead RSG Production Cost Amount.
$= \Sigma_{H}$ (DA_PC_AMT)

DA_PC_AMT_MIT_TOTAL

Daily Day-Ahead Mitigated RSG Production Cost Amount ($); the daily summation of the Hourly Day-Ahead Mitigated RSG Production Cost Amount for a Generation Resource.
$= \Sigma_{H}$ (DA_PC_AMT_MIT)

DA_MWP_AMT

Daily Day-Ahead RSG MWP Amount ($); represents the daily amount of Production Costs not covered by the Asset's energy value.
= MIN [0, (DA_PC_AMT_TOTAL - DA_RSG_EN_VAL_TOTAL)]

DA_MWP_MIT_AMT

Daily Day-Ahead RSG Mitigated MWP Amount ($); represents the daily amount of the IMM calculated Production Costs not covered by the Generation Resource asset's energy value.
= MIN [0, (DA_PC_AMT_MIT_TOTAL - DA_RSG_EN_VAL_TOTAL)]

*IMM(DA)_RSG_MITIGATION

Daily Day-Ahead IMM RSG Mitigation flag (Y or N); a daily flag indicating whether a Generation Resource asset's Day-Ahead revenue sufficiency MWP had been mitigated by the IMM. An IMM RSG MITIGATION value of "N" indicates no mitigation had been performed; a value of "Y" indicates that the Day-Ahead RSG MWP was mitigated for the Operating Day for the generation asset.
= IF (DA_PC_AMT_MIT_TOTAL < 0 ,
THEN "Y" , ELSE "N")

DA_RSG_ELIG_HRS

Day-Ahead RSG Eligibility Hour Count by asset (Integer); this integer represents the total number of hours during an Operating Day where the related asset is eligible to receive the Day-Ahead RSG MWP.
$= \Sigma_{Hr\text{-}Asset}$ [IF (DA_IMM_RSG_MWH > 0) ,
THEN 1 ,
ELSE IF (DA_IMM_RSG_MWH_TOTAL = 0 AND
DA_RSG_ELIGIBILITY = "Y") ,
THEN 1 ,

ELSE 0]

*^DA_ASOF_MWP

Hourly Day-Ahead As Offered MWP ($); the hourly credit the participant will receive if they are not mitigated by the IMM. Note this credit amount is displayed as a positive amount and represents the amount in dollars per Hour MISO will pay the participant if not mitigated. Each Hour is rounded to the nearest cent with any rounding error being carried forward to the next hour of the day. Rounding error does not carry from one Operating Day to another.

= IF [DA_RSG_ELIGIBILITY = "Y" ,
THEN (DA_MWP_AMT / DA_RSG_ELIG_HRS) * (-1),
ELSE 0]

*^DA_IMM_MWP

Hourly Day-Ahead As Offered MWP ($); the hourly credit the participant will receive if they are mitigated by the IMM. Note this credit amount is displayed as a positive amount and represents the amount in dollars per Hour MISO will pay the participant if mitigated. Each Hour is rounded to the nearest cent with any rounding error being carried forward to the next hour of the day. Rounding error does not carry from one Operating Day to another.

= IF [DA_IMM_RSG_MWH > 0 ,
THEN (DA_MWP_MIT_AMT / DA_RSG_ELIG_HRS) * (-1) ,
ELSE IF (DA_IMM_RSG_MWH_TOTAL = 0 AND
DA_RSG_ELIGIBILITY = "Y") ,
THEN (DA_MWP_MIT_AMT / DA_RSG_ELIG_HRS) * (-1),
ELSE 0]

DA_RSG_ASSET_CR_HR

Hourly Daily Day-Ahead RSG Credit Amount for a Generation Resource asset ($); the following equation determines whether the participant receives their MWP based on their offered data or they receive the IMM's MWP based on the IMM's mitigated Offer data. The evaluation to determine if an asset is mitigated is performed by the Operating Day, but the hourly credits may differ based on when a unit is committed, how long it takes to start up, and the cleared LMP in the market. MWPs are only provided in hours where the asset has a Day-Ahead RSG Eligibility of yes ("Y").

= IF [IMM_RSG_MITIGATION = "N" , THEN DA_ASOF_MWP * (-1) ,
ELSE DA_IMM_MWP * (-1)]

B.12.3Day-Ahead ELMP Make Whole Payments

The Day-Ahead ELMP Make Whole Payment (DA_ELMP_MWP) is a make whole payment for Day-Ahead Must-Run Resources (MR_ELMP_MWP), Virtual Transactions (VIRT_ELMP_MWP), Price Sensitive Demand Bids (DA_DB_ELMP_MWP), Dispatchable Interchange Schedule (DISP_ELMP_MWP), and "UP-to-TUC" Interchange Schedules (TUC_ELMP_MWP) in the Day-Ahead Market.

The calculations of MR_ELMP_MWP, VIRT_ELMP_MWP, DA_DB_ELMP_MWP are described in the Post Operating Processor Calculation Guide (MS-OP-031), and the calculations of DISP_ELMP_MWP and TUC_ELMP_MWP are explained in this Section.

B.12.3.1 Day-Ahead Must-Run ELMP Make Whole Payment (MR_ELMP_MWP_HR)

A Day-Ahead Must-Run Resource is eligible for ELMP MWP for a given Market Hour if its DA Schedule is above its achievable minimum MW level for Energy, or any of its DA Cleared Operating Reserves is above the corresponding DA Self-Schedule volume.

B.12.3.1.1 Calculation Inputs for MR_ELMP_MWP

*DA_CONTROL_STATUS	Hourly Day-Ahead Unit Dispatch System Control Status for Must-Run Resources: "0" represents offline, "1" represents online following non-Regulation, "2" represents online for Regulation; and, "3" represents online but off control.
*MR_MWP_ELIG_FL	Hourly Day-Ahead Must-Run ELMP MWP Eligibility Flag; represents the Day-Ahead ELMP MWP eligibility for a given Market Hour for a Must-Run Resource. "Y" represents that the Resource is eligible for DA ELMP MWP; "N" represents that the Resource is ineligible for DA ELMP MWP.
* MR_ELMP_MWP	Hourly Day-Ahead Must-Run Resource ELMP MWP Amount ($); for a Commercial Pricing Node.

B.12.3.2 Virtual Transaction ELMP Make Whole Payment (VIRT_ELMP_MWP)

* VIRT_ELMP_MWP	Hourly Virtual Transaction ELMP MWP Amount ($); for an AO at a Commercial Pricing Node. The Day-Ahead Virtual Transaction ELMP MWP is the sum of Virtual Offer MWP and Virtual Bid MWP.

B.12.3.3 Price Sensitive Demand Bid ELMP Make Whole Payment (DA_DB_ELMP_MWP)

*DA_DB_ELMP_MWP	The Hourly Price Sensitive Demand Bid ELMP MWP Amount ($); for a Commercial Pricing Node. The Day-Ahead Price Sensitive Demand Bid, including EAR Wheel-Out Interchange Schedule, ELMP MWP is credit to an AO for its Price Sensitive Demand Bid when the Day-Ahead Charge Amount is greater than its Willing-To-Pay Amount.

B.12.3.4 Day-Ahead Dispatchable Interchange Schedule Make Whole Payment (DISP_ELMP_MWP)

Day-Ahead Dispatchable Interchange Schedule ELMP MWP is the Make-Whole Payment to an Asset Owner for its Day-Ahead Wheel-In and Wheel-Out Dispatchable Interchange Schedules.

B.12.3.4.1 Calculation Inputs for DISP_ELMP_MWP

*DA_PHYS_{Buyer}	Hourly Day-Ahead Wheel-Out Dispatchable Interchange Schedule Volume where the AO is the Buyer (MWh); a Buyer is defined as an AO that receives energy from MISO, at a MISO defined Sink Commercial Pricing Node. The transaction volume is presented as a positive value.
*DA_PHYS_{Seller}	Hourly Day-Ahead Wheel-In Dispatchable Interchange Schedule Volume where the AO is the Seller (MWh); a Seller is defined as an AO that supplies energy to MISO, at a MISO defined Source Commercial Pricing Node. The transaction volume is presented as a positive value.
DA_BID_PRICE	Hourly Day-Ahead Wheel-Out Dispatchable Interchange Schedule Price ($/MWh); represents Buyer bid price.
DA_OFFER_PRICE	Hourly Day-Ahead Wheel-In Dispatchable Interchange Schedule Price ($/MWh); represents Seller offer price.
*DA_LMP_{Si}	Day-Ahead LMP ($/MWh); at a Sink Commercial Pricing Node for Wheel-Out Dispatchable Interchange Schedule.

*DA_LMP_{So} — Day-Ahead LMP ($/MWh); at a Source Commercial Pricing Node for Wheel-in Dispatchable Interchange Schedule.

B.12.3.4.2 Intermediate Calculations for DISP_ELMP_MWP

*DISP_WO_ELMP_MWP — Hourly Total Day-Ahead Wheel-Out Dispatchable Interchange Schedule MWP Amount ($); for a given Wheel-Out Dispatchable Interchange Schedule at its Sink Interface Commercial Pricing Node. The Day-Ahead Dispatchable Interchange Schedule WO ELMP MWP is a credit to the Buyer AO when the Day-Ahead Bid Charge Amount is greater than the Day-Ahead Willingness-To-Pay Amount for Day-Ahead Wheel-Out Dispatchable Interchange Schedule.

$$= \{MIN\ [0, (DA\_BID\_PRICE - DA\_LMP_{Si})] \times DA\_PHYS_{Buyer}\}$$

*DISP_WI_ELMP_MWP — Hourly Total Day-Ahead Wheel-In Dispatchable Interchange Schedule MWP Amount ($); for a given Wheel-In Dispatchable Interchange Schedule at its Source Interface Commercial Pricing Node. The Day-Ahead Dispatchable Interchange Schedule WI_ELMP_MWP is a credit to the Seller AO when the Day-Ahead Production Cost Amount is greater than the Day-Ahead LMP Revenue Amount for Day-Ahead Wheel-In Dispatchable Interchange Schedule.

$$= \{MIN\ [0, (DA\_LMP_{So} - DA\_OFFER\_PRICE)] \times DA\_PHYS_{Seller}\}$$

DISP_ELMP_MWP — Hourly Total Dispatchable Interchange Schedule ELMP MWP ($); represents the total hourly Dispatchable Interchange Schedule ELMP MWP for a given Asset Owner at a Commercial Pricing Node.

$$= \Sigma_{Transactions}\ (DISP\_WO\_ELMP\_MWP) + \Sigma_{Transactions}\ (DISP\_WI\_ELMP\_MWP)$$

B.12.3.5 Day-Ahead “UP-to-TUC” Interchange Schedule ELMP Make Whole Payment (TUC_ELMP_MWP)

The Day-Ahead “UP-to-TUC” Interchange Schedule ELMP MWP is a credit to an Asset Owner when the transmission usage costs are greater than the Transmission Usage Charge Bid or Offer for Day-Ahead Wheel-In, Wheel-Out, and Wheel-Though Interchange Schedules.

B.12.3.5.1 Calculation Inputs for UTC_ELMP_MWP

*DA_PHYS_{Buyer}	Hourly Day-Ahead Wheel-Out "UP-to-TUC" Interchange Schedule Volume where the AO is the Buyer (MWh); at a single Sink Interface Commercial Pricing Node where the AO is buying "UP-to-TUC" Interchange Schedules from MISO. The Transaction volume is presented as a positive value.
*DA_PHYS_{Seller}	Hourly Day-Ahead Wheel-In "UP-to-TUC" Interchange Schedule Volume where the AO is the Seller (MWh); at a MISO defined Source Interface Commercial Pricing Node where AO is selling "UP-to-TUC" Interchange Schedules to MISO. The Transaction volume is presented as a positive value.
*DA_PHYS_{WT}	Hourly Day-Ahead Wheel-Though "UP-to-TUC" Interchange Schedule Volume where the AO is both the Seller and the Buyer (MWh); the Transaction volume is presented as a positive value.
DA_BID_PRICE	Hourly Day-Ahead Wheel-Out "UP-to-TUC" Interchange Schedule Price ($/MWh).
DA_OFFER_PRICE	Hourly Day-Ahead Wheel-In "UP-to-TUC" Interchange Schedule Price ($/MWh).
DA_WT_PRICE	Hourly Day-Ahead Wheel-Though "UP-to-TUC" Interchange Schedule Price ($/MWh).
*DA_LMP_{si}	Day-Ahead LMP ($/MWh) at a Sink Commercial Pricing Node.
*DA_LMP_{so}	Day-Ahead LMP ($/MWh) at a Source Commercial Pricing Node.

B.12.3.5.2 Intermediate Calculations for TUC_ELMP_MWP

*^TUC_WO_ELMP_MWP

Hourly Wheel-Out MWP Amount ($); for Day-Ahead Wheel-Out "UP-to-TUC" Interchange Schedule between a Sink and Source Commercial Pricing Nodes.

$= \text{MIN}\ \{0, [\text{DA\_BID\_PRICE} - (\text{DA\_LMP}_{si} - \text{DA\_LMP}_{so)}]\} \times \text{DA\_PHYS}_{Buyer}$

*^TUC_WI_ELMP_MWP

Hourly Wheel-In MWP Amount ($); for Day-Ahead Wheel-In "UP-to-TUC" Interchange Schedule between a Sink and Source Commercial Pricing Nodes.

$= \text{MIN}\ \{0, [\text{DA\_OFFER\_PRICE} - (\text{DA\_LMP}_{si} - \text{DA\_LMP}_{so)}]\} \times \text{DA\_PHYS}_{Seller}$

*^TUC_WT_ELMP_MWP

Hourly Wheel-Through MWP Amount ($); for Day-Ahead Wheel-Though "UP-to-TUC" Interchange Schedule between a Sink and Source Commercial Pricing Nodes.

$= \text{MIN}\ \{0, [\text{DA\_WT\_PRICE} - (\text{DA\_LMP}_{si} - \text{DA\_LMP}_{so)}]\} \times \text{DA\_PHYS}_{WT}$

TUC_ELMP_MWP

Hourly Total Day-Ahead "UP-to-TUC" Interchange Schedule ELMP MWP Amount ($); represents total hourly "UP-to-TUC" Interchange Schedule ELMP MWP for a given Asset Owner at a Commercial Pricing Node.

$= \Sigma_{Transactions}\ (\text{TUC\_WO\_ELMP\_MWP}) +$
$\Sigma_{Transactions}\ (\text{TUC\_WI\_ELMP\_MWP}) +$
$\Sigma_{Transactions}\ (\text{TUC\_WT\_ELMP\_MWP})$

B.12.3.6 Intermediate Calculation for DA_ELMP_MWP

DA_ELMP_MWP_HR

Hourly Total Day-Ahead ELMP MWPs Amount ($); for a given Asset Owner at a Commercial Pricing Node. It is the sum of MR_ELMP_MWP, VIRT_ ELMP_ELMP, DB_ ELMP_MWP, DISP_ ELMP_MWP, and TUC_ELMP_MWP.

= (-1) * MR_ ELMP_MWP + (-1) * VIRT_ELMP_MWP +
(-1) * DA_DB_ ELMP_MWP + DISP_ ELMP_MWP + TUC_ ELMP_MWP

B.12.4Charge Type Calculation for DA_RSG_MWP

*DA_RSG_MWP_HR	Hourly Day-Ahead RSG MWP Amount ($); is the hourly AO total credit amount for all their assets. The formula result is per Hour. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement. $= \Sigma_{Assets}$ (DA_RSG_ASSET_CR_HR) for Generation Resources + Σ_{Assets} [DA_ASOF_MWP * (-1)] for Demand Response Resources – Type I and Type II
*AO_DA_ELMP_MWP_HR	Hourly Total Day-Ahead ELMP MWP Amount ($); is the hourly AO total ELMP MWP credit amount for all their assets. $= \Sigma_{AO}$ (DA_ ELMP_MWP_HR)
*DA_RSG_MWP	Day-Ahead RSG MWP Amount ($); is the hourly asset credit amount summed for all hours of the day for an AO. $= \Sigma_{H}$ (DA_RSG_MWP_HR) + Σ_{H} (AO_DA_ELMP_MWP_HR)

B.13 Day-Ahead Virtual Energy Amount (DA_VIRT_EN)

The Day-Ahead Virtual Energy Amount represents an AO's total Day-Ahead net energy cost (or credit) associated with all its struck virtual Bids and Offers. The Day-Ahead Virtual Amount is calculated hourly for each AO by Commercial Pricing Node and is summed to determine a daily total. The hourly amount by Commercial Pricing Node is the net Day-Ahead Struck Virtual Bid and Offer volume multiplied by the associated LMP for the Commercial Pricing Node.

For each AO, the Settlement Statement shows the total net cleared Bid and Offer volume by Commercial Pricing Node by Hour.

The Day-Ahead Virtual Energy Amount, including determinants, is displayed on the Day-Ahead Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a billing determinant that is displayed on an AO's Day-Ahead statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

B.13.1 Calculation Inputs for DA_VIRT_EN

*DA_LMP_EN	Hourly Day-Ahead LMP ($/MWh); at a Commercial Pricing Node. The Day-Ahead Energy and Operating Reserve Market clearing price for Energy at a given Commercial Pricing Node in the Transmission Provider Region, which is equivalent to the marginal cost of serving demand at the Commercial Pricing Node. The Day-Ahead Locational Margin Price includes the MCC and the MLC.
*DA_VSCHD	Hourly Day-Ahead Net Virtual Schedule Volume at a Commercial Pricing Node (MWh); for an AO. The Day-Ahead Net Virtual Schedule Volume is the net Day-Ahead Energy and Operating Reserve Market cleared Bid and Offered Virtual Schedule volume by AO by Commercial Pricing Node by Hour. A positive volume represents a net Load obligation and a negative volume represents a net supply obligation.

B.13.2 Intermediate Calculations for DA_VIRT_EN

There are no intermediate calculations.

B.13.3 Charge Type Calculation for DA_VIRT_EN

*^DA_VIRT_EN_HR	Hourly Day-Ahead Virtual Energy Amount ($); for an AO. The result represents the AO's total hourly charge or credit for all cleared Virtual Energy Bids and Offers for all Commercial Pricing Nodes in the Day-Ahead Energy and Operating Reserve Market. The formula result is per Hour and rounded to the nearest cent. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement. $= \Sigma_{\text{Transactions}} (\text{DA_VSCHD} * \text{DA_LMP_EN})$
*DA_VIRT_EN	Day-Ahead Virtual Energy Amount ($); for an AO. This is a daily total amount due MISO from an AO from all the AO's net Day-Ahead Virtual Schedules. $= \Sigma_{H} (\text{DA_VIRT_EN_HR})$

B.14 Day Ahead Regulation Amount (DA_ASM_REG)

The Day-Ahead Regulation Amount represents an AO's remuneration for the availability of its regulation-capable Assets to provide regulation and frequency response service in the Day-Ahead Energy and Operating Reserve Market when instructed by MISO.

The Day-Ahead Regulation Amount, including billing determinants, is displayed on the Day-Ahead Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a determinant that is displayed on an AO's Day-Ahead statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

B.14.1Calculation Inputs for DA_ASM_REG

*DA_REG_VOL	Hourly Day-Ahead Regulation Volume (MWh); the amount of Regulating Reserve in the Day-Ahead Energy and Operating Reserve Market for a qualified Resource.
*DA_REG_SPIN_VOL	Hourly Day-Ahead Regulation for Spinning Reserve Volume (MWh); the amount of Regulating Reserve in the Day-Ahead Energy and Operating Reserve Market substituted for Spinning Reserve for a qualified Resource.
*DA_REG_MCP	Hourly Day-Ahead Regulation Market Clearing Price ($/MWh); please refer the previously defined calculation definition of this component.
*DA_PROD_SUB_FL	Day-Ahead Hourly Product Substitution: Product substitution is a mechanism that allows the substitution of a given higher quality Ancillary Service (AS) product for a lower quality AS product in order to meet the Operating Reserve requirements in a least cost manner for a given Interval. 'Y' indicates product substitution has occurred. 'N' indicates no product substitution has occurred.

B.14.2 Intermediate Calculations for DA_ASM_REG

DA_TOT_REG_VOL

Hourly Day-Ahead Total Regulation Volume (MWh); the amount of Regulating Reserve cleared in the Day-Ahead Energy and Operating Reserve Market by a qualified Resource.
= DA_REG_VOL + DA_REG_SPIN_VOL

B.14.3 Charge Type Calculation for DA_ASM_REG

*^ DA_ASM_REG_HR

Hourly Day-Ahead Regulation Amount ($); for an AO. Calculation is performed for asset Commercial Pricing Nodes clearing megawatts in Day-Ahead Market. The hourly amount is the product of cleared Regulating Reserve megawatts and Day-Ahead Regulation Market Clearing Price. Amount is presented as hourly total for the AO.
$=\sum_{CN} (-1 * DA\_REG\_VOL_{CN} * DA\_REG\_MCP_{CN})$

* DA_ASM_REG

Day-Ahead Regulation Amount ($); the total daily amount due to the Asset Owner that owns the qualified Resources with cleared Regulating Reserve.
$= \sum_{H} (DA\_ASM\_REG\_HR)$

B.15 Day Ahead Spinning Reserve Amount (DA_ASM_SPIN)

The Day-Ahead Spinning Reserve Amount represents an AO's remuneration for the Day-Ahead total cleared Spinning Reserve from its qualified Resources including Regulating Reserve for Spinning Reserve substitution.

The Day-Ahead Spinning Reserve Amount, including billing determinants, is displayed on the Day-Ahead Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a determinant that is displayed on an AO's Day-Ahead statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

B.15.1 Calculation Inputs for DA_ASM_SPIN

*DA_SPIN_VOL	Hourly Day-Ahead Spinning Reserve Volume (MWh); the amount of Spinning Reserve and the amount of Regulating Reserve substituted for Spinning Reserve in the Day-Ahead Energy and Operating Reserve Market for a qualified Resource.
*DA_REG_SPIN_VOL	Hourly Day-Ahead Regulation for Spinning Reserve Volume (MWh); please refer to the previously defined calculation definition of this component.
*DA_SPIN_MCP	Hourly Day-Ahead Spinning Reserve Market Clearing Price ($/MWh); please refer to the previously defined calculation definition of this component.

B.15.2 Intermediate Calculations for DA_ASM_SPIN

There are no intermediate calculations.

B.15.3 Charge Type Calculation for DA_ASM_SPIN

*^ DA_ASM_SPIN_HR

Hourly Day-Ahead Spinning reserve Amount ($); for an AO. Calculation is performed for asset Commercial Pricing Nodes clearing megawatts in Day-Ahead Market. The hourly amount is the product of cleared Day-Ahead Spinning Reserve megawatts and Day-Ahead Spinning Reserve Market Clearing Price. Amount is presented as hourly total for the AO.

$$= \sum_{CN} (-1 * DA\_SPIN\_VOL * DA\_SPIN\_MCP)$$

* DA_ASM_SPIN

Day-Ahead Spinning Reserve Amount ($); the total daily amount due to the Asset Owner that owns the qualified Resources with cleared Spinning Reserve.

$$= \sum_{H} (DA\_ASM\_SPIN\_HR)$$

B.16 Day Ahead Supplemental Reserve Amount (DA_ASM_SUPP)

The Day-Ahead Supplemental Reserve Amount represents an AO's remuneration for the DA total cleared Supplemental Reserve from its qualified Resources.

The Day-Ahead Supplemental Reserve Amount, including billing determinants, is displayed on the Day-Ahead Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a determinant that is displayed on an AO's Day-Ahead statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

B.16.1 Calculation Inputs for DA_ASM_SUPP

*DA_SUPP_VOL — Hourly Day-Ahead Cleared Supplemental Reserve Volume (MWh); the amount of Supplemental Reserve cleared in the Day-Ahead Energy and Operating Reserve Market by a Generation Resource or qualified Demand Response, Supplemental-Qualified Resource.

*DA_SUPP_MCP — Hourly Day-Ahead Supplemental Reserve Market Clearing Price ($/MWh); please refer to the previously defined calculation definition of this component.

B.16.2 Intermediate Calculations for DA_ASM_SUPP

There are no intermediate calculations.

B.16.3 Charge Type Calculation for DA_ASM_SUPP

*^ DA_ASM_SUPP_HR — Hourly Day-Ahead Supplemental reserve Amount ($); for an AO. Calculation is performed for asset Commercial Pricing Nodes clearing megawatts in Day-Ahead Market. The hourly amount is the product of cleared Supplemental Reserve megawatts and Day-Ahead Supplemental Reserve Market Clearing Price. Amount is presented as hourly total for the AO.

$$= \sum_{CN} (-1 * DA\_SUPP\_VOL * DA\_SUPP\_MCP)$$

* DA_ASM_SUPP	Day-Ahead Supplemental Reserve Amount ($); the total daily amount due to the Asset Owner that owns the qualified Resources with cleared Supplemental Reserve. $= \sum_{H} (\text{DA_ASM_SUPP_HR})$

B.17 Day Ahead Ramp Capability Amount (DA_RC_AMT)

The Day-Ahead Ramp Capability Amount represents an AO's compensation for Up Ramp Capability and/or Down Ramp Capability in the Day-Ahead Energy and Operating Reserve Market.

The Day-Ahead Ramp Capability Amount, including billing determinants, is displayed on the Day-Ahead Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a determinant that is displayed on an AO's Day-Ahead statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

B.17.1 Calculation Inputs for DA_RC_AMT

*DA_URC_VOL	Hourly Day-Ahead Cleared Up Ramp Capability Volume (MWh); the amount of Up Ramp Capability cleared in the Day-Ahead Energy and Operating Reserve Market by a participating Resource.
*DA_URC_MCP	Hourly Day-Ahead Up Ramp Capability Market Clearing Price ($/MWh); please refer to the previously defined calculation definition of this component.
*DA_DRC_VOL	Hourly Day-Ahead Cleared Down Ramp Capability Volume (MWh); the amount of Down Ramp Capability cleared in the Day-Ahead Energy and Operating Reserve Market by a participating Resource.
*DA_DRC_MCP	Hourly Day-Ahead Down Ramp Capability Market Clearing Price ($/MWh); please refer to the previously defined calculation definition of this component.

B.17.2 Intermediate Calculations for DA_RC_AMT

DA_URC	Hourly Day-Ahead Up Ramp Capability Market Clearing Price ($); This amount represents the Hourly Day-Ahead Up Ramp Capability Volume multiplied by the Day-Ahead Up Ramp Capability Market Clearing Price. = (DA_URC_VOL * DA_URC_MCP)

DA_DRC — Hourly Day-Ahead D Ramp Capability Market Clearing Price ($); This amount represents the Hourly Day-Ahead Down Ramp Capability Volume multiplied by the Day-Ahead Down Ramp Capability Market Clearing Price.
= (DA_DRC_VOL * DA_DRC_MCP)

B.17.3 Charge Type Calculations for DA_RC_AMT

^ DA_RC_AMT_HR — Hourly Day-Ahead Ramp Capability Amount ($); at a Commercial Pricing Node. Calculation is performed for Commercial Pricing Nodes clearing Ramp Capability volumes in the Day-Ahead Energy and Operating Reserves Market. The hourly amount is the sum of the Day-Ahead Up Ramp Capability and Day-Ahead Down Ramp Capability Amounts. Amount is presented as hourly total for the AO.
= $\sum_{CN}$ ((DA_URC + DA_DRC) * -1)

* DA_RC_AMT — Day-Ahead Ramp Capability Amount ($); the total daily amount due to the Asset Owner that owns the participating Resource(s) clearing Ramp Capability.
= $\sum_{H}$ (DA_RC_AMT_HR)

C. Financial Transmission Rights Charge Types

C.1 Financial Transmission Rights Hourly Allocation Amount (FTR_HR_ALC)

Market Settlement of FTR Hourly Allocation Amount is calculated for each FTR and summed into a daily total per AO. The FTR is a financial instrument that entitles the holder to receive compensation, or possible pay charges depending on the type of FTR, for congestion along an energy flow path. This instrument can be used to help hedge Day-Ahead congestion costs.

FTRs can be owned by entities at the AO level and are categorized as:

- An obligation or option
- Point-to-Point (PTP) or Flowgate Right (FGR)
- On-Peak or Off-Peak type
- ~~Counterflow or Non-Counterflow~~
- AO held or MISO held

An obligation type of FTR pays AOs when the energy flow path is from a lower cost congestion area to a higher cost congestion area, but it also requires AOs to pay congestion charges when the flow path is from a higher cost congestion area to a lower cost congestion area. An option type of FTR pays AOs when the energy flow path is from a lower cost congestion area to a higher cost congestion area, but never charges the AOs when congestion occurs in the opposite direction. Only obligation type FTRs are currently available for Market Participants in MISO.

A PTP FTR determines congestion based on two Commercial Pricing Nodes. A FGR FTR determines congestion based on a pre-determined flow path constrained point on the system. FGRs can only be the option type.

An On-Peak type FTR only applies during the hours ending from 0700 hours through 2200 Eastern Standard Time (no regard for Daylight Savings) Monday through Friday. During Off-Peak times on Saturday, Sunday, New Year's, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, Christmas Day or if the holiday occurs on a Sunday, the Monday immediately following the holiday, On-Peak FTRs are set to zero.

The special provision that excluded Counterflow FTRs from financial settlement during a forced or scheduled outage of the FTR source (Section 43.2.5.b), as well as the concept of Counterflow FTRs, were removed from the Tariff effective on 6/1/2008 with the implementation of the new ARR/FTR methodology. However, the special provision was inadvertently left in place post 6/1/2008. For the period from 6/1/2008 to 1/31/2009, FTRs which were identified as Counterflow FTRs will remain as such. From 2/1/2009 forward, all FTRs will be settled as standard FTRs.

An AO held FTR is eligible for funding through the hourly, monthly, and yearly revenue allocation process. MISO will hold FTRs for Option B (GFA or ECCH) FBTs and for Carved-Out GFAs. MISO held FTRs are only funded with the hourly revenue allocation process with shortfalls never being eligible for funding through the monthly and yearly revenue allocation processes. MISO held FTRs can only be of the option type and are used as the primary instrument to fund the Day-Ahead Rebate of Congestion on GFAs Amount for Day-Ahead GFA FBTs. All MISO held FTRs are used to collectively fund all the Day-Ahead Rebate of Congestion on GFAs Amounts paid to AOs. Any funding shortfall is collected through the Real-Time GFA Congestion Rebate Distribution Amount.

The FTR settlement dollar revenue allocation process (i.e., payments to FTR holders from MISO) occurs for an FTR in three processes:

- **Hourly revenue allocation process (FTR_HR_ALC)** – The hourly revenue allocation process determines the amount of congestion dollars available in a single Hour and then allocates those dollars to holders of FTRs for the same Hour. For each AO and MISO held FTR, Market Settlements calculates the hourly target revenue allocation value based on the Day-Ahead Energy and Operating Reserve Market. The hourly revenue allocation target is the amount of credit that an FTR is paid if there are sufficient congestion dollars available. When there are sufficient congestion dollars available to pay an FTR with its full credit, it is referred to as being a fully funded FTR. If less congestion dollars are collected in an Hour than is needed to pay all FTR holders their target value, then all FTR holders are paid on a prorated basis for that Hour. The difference between an AO's target revenue allocation and the actual credit paid is referred to as shortfall. When AOs are not fully funded by the hourly available congestion dollars, AOs are eligible to receive additional revenue allocations to cover their shortfall in the monthly and/or the yearly revenue allocations. For example, if $10,000 is collected in congestion for an Hour, but total FTRs are owed $20,000, then each FTR holder is only credited 50% of what they are owed during that Hour. The hourly FTR revenue allocation process is performed each time an Operating Day is settled whether it is a normally scheduled settlement or an additional non-standard settlement. A non-standard settlement is defined as a settlement that is not 7, 14, 55, or 105 days after the Operating Day.

The Day-Ahead hourly FTR revenue allocation process is funded from:

- The hourly positive sum of (grouping A):
  - Total Hourly Congestion Collections from the Day-Ahead FBT Congestion Amount, plus
  - Total Hourly Congestion Collections from all Day-Ahead energy schedules, plus
  - Total Hourly Congestion Collections from all Obligation FTRs.
- Plus the following (grouping B):
  - Hourly Day-Ahead Joint Operating Agreement (JOA) Excess Funds
- Less the following (grouping C):
  - Hourly Day-Ahead JOA Shortfall

Whenever the sum of grouping A is negative, this shortfall rolls over to the Day-Ahead Congestion Fund to be netted out during the monthly FTR revenue allocation process. The FTR hourly allocation process only occurs when there are positive funds available for an Hour; this occurs after grouping C is subtracted from groups A and B. Hourly FTR funding can still occur if the sum of grouping A is negative provided the net of grouping C from grouping B is positive. At the conclusion of the hourly FTR funding, all unallocated Day-Ahead congestion funds roll into the Monthly FTR revenue allocation process.

The hourly FTR revenue allocation fund cannot be reduced below zero by either Day-Ahead JOA Shortfall or by Day-Ahead Revenue Inadequacy Shortfall.

- **Monthly revenue allocation process (FTR_MN_ALC)** – The monthly revenue allocation determines the amount of excess congestion dollars available in the calendar month and allocates those dollars on a pro rata basis to all AO FTR holders who did not receive their full FTR target revenue allocation during the hourly process for the same calendar month. Excess congestion dollars occur when the total congestion for an Hour exceed the 100% FTR revenue allocation for that Hour. The FTR Monthly Revenue allocation Amount only calculates when the last Operating Day of the month is settled for S7, S14, S55, and S105. The Monthly FTR revenue allocation process is never performed on a non-standard settlement, which does not cause the monthly revenue allocation process to occur.

- **Yearly revenue allocation process (FTR_YR_ALC)** – After the last FTR Monthly Revenue allocation is completed for a calendar month (day 105 settlement for the last calendar day of the month), any unallocated excess congestion dollars go into the FTR Yearly Revenue allocation process. Whenever a settlement is performed after the S105 for the last calendar day of the month has been completed, any congestion and FTR revenue allocation changes that occur impact the FTR Yearly Excess Congestion fund (whether positive or negative). The yearly FTR revenue allocation process is only performed once a year and occurs when December 31st is settled during the last scheduled settlement (S105). The yearly revenue allocation determines the amount of excess congestion dollars available as of December 31st after the hourly and monthly revenue allocation has been completed for the last scheduled settlement (S105), and then allocates those dollars on a pro rata basis to all AO FTR holders who did not receive their full FTR target revenue allocation during the same calendar year. When a non-standard settlement has been performed for an Operating Day prior to the calendar year, any congestion charge changes and hourly FTR revenue allocation changes impact the next yearly FTR revenue allocation process.

The FTR Hourly Revenue allocation Charge, including billing determinants, is displayed on the FTR Market Settlement Statement.

An asterisk (*) denotes a billing determinant that is displayed on an AO's FTR statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM

C.1.1 Calculation Inputs for FTR_HR_ALC

~~*CFTR_FL~~	~~FTR Counterflow Flag ("Y" or "N") The flag indication on each FTR as to whether it is Counter Flow FTR or not. This designation is static for an FTR_ID and does not change. A "Y" indicates that the FTR is a Counterflow FTR. From Operating Day 2/1/2009 forward, the FTR Counterflow Flag will be set to "N" for all FTRs.~~
*DA_LMP_CG	Hourly Day-Ahead Congestion Component of LMP ($/MWh)
*DA_LMP_CG$_{SI}$	Hourly Day-Ahead Congestion Component of LMP at Sink Commercial Pricing Node ($/MWh)
*DA_LMP_CG$_{SO}$	Hourly Day-Ahead Congestion Component of LMP at Source Commercial Pricing Node ($/MWh)
*DA_LMP_EN$_{FG}$	Hourly Day-Ahead LMP ($/MWh); at Flowgate. The Day-Ahead Energy and Operating Reserve Market clearing price for a Flowgate is equivalent to the cost of congestion across the defined flowgate.
DA_VSCHD	Hourly Day-Ahead Net Virtual Schedule Volume for a Commercial Pricing Node for an AO (MWh); the Day-Ahead Net Virtual Schedule Volume is the net Day-Ahead Energy and Operating Reserve Market cleared Bid and Offered Virtual Schedule volume by AO by Commercial Pricing Node by Hour. A positive volume represents a net Load obligation and a negative volume represents a net supply obligation.
*AO_FTR_PRF	Hourly AO FTR Profile Volume (MWh); these include all flowgate and PTP FTRs.

~~*GEN_OUTAGE~~ ~~Hourly Generation Scheduled Outage Flag ("Y" or "N"); an hourly flag indicating whether a Generator at the listed Commercial Pricing Node was in an outage prior to the close of the Day-Ahead Market. The GEN_OUTAGE daily record will only populate on the FTR Statements when at least for one Hour the asset was in an outage. The default value for this determinant is "N". A "Y" for an Hour indicates that the generation asset was in reported outage for the Hour.~~

MISO_OB_FTR_PRF Hourly MISO Held FTR Profile Volume for an Option B (GFA or ECCH) Transactions (MWh); a PTP, option type FTR held by MISO as a primary funding mechanism for GFAOB (FBTs) Congestion Rebate.

MISO_CO_FTR_PRF Hourly MISO Held FTR Profile Volume for a Carved-Out GFA (MWh); a PTP, option type FTR held by MISO as a primary funding mechanism for Carved-Out GFA Congestion Rebate.

C.1.2 Intermediate Calculations for FTR_HR_ALC

IF The “IF” logical statement is a conditional test and returns one value if a condition you specify evaluates to TRUE and another value if it evaluates to FALSE. { An example of the IF (logical_test, THEN value_if_true, ELSE value_if_false) }

MAX The mathematical maximum of the series of numbers in the succeeding parentheses.

MIN The mathematical minimum of the series of numbers in the succeeding parentheses.

C.1.2.1 Intermediate Calculations for FTR Hourly Congestion Fund Portion of FTR_HR_ALC

^DA_FIN_CG_HR Hourly Day-Ahead FBT Congestion Hourly Amount ($); the result represents the AO's total hourly congestion charge or credit for all their Day-Ahead FBTs and is rounded to the nearest cent. Please refer to the previously defined calculation definition of this component.

DA_ASSET_VOL Hourly Day-Ahead Asset Volume (MWh); for an AO for a Commercial Pricing Node. This calculation is only performed for Commercial Pricing Nodes where the AO has a generation, Load Zone, or DRR asset. The result represents the AO's total hourly net energy volume at each of its assets. Please refer to the previously defined calculation definition of this component.

DA_NASSET_VOL

Hourly Day-Ahead Non-Asset Energy Amount (MWh); for an AO for a Commercial Pricing Node. This calculation is only performed for Commercial Pricing Nodes where the AO does not have one or more assets. The result represents the AO's total hourly net non-asset market energy activity other than Virtual Schedules at each Commercial Pricing Node. Please refer to the previously defined calculation definition of this component.

AO_FTR_ADJ_PRF

Hourly AO FTR Adjusted Profile Volume (MWh); this is the hourly AO FTR Profile volume~~ after being adjusted by any Counterflow FTR requirements. Whenever an FTR is a Counterflow FTR and there is an accompanying generation outage for that Hour, the FTR Profile volume is set to zero for the Hour~~. This calculation is performed for each FTR for every Hour.

= ~~{ IF [CFTR_FL = "Y" , IF (GEN_OUTAGE = "Y", 0 , AO_FTR_PRF) , ~~AO_FTR_PRF~~] }~~

FTR_PTP_OBL_CHARGE

Total Hourly PTP Obligation FTR Charge for an AO ($)

$= \Sigma_{AO} \{ \ \text{MAX} [\ (\ DA\_LMP\_CG_{SO} - DA\_LMP\_CG_{SI} \ ) * AO\_FTR\_ADJ\_PRF , \ 0 \ ] \ \}$

MISO_DA_HR_CG

Total MISO Day-Ahead Hourly Congestion Amount ($); the amount of congestion dollars available from the Day-Ahead Energy and Operating Reserve Market for hourly FTR revenue allocation. A positive value represents congestion funds available for distribution.

$$= \Sigma_{MISO} (\ DA\_ASSET\_VOL * DA\_LMP\_CG \ ) + \Sigma_{MISO} (DA\_FIN\_CG\_HR) + \Sigma_{MISO} (\ DA\_NASSET\_VOL * DA\_LMP\_CG \ ) + \Sigma_{MISO} (\ DA\_VSCHD * DA\_LMP\_CG \ ) + \Sigma_{MISO} (FTR\_PTP\_OBL\_CHARGE) \ \square$$

MISO_DA_POS_CG

Total MISO Day-Ahead Hourly Positive Congestion Amount ($); the amount of positive congestion dollars available for the hourly revenue allocation. Negative hourly Day-Ahead congestion fund dollars are transferred to the Day-Ahead Excess Congestion Fund in order to be offset by other positive hours.

$= \text{MAX} (\ 0 , \ MISO\_DA\_HR\_CG \ )$

MISO_DA_JOA	Total MISO Day-Ahead Hourly JOA Charges ($); the total hourly net dollars collected by MISO for JOA seams coordinated dispatching. In the Day-Ahead Market, ISOs may request that MISO redispatch generation to relieve a constrained path. Likewise MISO can request other ISOs to redispatch to relieve a constrained path. Please refer to the previously defined calculation definition of this component.
MISO_DA_JOA_AR	Net MISO Day-Ahead Hourly JOA Account Receivable ($); the total hourly net dollars collected by MISO for JOA seams coordinated dispatching. =MIN (0 , MISO_DA_JOA) * (-1)
MISO_DA_JOA_AP	Net MISO Day-Ahead Hourly JOA Account Payable ($); the total hourly net dollars paid by MISO for JOA seams coordinated dispatching. = MAX (0 , MISO_DA_JOA)
MISO_DA_HR_CG_FOR_JOA	Total MISO Day-Ahead Hourly Congestion Fund Available to Fund Day-Ahead JOA Account Payable ($); represents the total available dollars for funding JOA shortfalls. In the event this fund is not sufficient to fully fund the Day-Ahead JOA Accounts Payable, any additional funds are collected through the Day-Ahead Revenue Neutrality Uplift Charge Type. = MISO_DA_POS_CG + MISO_DA_JOA_AR
MISO_DA_HR_CG_FOR_FTR	Total MISO Day-Ahead Hourly Congestion Fund Available to Fund Hourly FTR Revenue Allocation ($); In the event this fund is not sufficient to fully fund the hourly FTRs, the FTRs may still be funded through the Monthly and Yearly FTR Charge Types. = MAX [0 , (MISO_DA_HR_CG_FOR_JOA - MISO_DA_JOA_AP)]

C.1.2.2 Intermediate Calculations for FTR Hourly Funding Factor Portion of FTR_HR_ALC

AO_FTR_TARG_CR	Total Hourly FTR and FGR Target Credit Revenue Allocation Amount for an AO ($); this value represents the total hour FTR and FGR credits payable to an AO provided there are sufficient congestion dollars available. $= \Sigma_{AO\text{-}FTR} \{ \text{MIN} [(DA_LMP_CG_{SO} - DA_LMP_CG_{SI}) * AO_FTR_ADJ_PRF , 0] \} + \Sigma_{AO\text{-}FG} [(-1) * \text{MAX} (DA_LMP_EN_{FG} * AO_FTR_ADJ_PRF , 0)]$

MISO_OB_FTR_TARG_CR — Total Hourly Option B FTR Target Credit Revenue Allocation Amount for MISO Held FTRs ($); this value represents the total target hourly FTR credits for MISO held Option B related FTRs provided there are sufficient congestion dollars available.
= Σ MISO_OB-FTR (MIN { [(DA_LMP_CG$_{SO}$ – DA_LMP_CG$_{SI}$) * MISO_OB_FTR_PRF] , 0 })

MISO_CO_FTR_TARG_CR — Total Hourly Carved-Out FTR Target Credit Revenue Allocation Amount for MISO Held FTRs ($); this value represents the total target hourly FTR credits for MISO held FTRs provided there are sufficient congestion dollars available.
= Σ MISO_CO-FTR (MIN { [(DA_LMP_CG$_{SO}$ – DA_LMP_CG$_{SI}$) * MISO_CO_FTR_PRF] , 0 })

*FTR_HR_ALC_FCT — Hourly MISO FTR Allocation Factor (factor); this factor determines on an hourly basis the pro rata payout of collected congestion dollars divided by the total target FTR credits for the same hour.
= MIN [1 , (MISO_DA_HR_CG_FOR_FTR / { (-1) * [Σ MISO (AO_FTR_TARG_CR) + MISO_OB_FTR_TARG_CR + MISO_CO_FTR_TARG_CR] })]

C.1.2.3 Intermediate Calculations for FTR Hourly Funding Allocation Portion of FTR_HR_ALC

FGR_OPT_CR — Hourly FGR (Option) Credit for an AO ($); adjusted based on the Hourly MISO FTRs Allocation Factor.
= Σ AO-FG [FTR_HR_ALC_FCT * (-1) * MAX (DA_LMP_EN$_{FG}$ * AO_FTR_ADJ_PRF , 0)]

FTR_PTP_OBL_CR — Hourly PTP Obligation FTR Credit for an AO ($); adjusted based on the Hourly MISO FTRs Allocation Factor.
= Σ AO-FTR { FTR_HR_ALC_FCT * MIN [(DA_LMP_CG$_{SO}$ – DA_LMP_CG$_{SI}$) * AO_FTR_ADJ_PRF , 0] }

FTR_PTP_OPT_CR — Hourly PTP Option FTR Credit for an AO($)
= Σ AO-FTR { FTR_HR_ALC_FCT * MIN [(DA_LMP_CG$_{SO}$ – DA_LMP_CG$_{SI}$) * AO_FTR_ADJ_PRF , 0] }

C.1.3 Charge Type Calculation for FTR_HR_ALC

*^FTR_HR_ALC_HR	Hourly FTR Hourly Allocation Amount for an AO ($); represents the hourly total credit or charge for an AO for all its FTRs (inclusive of flowgates). The formula result is per Hour and rounded to the nearest cent. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement. = FTR_PTP_OBL_CHARGE + FTR_PTP_OBL_CR + FGR_OPT_CR + FTR_PTP_OPT_CR
*FTR_HR_ALC	FTR Hourly Allocation Amount for an AO ($); the result is an AO's daily total credit or charge for an AO for all its FTRs (inclusive of flowgates). $= \Sigma_{H}$ (FTR_HR_ALC_HR)

C.2 Financial Transmission Rights Market Administration Amount (FTR_ADMIN)

The FTR Market Administration Amount, referred to as Tariff Schedule 16, recovers from AOs the cost of operating the FTR Markets. A flat rate administration charge is assessed per megawatt of FTR Profile Volume and per megawatt of scheduled, validated Option B (GFA or ECCH) FBT volume. The charge is summed by AO for the Operating Day. The administration charge rate is subject to change based on costs incurred by MISO.

The Option B FBT buyer is considered to be the GFA Responsible Entity for the collection of the administration amount for Schedule 16 when the transaction Delivery Point is defined as the transaction source Commercial Pricing Node. The GFAOB FBT seller is considered to be the GFA Responsible Entity for the collection of the administration amount for Schedule 16 when the transaction Delivery Point is defined as the transaction sink Commercial Pricing Node.

As with any market determinant, Market Settlements uses the FTR Market Administration Rate in effect at the time of the Operating Day to calculate the FTR Market Administration Amount.

The FTR Market Administration Amount, including determinants, is displayed on the FTR Market Settlement Statement.

An asterisk (*) denotes a billing determinant that is displayed on an AO's FTR statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

Settlement of GFA Related Day-Ahead FBTs

GFAOB FBTs are used specifically for MPs with a MISO recognized GFA (Option B) of the Tariff. Option B ECCH FBTs are used specifically for MPs for ECCH. MISO defines the transaction buying and selling AO, the source, sink and delivery Commercial Pricing

Nodes, and the transaction (contract) date range per a participant's GFA. Grandfathered FBTs can only occur in the Day-Ahead Energy and Operating Reserve Market between the following Commercial Pricing Nodes:

- A generation source and a Load Zone,
- A generation source and an Interface Commercial Pricing Node, or
- An Interface Commercial Pricing Node and a Load Zone.

All Option B FBT hourly volumes are validated prior to settlement. Transactions that are invalidated are not subject to MISO administration charges. Validations are performed only once and one transaction invalidation cannot then make another transaction valid.

- Option B FBT sellers must provide sufficient supply volume for all their transactions with a generation asset or through PBTs.
- Option B FBT buyers must fully consume all transaction volume with a Load Zone asset or through PBTs.

C.2.1 Calculation Inputs for FTR_ADMIN

*FTR_ADMIN_RATE	Hourly FTR Market Administration Rate ($/MWh).

C.2.2 Intermediate Calculations for FTR_ADMIN

*AO_FTR_PRF	Hourly AO FTR Profile Volume (MWh); these include all flowgate and PTP FTRs.
*DA_GFAOB_{Buyer}	Hourly Day-Ahead Validated Option B (GFA or ECCH) FBT Volume (MWh); at a Commercial Pricing Node where the AO is the Transaction Buyer. The equation represents a single validated transaction at a single Commercial Pricing Node. The Option B FBT Volume is validated to ensure there is sufficient supplied energy volume at the source and sufficient energy consumption at the sink Commercial Pricing Nodes. In absence of sufficient volume at both ends of the transaction, then the transaction volume is reduced to zero. This equation is performed for each AO Option B FBT where the AO is the transaction buyer. Please refer to the previously defined calculation definition of this component.
$FTR\_DA\_GFAOB_{Buyer}$	FTR Admin Hourly Day-Ahead Valid Option B (GFA or ECCH) FBT Buying Volume (MWh); for all buying Option B transactions for an AO. The buyer is only responsible for paying administrative charges on the transaction volume when the transaction Delivery Point is defined as the source Commercial Pricing Node. This equation sums all the Day-Ahead

Option B FBTs where the AO is the buyer and is responsible for paying FTR Administrative charges.

= Σ Transactions(IF (Option B Transaction Buyer = True, THEN
IF (Option B Transaction Delivery Commercial Pricing Node = Option B Transaction Source Commercial Pricing Node,
THEN DA_GFAOB_{Buyer} , ELSE 0)

*DA_GFAOB_{Seller}	Hourly Day-Ahead Validated Option B (GFA or ECCH) FBT Volume (MWh); at a Commercial Pricing Node where the AO is the Transaction Seller. The equation represents a single intermediate validated transaction at a single Commercial Pricing Node. The Option B FBT Volume is validated to ensure there is sufficient supplied energy volume at the source and sufficient energy consumption at the sink Commercial Pricing Nodes. In absence of sufficient volume at both ends of the transaction, then the transaction volume is reduced to zero. This equation is performed for each AO Option B FBT where the AO is the transaction seller. Please refer to the previously defined calculation definition of this component.
$FTR\_DA\_GFAOB_{Seller}$	FTR Admin Hourly Day-Ahead Valid Option B (GFA or ECCH) FBT Seller Volume (MWh); for all selling Option B transactions for an AO. The seller is only responsible for paying administrative charges on the transaction volume when the transaction Delivery Point is defined as the sink Commercial Pricing Node. This equation sums all the Day-Ahead Option B FBTs where the AO is the seller and is responsible for paying FTR Administrative charges. = Σ Transactions (IF (Option B Transaction Buyer = True, THEN IF (Option B Transaction Delivery Commercial Pricing Node = Option B Transaction Source Commercial Pricing Node, THEN DA_GFAOB_{Seller} , ELSE 0)
*FTR_ADMIN_VOL	Hourly FTR Market Administration Volume (MWh); for an AO. This value is the hourly volume from PTP and flowgate FTRs along with the hourly volume from all validated GFAOB FBTs for an AO. = Σ (AO_FTR_PRF) + $FTR\_DA\_GFAOB_{Buyer}$ + $FTR\_DA\_GFAOB_{Seller}$

C.2.3 Charge Type Calculation for FTR_ADMIN

*^FTR_ADMIN_HR	Hourly FTR Market Administration Amount per AO ($); the formula result is per Hour and is rounded to the nearest cent. = FTR_ADMIN_RATE * FTR_ADMIN_VOL
*FTR_ADMIN	FTR Market Administration Fee Amount per AO; the formula result is displayed in dollars ($). = Σ_H (FTR_ADMIN_HR)

C.3 Financial Transmission Rights Monthly Allocation Amount (FTR_MN_ALC)

The FTR Monthly Allocation Amount is the distribution of excess congestion dollars collected during a calendar month, but not allocated in the FTR Hourly Revenue allocation process, to FTR holders that did not receive their full hourly credit revenue allocation. The excess congestion funds are distributed to all AOs based on the amount of FTR credits not yet received for the calendar month. Residual dollars from the FTR monthly auction are added to the funds distributed in this charge type. MISO held FTRs for Option B and Carved-Out GFAs are exempt from the monthly revenue allocation process.

The FTR settlement dollar revenue allocation process (i.e., payments to FTR holders from MISO) occurs for an FTR in three processes:

- **Hourly revenue allocation process (FTR_HR_ALC)** – The hourly revenue allocation process determines the amount of congestion dollars available in a single Hour and then allocates those dollars to holders of FTRs for the same Hour. For each AO and MISO held FTR, Market Settlements calculates the hourly target revenue allocation value based on the Day-Ahead Energy and Operating Reserve Market. The hourly revenue allocation target is the amount of credit that an FTR is paid if there are sufficient congestion dollars available. When there are sufficient congestion dollars available to pay an FTR with its full credit, it is referred to as being a fully funded FTR. If less congestion dollars are collected in an Hour than are needed to pay all FTR holders their target value, then all FTR holders are paid on a prorated basis for that Hour. The difference between an AO's target revenue allocation and the actual credit paid is referred to as shortfall. When AOs are not fully funded by the hourly available congestion dollars, AOs are eligible to receive additional revenue allocations to cover their shortfall in the monthly and/or the yearly revenue allocations. For example, if $10,000 is collected in congestion for an Hour, but total FTRs are owed $20,000, then each FTR holder is only credited 50% of what they are owed during that Hour. The hourly FTR revenue allocation process is performed each time an Operating Day is settled, whether it is a normally scheduled settlement or an additional non-standard settlement. A non-standard settlement is defined as a settlement that is not 7, 14, 55, or 105 days after the Operating Day.

- **Monthly revenue allocation process (FTR_MN_ALC)** – The monthly revenue allocation determines the amount of excess congestion dollars available in the calendar month and allocates those dollars on a pro rata basis to all AO FTR holders who did not receive their full FTR target revenue allocation during the hourly process for the same calendar month. Excess congestion dollars occur when the total congestion for an hour exceed the 100% FTR revenue allocation for that Hour. The FTR Monthly Revenue Allocation Amount only calculates when the last Operating Day of the month is settled for S7, S14, S55, and S105. The Monthly FTR revenue allocation process is never performed on a non-standard settlement, which does not cause the monthly revenue allocation process to occur. The monthly FTR revenue allocation process is funded from the Day-Ahead hourly unallocated and shortfall congestion dollars for the calendar month. The FTR monthly allocation process only occurs when there are positive (surplus) funds available for the month. At the conclusion of the monthly FTR funding, all unallocated funds roll over to the Yearly FTR revenue allocation process.
- **Yearly revenue allocation process (FTR_YR_ALC)** – After the last FTR Monthly Revenue allocation is completed for a calendar month (day 105 settlement for the last calendar day of the month), any unallocated excess congestion dollars go into the FTR Yearly Revenue allocation process. Whenever a settlement is performed after the S105 for the last calendar day of the month has been completed, any congestion and FTR revenue allocation changes that occur impact the FTR Yearly Excess Congestion fund (whether positive or negative). The yearly FTR revenue allocation process is only performed once a year and occurs when December 31st is settled during the last scheduled settlement (S105). The yearly revenue allocation determines the amount of excess congestion dollars available as of December 31st after the hourly and monthly revenue allocation has been completed for the last scheduled settlement (S105), and then allocates those dollars on a pro rata basis to all AO FTR holders who did not receive their full FTR target revenue allocation during the same calendar year. When a non-standard settlement has been performed for an Operating Day prior to the

calendar year, any congestion charge changes and hourly FTR revenue allocation changes impact the next yearly FTR revenue allocation process.

On every FTR statement, the following information is displayed related to the upcoming monthly FTR revenue allocation process:

- A monthly revenue allocation flag indicating whether the monthly revenue allocation was performed on the Operating Day
- The total MISO monthly excess congestion dollar amount collected during the calendar month (up through the Operating Day) that will be used for the monthly revenue allocation process at the end of the month
- The total FTR monthly credited shortfall for all AOs for the calendar month
- The total FTR monthly credited shortfall for the AO for the calendar month

These determinants permit AOs to estimate what their potential future FTR monthly revenue allocation credit may be. The estimated credit amount can change with each Operating Day. Only AOs that are registered with MISO on the Operating Day when the monthly FTR revenue allocation is performed are eligible to receive credits from the FTR monthly revenue allocation.

The FTR Monthly Allocation Charge, including billing determinants, is displayed on the FTR Market Settlement Statement.

An asterisk (*) denotes a billing determinant that is displayed on an AO's FTR statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

C.3.1 Calculation Inputs for FTR_MN_ALC

~~DA_VSCHD~~	~~Hourly Day-Ahead Net Virtual Schedule Volume for a Commercial Pricing Node for an AO (MWh); The Day-Ahead Net Virtual Schedule Volume is the net Day-Ahead Energy and Operating Reserve Market cleared Bid and Offered Virtual Schedule volume by AO by Commercial Pricing Node by Hour. A positive volume represents a net Load obligation and a negative volume represents a net supply obligation.~~

~~DA_LMP_CG~~ ~~Hourly Day-Ahead Congestion Component of LMP ($/MWh).~~

C.3.2 Intermediate Calculation for FTR_MN_ALC

IF The "IF" logical statement is a conditional test and returns one value if a condition you specify evaluates to TRUE and another value if it evaluates to FALSE. { An example of the IF (logical_test, THEN value_if_true, ELSE value_if_false) }

MAX The mathematical maximum of the series of numbers in the succeeding parentheses.

MIN The mathematical minimum of the series of numbers in the succeeding parentheses.

C.3.2.1 Intermediate Calculations for determining Day-Ahead Excess Congestion Fund for FTR_MN_ALC

FGR_OPT_CR Hourly FGR (Option) Credit for an AO ($); please refer to the previously defined calculation definition of this calculation component.

MISO_ FGR_OPT_CR Hourly FGR (Option) Credit for all of MISO ($)
$= \Sigma_{MISO}$ (FGR_OPT_CR)

FTR_PTP_OBL_CR Hourly PTP Obligation FTR Credit for an AO ($); please refer to the previously defined calculation definition of this calculation component.

MISO_FTR_PTP_OBL_CR Hourly PTP Obligation FTR Credit for all of MISO ($).
$= \Sigma_{MISO}$ (FTR_PTP_OBL_CR)

FTR_PTP_OPT_CR Hourly PTP Option FTR Credit for an AO ($); please refer to the previously defined calculation definition of this calculation component.

MISO_FTR_PTP_OPT_CR Hourly PTP Option FTR Credit for all of MISO ($).
$= \Sigma_{MISO}$ (FTR_PTP_OPT_CR)

AO_FTR_TARG_CR Total Hourly FTR and FGR Target Credit Revenue allocation Amount for an AO ($); this value represents the total hour FTR and FGR credits payable to an AO provided there are sufficient congestion dollars available. Please refer to the previously defined calculation definition of this calculation component.

MISO_OB_FTR_TARG_CR — Total Hourly Option B related FTR Target Credit Revenue allocation Amount for MISO Held FTRs ($); this value represents the total target hourly Option B related FTR credits for MISO held FTRs provided there are sufficient congestion dollars available. Please refer to the previously defined calculation definition of this calculation component.

MISO_CO_FTR_TARG_CR — Total Hourly Carved-Out related FTR Target Credit Revenue allocation Amount for MISO Held FTRs ($); this value represents the total target hourly Carved-Out related FTR credits for MISO held FTRs provided there are sufficient congestion dollars available. Please refer to the previously defined calculation definition of this calculation component.

FTR_HR_ALC_FCT — Hourly MISO FTR Allocation Factor (factor); this factor determines on an hourly basis the pro rata payout of collected congestion dollars divided by the total target FTR credits for the same Hour. Please refer to the previously defined calculation definition of this calculation component.

MISO_OB_FTR_CR — Hourly Option B related FTR Credit Revenue allocation for MISO Held FTRs ($); this value represents the total hourly Option B FTR credits for MISO held FTRs.

= MISO_OB_FTR_TARG_CR * FTR_HR_ALC_FCT

MISO_CO_FTR_CR — Hourly Carved-Out related FTR Credit Revenue allocation for MISO Held FTRs ($); this value represents the total hourly Carved-Out FTR credits for MISO held FTRs.

= MISO_CO_FTR_TARG_CR * FTR_HR_ALC_FCT

*AO_FTR_MN_SHORTFALL — Total FTR and FGR Shortfall Amount for the calendar month for an AO ($); a positive value represents the amount of funding that the AO has not been paid, but will be get paid if there are sufficient monthly congestion funds available.

$$= \Sigma_{Month} \{ \Sigma_{H} [\Sigma_{AO} (AO\_FTR\_TARG\_CR - FTR\_PTP\_OBL\_CR - FGR\_OPT\_CR - FTR\_PTP\_OPT\_CR)] \} * (-1)$$

*MISO_FTR_MN_SHORTFALL — Total FTR and FGR Shortfall Amount for a calendar month for all of MISO ($); the shortfall does not include shortfall from MISO held FTRs. A positive amount represents the total funding that all AOs have not been paid, but will be paid if there are sufficient monthly congestion funds available.

$$= \Sigma_{MISO} (AO\_FTR\_MN\_SHORTFALL)$$

MISO_DA_HR_CG	Total MISO Day-Ahead Hourly Congestion Amount ($); the amount of congestion dollars available from the Day-Ahead Energy and Operating Reserve Market for hourly FTR revenue allocation. The total congestion amount is equal to the congestion charges collected for both the Day-Ahead and Real-Time Energy and Operating Reserve Markets. A positive value represents congestion funds available for distribution. Please refer to the previously defined calculation definition of this calculation component.
MISO_DA_POS_CG	Total MISO Day-Ahead Hourly Positive Congestion Amount ($); the amount of positive congestion dollars available for the hourly revenue allocation. Negative hourly Day-Ahead congestion fund dollars are transferred to the Day-Ahead Excess Congestion Fund in order to be offset by other positive hours. Please refer to the previously defined calculation definition of this calculation component.
MISO_DA_HR_CG_FOR_FTR	Total MISO Day-Ahead Hourly Congestion Fund Available to Fund Hourly FTR Revenue Allocation ($); In the event this fund is not sufficient to fully fund the hourly FTRs, the FTRs may still be funded through the Monthly and Yearly FTR Charge Types. Please refer to the previously defined calculation definition of this calculation component.
MISO_GFAOB_RBT_CG	Hourly MISO GFAOB Congestion Rebates ($); the total of all congestion dollars rebated on Option B Grandfathered Day-Ahead Transactions per hour. Please refer to the previously defined calculation definition of this calculation component.
MISO_OB_CG_EXCESS	MISO Held FTRs for Option B Total Excess Congestion Fund Dollars Not Used to Fund Rebates ($); this value represents all unused congestion dollars from MISO held Option B FTRs for an hour when the amount of the congestion fund available for refund exceeds the refunds. = (-1) * MIN (0 , MISO_OB_FTR_CR - MISO_GFAOB_RBT_CG)
MISO_DA_GFACO_RBT_CG	Hourly MISO Day-Ahead Carved-Out GFA Congestion Rebates ($); the Day-Ahead total of all congestion dollars rebated on Carved-Out Grandfathered Day-Ahead Transactions per hour. Please refer to the previously defined calculation definition of this calculation component.

MISO_RT_GFACO_RBT_CG — Hourly MISO Real-Time Carved-Out GFA Congestion Rebates ($); the Real-Time total of all congestion dollars rebated on Carved-Out Grandfathered Real-Time Transactions per hour. Please refer to the previously defined calculation definition of this calculation component.

MISO_CO_CG_EXCESS — MISO Held FTRs for Carved-Out GFAs Total Excess Congestion Fund Dollars Not Used to Fund Rebates ($); this value represents all unused congestion dollars from MISO held Carved-Out FTRs for an Hour when the amount of the congestion fund available for refund exceeds the refunds.
= (-1) * MIN (0 , MISO_CO_FTR_CR - (MISO_DA_GFACO_RBT_CG + MISO_RT_GFACO_RBT_CG))

MISO_DA_MN_CG_FND — Total MISO Day-Ahead Congestion Fund Available to Fund Monthly FTR Revenue Allocation ($); the total funding is the sum of all excess congestion funds where funding exceeded hourly FTR revenue allocation requirement, plus any Hour that had negative congestion. The result is summed for the entire calendar month.
= Σ_{Month} [MIN (0 , MISO_DA_HR_CG - MISO_DA_POS_CG) + MISO_DA_HR_CG_FOR_FTR + MISO_FTR_PTP_OBL_CR + MISO_ FGR_OPT_CR + MISO_FTR_PTP_OPT_CR + MISO_OB_FTR_CR + MISO_CO_FTR_CR + MISO_OB_CG_EXCESS + MISO_CO_CG_EXCESS]

C.3.2.2 Intermediate Calculations for FTR Monthly Funding Allocation Portion of FTR_MN_ALC

^*FTR_MO_TXN — FTR Transaction Amount ($); Monthly amount for an AO.

MISO_FTR_MO_TXN — MISO FTR Transaction Amount ($); MISO total monthly amount.
= Σ_{MISO} FTR_MO_TXN

FTR_MN_ALC_FCT — Monthly MISO FTR Allocation Factor (factor); this factor determines on a monthly basis the pro rata payout of excess collected congestion dollars plus the FTR monthly auction residual dollars divided by the total FTR shortfall for the month.
= MIN { ([MISO_DA_MN_CG_FND + MISO_FTR_MO_TXN] / MISO_FTR_MN_SHORTFALL) , 1 }

*FTR_MN_ALC_FL

Monthly FTR Revenue Allocation Flag ("Y" or "N"); a flag that indicates whether the FTR Monthly Revenue Allocation Charge Type is calculated. This flag is set to "Y" when the last Operating Day of a calendar month is settled.

= IF (*Operating Day* = *Last Day of the Calendar Month* , THEN "Y" , ELSE "N")

C.3.3 Charge Type Calculation for FTR_MN_ALC

^*FTR_MN_ALC

FTR Monthly Allocation Amount for an AO ($); This charge type is only calculated when settling the S7, S14, S55, and S105 for the last day of the calendar month The formula rounded to the nearest cent and is displayed in dollars.

= IF { FTR_MN_ALC_FL = "Y" ,
THEN [FTR_MN_ALC_FCT * AO_FTR_MN_SHORTFALL * (-1)] , ELSE 0 }

C.4 Financial Transmission Rights Transaction Amount (FTR_TXN)

The FTR Transaction Amount is used to: 1) settle and invoice FTR purchases and sales, and 2) facilitate dollar exchanges between AOs originally allocated FTR(s) holding FTR Auction Revenue Rights, and AOs with retail choice Load obligations.

MPs may buy or sell FTRs through FTR auctions. Records of purchases and sales of FTRs are simply passed from the FTR system to Market Settlements where purchases and sales are netted into a daily settlement value, and then passed to the Financial System for inclusion on Invoices. FTR Transactions are not resettled, they are assumed to be final when posted to Market Settlements; any change to the sale price of an FTR purchased or sold is conveyed to Market Settlements as an adjustment.

For retail choice states, AOs originally allocated FTR(s) in an allocation may be assigned FTR Auction Revenue Rights. The auction value of these rights may be allocated to different AOs based on LRS. The actual determination of ratio share is calculated by the original AO. MISO facilitates the dollar exchange between the original AO that held the FTRs, and the other AOs to which the auction value is allocated, by permitting the original entity to record on a website the ratio share to allocate to the new AOs. This information is passed to Market Settlements and shows up in the FTR Market Settlement Statement as FTR Transaction Records. Each time a new designation is made, FTR Transaction Records will be sent to Market Settlements and processed on the next Operating Day initial settlement (S7), thus transferring the credits and charges.

FTR Transaction Records are always settled on the first Operating Day initial settlement (S7) after they are received by the settlement system.

The FTR Transaction Amount, including billing determinants, is displayed on the FTR Market Settlement Statement.

An asterisk (*) denotes a billing determinant that is displayed on an AO's FTR statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

C.4.1 Calculation Inputs for FTR_TXN

FTR_TXN_RECORD	FTR Transaction Record purchase ($).

C.4.2 Intermediate Calculations for FTR_TXN

There are no intermediate calculations for FTR_TXN.

C.4.3 Charge Type Calculation for FTR_TXN

*FTR_TXN	FTR Transaction Amount ($); the formula result is displayed in dollars. = ∑ (FTR_TXN_RECORD)

C.5 Financial Transmission Rights Yearly Allocation Amount (FTR_YR_ALC)

The FTR Yearly Allocation Amount is a distribution of excess congestion funds from prior calendar years to FTR Holders during the prior year that did not receive their full-targeted credit revenue allocation. The excess congestion funds are distributed on a prorated basis to all AOs based on the amount of FTR credit shortfall each has remaining after the hourly and monthly revenue allocation processes for the previous calendar year. MISO held FTRs for Option B and Carved-Out GFAs are excluded from the yearly revenue allocation process.

The FTR settlement dollar revenue allocation process (i.e., payments to FTR holders from MISO) occurs for an FTR in three processes:

- **Hourly revenue allocation process (FTR_HR_ALC)** – The hourly revenue allocation process determines the amount of congestion dollars available in a single Hour and then allocates those dollars to holders of FTRs for the same Hour. For each AO and MISO held FTR, Market Settlements calculates the hourly target revenue allocation value based on the Day-Ahead Energy and Operating Reserve Market. The hourly revenue allocation target is the amount of credit that an FTR is paid if there are sufficient congestion dollars available. When there are sufficient congestion dollars available to pay an FTR with its full credit, it is referred to as being a fully funded FTR. If less congestion dollars are collected in an Hour than is needed to pay all FTR Holders their target value, then all FTR Holders are paid on a prorated basis for that Hour. The difference between an AO's target revenue allocation and the actual credit paid is referred to as shortfall. When AOs are not fully funded by the hourly available congestion dollars, AOs are eligible to receive additional revenue allocations to cover their shortfall in the monthly and/or the yearly revenue allocations. For example, if $10,000 is collected in congestion for an Hour, but total FTRs are owed $20,000, then each FTR Holder is only credited 50% of what they are owed during that Hour. The hourly FTR revenue allocation process is performed each time an Operating Day is settled, whether it is a normally scheduled settlement or an additional non-standard settlement. A non-standard settlement is defined as a settlement that is not 7, 14, 55, or 105 days after the Operating Day.

- **Monthly revenue allocation process (FTR_MN_ALC)** – The monthly revenue allocation determines the amount of excess congestion dollars available in the calendar month and allocates those dollars on a pro rata basis to all AO FTR Holders who did not receive their full FTR target revenue allocation during the hourly process for the same calendar month. Excess congestion dollars occur when the total congestion for an Hour exceed the 100% FTR revenue allocation for that Hour. The FTR Monthly Revenue allocation Amount only calculates when the last Operating Day of the month is settled for S7, S14, S55, and S105. The Monthly FTR revenue allocation process is never performed on a non-standard settlement, which does not cause the monthly revenue allocation process to occur.
- **Yearly revenue allocation process (FTR_YR_ALC)** – After the last FTR Monthly Revenue allocation is completed for a calendar month (day 105 settlement for the last calendar day of the month), any unallocated excess congestion dollars go into the FTR Yearly Revenue allocation process. Whenever a settlement is performed after the S105 for the last calendar day of the month has been completed, any congestion and FTR revenue allocation changes that occur impact the FTR Yearly Excess Congestion fund (whether positive or negative). The yearly FTR revenue allocation process is only performed once a year and occurs when December 31st is settled for the last scheduled settlement (S105). The yearly revenue allocation determines the amount of excess congestion dollars available as of December 31st after the hourly and monthly revenue allocation has been completed for the last scheduled settlement (S105), and then allocates those dollars on a pro rata basis to all AO FTR Holders who did not receive their full FTR target revenue allocation during the same calendar year. When a non-standard settlement is performed for an Operating Day prior to the calendar year, any congestion charge changes and hourly FTR revenue allocation changes impact the next yearly FTR revenue allocation process.

On every FTR statement, the following information is displayed related to the upcoming yearly FTR revenue allocation process:

- A yearly revenue allocation flag indicating whether the yearly revenue allocation was performed on the Operating Day
- The total MISO yearly excess congestion dollar amount collected during the calendar year (up through the Operating Day) that will be used for the yearly revenue allocation process at the end of the year
- The total FTR yearly credited shortfall for all AOs for the calendar year
- The total FTR yearly credited shortfall for the AO for the calendar year

These determinants permit AOs to estimate what their potential future FTR yearly revenue allocation credit may be. The estimated credit amount can change with each Operating Day. Only AOs that are registered with MISO on the Operating Day when the yearly FTR revenue allocation is performed are eligible to receive credits from the FTR yearly revenue allocation.

The FTR Yearly Allocation Charge, including billing determinants, is displayed on the FTR Market Settlement Statement.

An asterisk (*) denotes a billing determinant that is displayed on an AO's FTR statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

C.5.1 Calculation Inputs for FTR_YR_ALC

There are no calculation inputs.

C.5.2 Intermediate Calculations for FTR_YR_ALC

IF	The "IF" logical statement is a conditional test and returns one value if a condition you specify evaluates to TRUE and another value if it evaluates to FALSE. { An example of the IF (logical_test, THEN value_if_true, ELSE value_if_false) }
MIN	The mathematical minimum of the series of numbers in the succeeding parentheses.

C.5.2.1 Intermediate Calculations for determining Excess Congestion Fund for FTR_YR_ALC

MISO_MN_CG_FND — MISO Accumulated Excess Congestion for <Month> ($); this is equal to all the congestion funds collected during the month less all the FTR Hourly Revenue allocations and those revenue allocations for MISO held FTRs. Please refer the previously defined calculation definition of this component.

PRIOR_YR_CG_CHG — Prior Years Congestion Dollar Changes ($); any change in congestion dollars due to additional settlements performed for Operating Days prior to January 1st of the calendar year that were not performed prior to the last yearly FTR revenue allocation. The dollar changes are tracked by MISO Market Settlements and provided as an input to the next FTR Yearly Revenue allocation in order to maintain MISO revenue neutral.

FTR_MN_ALC — FTR Monthly Allocation Amount for an AO; the formula result is displayed in dollars ($); the formula result is for the month, rounded to the nearest cent and is displayed in dollars. Please refer to the previously defined calculation definition of this calculation component.

AO_FTR_MN_SHORTFALL — Total FTR and FGR Shortfall Amount for the calendar month for an AO ($); the shortfall is determined for a calendar month by calculating the hourly target credit amount and then subtracting from that value all the credits given in the hourly revenue allocation. Please refer to the previously defined calculation definition of this calculation component..

*AO_FTR_YR_SHORTFALL — Total FTR and FGR Shortfall Amount for a calendar year for an AO ($); the annual shortfall for an AO is equal to the sum of its monthly shortfalls less the credits it received in the monthly FTR revenue allocations.
$= \Sigma_{Year}(\ AO\_FTR\_MN\_SHORTFALL + FTR\_MN\_ALC\ )$

*MISO_FTR_YR_SHORTFALL — Total FTR and FGR Shortfall Amount for a calendar year for all of MISO ($); the shortfall does not include shortfall from MISO held FTRs. The annual shortfall for all MISO is equal to the sum of the AO yearly shortfalls.
$= \Sigma_{MISO}(\ AO\_FTR\_YR\_SHORTFALL\ )$

^*MISO_YR_CG_FND — MISO Accumulated Excess Congestion for <Year> ($); is the total excess congestion fund dollars collected during the calendar year less all the FTR Hourly Revenue allocations, hourly revenue allocations for

MISO held FTRs, FTR Monthly Revenue allocations, and any change in congestion dollars due to additional settlements performed for Operating Days prior to January 1st of the calendar year that were not performed prior to the last yearly FTR revenue allocation. The calculation is performed for each month, summed to a calendar year total, and rounded to two decimal places.

= Σ_{Year} [MISO_MN_CG_FND + Σ_{MISO} (FTR MN_ALC)] + PRIOR_YR_CG_CHG

C.5.2.2 Intermediate Calculations for FTR Yearly Funding Allocation Portion of FTR_YR_ALC

*FTR_YR_ALC_FCT

Yearly MISO FTR Allocation Factor (factor); this factor determines for the prior calendar year the pro rata payout of excess collected congestion dollars divided by the total FTR shortfall of all AOs for the year.

= MIN { (MISO_YR_CG_FND / MISO_FTR_YR_SHORTFALL) , 1 }

*FTR_YR_ALC_FL

Yearly FTR Revenue Allocation Flag ("Y" or "N"); a flag that indicates whether the FTR Yearly Revenue Allocation Charge Type is calculated. This flag is set to "Y" when the last Operating Day of a calendar year is settled for the last regularly scheduled settlement (i.e., S105).

= IF (*Operating Day* = *Last Regular Settlement Day of the Calendar Year* , THEN "Y" , ELSE "N")

C.5.3 Charge Type Calculation for FTR_YR_ALC

^*FTR_YR_ALC

FTR Yearly Allocation Amount for an AO; this charge type is only calculated when settling the S105 for the last day of the calendar year. The formula result is rounded to the nearest cent and is displayed in dollars.

= IF { FTR_YR_ALC_FL = "Y" ,
THEN [FTR_YR_ALC_FCT * AO_FTR_YR_SHORTFALL * (-1)] , ELSE 0 }

C.6 Financial Transmission Rights Monthly Transaction Amount (FTR_MO_TXN)

Effective January 1, 2008, the FTR Monthly Transaction Amount is used to settle and invoice FTR purchases and sales from each monthly auction.

MPs may buy or sell FTRs through FTR auctions. Records of purchases and sales of FTRs are simply passed from the FTR system to Market Settlements where purchases and sales are netted into a daily settlement value, and then passed to the Financial System for inclusion on Invoices. During the settlement of these transactions only a portion of the AO's total settlement is processed depending on the duration of the FTR. This calculation is performed upon settlement or resettlement of the first calendar day of the month

FTR Monthly Transaction Records are included in each settlement of the first Operating Day of the Calendar Month.

The net AO FTR Monthly Transaction Amount and individual transactions are displayed on the FTR Market Settlement Statement.

An asterisk (*) denotes a billing determinant that is displayed on an AO's FTR statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

C.6.1 Calculation Inputs for FTR_MO_TXN

*MO_FTR_TXN	Monthly FTR Transaction Record purchase or sale ($).

C.6.2 Intermediate Calculations for FTR_MO_TXN

FTR_DUR	FTR Duration; the number of months between the *STARTTIME and *STOPTIME of the MO_FTR_TXN.

C.6.3 Charge Type Calculation for FTR_MO_TXN

^*FTR_MO_TXN   FTR Transaction Amount ($); the formula result is displayed in dollars.

$= \Sigma_{AO}$ ((1 / FTR_DUR) * MO_FTR_TXN)

C.7 Financial Transmission Rights Full Funding Guarantee Amount (FTR_FFG)

The FTR Full Funding Guarantee Amount is constructed of Hourly, Monthly and Yearly components. The Hourly component is the compliment to the actual value of FTRs determined in the hourly process (FR_HR_ALC) to bring the total to the target value. The FTR_FFG amount is continued to be carried as shortfall, which may be offset by the monthly or yearly true-up funding processes (FTR_MN_ALC & FTR_YR_ALC). When an AO receives monthly or yearly true-up an adjustment to the FTR_FFG amount is made to keep the AO at 100% funding through all charge types.

The three components of Full Funding Guarantee:

1) Amount calculated in the hourly funding process on every Operating Day
2) Guarantee credit reduction when offset by the monthly FTR true-up process, calculated only on settlements when a monthly true-up is performed
3) Guarantee credit reduction when offset by the yearly FTR true-up process, calculated only on settlements when a yearly true-up is performed

An asterisk (*) denotes a billing determinant that is displayed on an AO's FTR statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

C.7.1 Calculation Inputs for FTR_FFG

FTR_PTP_OBL_CHARGE	Total Hourly PTP Obligation FTR Charge for an AO ($); Please refer to the previously defined calculation definition of this component.
AO_FTR_TARG_CR	Total Hourly FTR and FGR Target Credit Revenue Allocation Amount for an AO ($); Please refer to the previously defined calculation definition of this calculation component.
*^FTR_HR_ALC_HR	Hourly FTR Hourly Allocation Amount for an AO ($); Please refer to the previously defined calculation definition of this calculation component.

^*FTR_MN_ALC — FTR Monthly Allocation Amount for an AO ($); Please refer to the previously defined calculation definition of this calculation component.

^*FTR_YR_ALC — FTR Yearly Allocation Amount for an AO ($); Please refer to the previously defined calculation definition of this calculation component.

C.7.2 Intermediate Calculations for FTR_FFG

FTR_FFG_HR — Financial Transmission Rights Full Funding Guarantee Hourly Amount for an AO ($).
= (AO_FTR_TARG_CR + FTR_PTP_OBL_CHARGE – FTR_HR_ALC_HR)

FTR_FFG_MN — Financial Transmission Rights Full Funding Guarantee Monthly Amount for an AO ($).
= (-1) * FTR_MN_ALC

FTR_FFG_YR — Financial Transmission Rights Full Funding Guarantee Yearly Amount for an AO ($).
= (-1) * FTR_YR_ALC

C.7.3 Charge Type Calculation for FTR_FFG

^*FTR_FFG — FTR Full Funding Guarantee Amount for an AO ($); the result is an AO's daily total credit for all their FTRs (inclusive of flowgates).
= Σ_H (FTR_FFG_HR) + FTR_FFG_MN + FTR_FFG_YR

C.8 Financial Transmission Rights Guarantee Uplift Amount (FTR_GUL)

The FTR Guarantee Uplift Amount distributes the cost of the Full Funding Guarantee to AOs pro rata by their total credit target FTR value for the period. On an hourly basis this results in a charge equal and opposite to the FFG credit the AO received. On a Monthly and Yearly basis the uplift is adjusted such that the amount paid by an AO is proportional to its total FTR credit target allocation for the period. Since this is a different basis than the Monthly and Yearly FTR funding true-ups, this may result in an AO bearing a larger portion of the cost than it received in the FFG for the period.

FTR Guarantee Uplift has 3 components:

1) Amount calculated in the hourly funding process on every Operating Day; when the monthly or yearly components are calculated this amount is 0.
2) Uplift charge reduction when offset by the monthly FTR true-up process, (FTR_MN_ALC), calculated only on settlements when a monthly true-up is performed – interim bill determinants are also only displayed when a monthly true-up is performed; when the yearly component is calculated this amount is 0
3) Uplift charge reduction when offset by the yearly FTR true-up process, (FTR_YR_ALC), calculated only on settlements when a yearly true-up is performed – interim bill determinants are also only displayed when a yearly true-up is performed.

An asterisk (*) denotes a billing determinant that is displayed on an AO's FTR statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

C.8.1 Calculation Inputs for FTR_GUL

FTR_FFG_HR	Financial Transmission Rights Full Funding Guarantee Hourly Amount for an AO ($); please refer to the previously defined calculation definition of this calculation component.

AO_FTR_TARG_CR — Total Hourly FTR and FGR Target Credit Revenue Allocation Amount for an AO ($); please refer to the previously defined calculation definition of this calculation component.

^*FTR_FFG — FTR Full Funding Guarantee Amount for an AO ($); please refer to the previously defined calculation definition of this calculation component.

C.8.2 Intermediate Calculations for FTR_GUL

FTR_GUL_HR — Financial Transmission Rights Guarantee Uplift Hourly Amount for an AO ($).

$= (-1) * \text{FTR\_FFG\_HR}$

*AO_FTR_M_TARG_CR — Asset Owner FTR Monthly Target Credit Allocation Amount ($).

$= \Sigma_{\text{Month}} (\text{AO\_FTR\_TARG\_CR})$

*AO_FTR_Y_TARG_CR — Asset Owner FTR Yearly Target Credit Allocation Amount ($).

$= \Sigma_{\text{Year}} (\text{AO\_FTR\_TARG\_CR})$

*MISO_FTR_M_TARG_CR — MISO FTR Monthly Target Credit Allocation Amount ($).

$= \Sigma_{\text{MISO}} (\text{AO\_FTR\_M\_TARG\_CR})$

*MISO_FTR_Y_TARG_CR — MISO FTR Yearly Target Credit Allocation Amount ($).

$= \Sigma_{\text{MISO}} (\text{AO\_FTR\_Y\_TARG\_CR})$

*MISO_FTR_FFG_M — MISO FTR Full Funding Guarantees for the Month ($).

$= \Sigma_{\text{MISO-Month}} (\text{FTR\_FFG})$

*MISO_FTR_FFG_Y — MISO FTR Full Funding Guarantees for the Year ($).

$= \Sigma_{\text{MISO-Year}} (\text{FTR\_FFG})$

*AO_FTR_GUL_M_PVS — Asset Owner Guarantee Uplift for the Month (Previous to current OD being settled) ($).

$= \Sigma_{\text{AO-Month}} (\text{FTR\_GUL})$

*AO_FTR_GUL_Y_PVS — Asset Owner Guarantee Uplift for the Year (Previous to current OD being settled) ($).

$= \Sigma_{\text{AO-Year}} (\text{FTR\_GUL})$

^FTR_GUL_MN — Financial Transmission Rights Guarantee Uplift Monthly Amount for an AO ($);
= (-1) * (AO_FTR_M_TARG_CR / MISO_FTR_M_TARG_CR) * (MISO_FTR_FFG_M) – AO_FTR_GUL_M_PVS

^FTR_GUL_YR — Financial Transmission Rights Guarantee Uplift Yearly Amount for an AO ($);
= (-1) * (AO_FTR_Y_TARG_CR / MISO_FTR_Y_TARG_CR) * (MISO_FTR_FFG_Y) - AO_FTR_GUL_Y_PVS

C.8.3 Charge Type Calculation for FTR_GUL

^*FTR_GUL — FTR Guarantee Uplift Amount for an AO ($); the result is an AO's daily total charge for all their FTRs (inclusive of flowgates).
= Σ_{H} (FTR_GUL_HR) + FTR_GUL_MN + FTR_GUL_YR

C.9 Financial Transmission Rights Annual Transaction Amount (FTR_ARR_FTR_TXN)

The FTR Annual Transaction Amount is used to settle and invoice FTR purchases and sales from the Annual FTR Auction. The transaction amount includes the results from the peak and off-peak auctions for each of the four seasons.

MPs may buy and/or sell FTRs through annual FTR auctions. MPs may also self-schedule their ARRs in Annual FTR Auctions in order to purchase the underlying FTR instrument. Records of purchases and sales of FTRs are simply passed from the FTR system to Market Settlements where purchases and sales are netted into a daily settlement value and then passed to the Financial System for inclusion on Invoices. During the settlement of these transactions only a portion of the AO's total settlement is processed depending on the duration of the FTR. This calculation is performed upon settlement or resettlement of the first calendar day of the month.

The AO's net FTR Annual Transaction Amount and individual transactions are displayed on the FTR Market Settlement Statement.

An asterisk (*) denotes a billing determinant that is displayed on an AO's FTR statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

C.9.1 Calculation Inputs for FTR_ARR_FTR_TXN

*SEA_FTR_TXN	Seasonal FTR Transaction; FTR purchased and/or sold in the Annual FTR Auction by an AO.
FTR_TXN_AMT	FTR Transaction Amount ($); purchase/sale price (VAL) of the SEA_FTR_TXN.

C.9.2 Intermediate Calculations for FTR_ARR_FTR_TXN

FTR_DUR	FTR Duration; the number of months between the STARTTIME and STOPTIME of the SEA_FTR_TXN.

C.9.3 Charge Type Calculation for FTR_ ARR_FTR _TXN

^*FTR_ ARR_FTR _TXN FTR Annual Transaction Amount ($); the formula result is displayed in dollars.

= Σ_{AO} ((1 / FTR_DUR) * FTR_TXN_AMT)

C.10 Auction Revenue Rights Transaction Amount (FTR_ARR_ARR_TXN)

The ARR Transaction Amount is the net credit or charge from the monthly revenue settlement of ARRs. An MP holding an ARR is entitled to the auction revenue associated with the underlying FTR. The value of the ARR is determined by the clearing price of the associated FTR in the Annual FTR Auction. A MPs total ARR Transaction Amount is comprised of both feasible and infeasible ARRs. The MW volume of each ARR may be adjusted due to retail load shifting that has occurred in the ARR Zone. A discount factor is applied to the feasible ARRs if the Annual FTR Auction revenue is less than the target value of the feasible ARRs. The full value of the infeasible ARRs, which is uplifted to LTTR holders, is included in the calculation. During the settlement of these transactions only a portion of the AO's total settlement is processed depending on the duration of the ARR. This calculation is performed upon settlement or resettlement of the first calendar day of the month.

Note: The calculations below are performed separately for Peak and Off-Peak ARRs and then aggregated together for the total FTR_ARR_ARR_TXN amount.

An asterisk (*) denotes a billing determinant that is displayed on an AO's FTR statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

C.10.1 Calculation Inputs for FTR_ARR_ARR_TXN

*ARR_TXN	ARR Transaction; ARR allocated to the AO in the Annual ARR Allocation.
ARR_PRC	ARR Price ($); Price (PRC) per MW of the ARR_TXN.
ARR_FEAS_MW	Feasible ARR MWs (MW); MW value (VOL) of an ARR_TXN where STAGE is either 1AF or 1B.
ARR_INFEAS_MW	Infeasible ARR MWs (MW); MW value (VOL) of an ARR_TXN where STAGE is 1AIF.

PK_TYP — Peak Type ("On Peak" or "Off Peak"); variable that indicates whether the ARR_TXN is for On Peak or Off Peak based on the PEAK_FL on the ARR_TXN. A PEAK_FL of "Y" indicates the ARR_TXN is On Peak. A PEAK_FL of "N" indicates the ARR_TXN is Off Peak.

*FTR_ARR_FTR_TXN — FTR Transaction Amount ($); please refer to the previously defined calculation definition of this calculation component.

*ARR_TXN_RLS_ADJ — ARR Transaction Adjustment for Retail Load Shift; for a given peak type and stage. A summarized adjustment transaction representing the net MW volume and average price for all ARR's gained or lost by an AO of the stated peak type and stage due to Retail Load Shift.

ARR_RLS_MW — ARR MW volume from Retail Load Shift (MW); the net adjustment volume (VOL from the ARR_TXN_RLS_ADJ) of ARR MWs gainned or lost by an AO due to Retail Load Shift. This may be a positive or negative value.

ARR_RLS_PRC — ARR Price per MW from Retail Load Shift (MW); the average price (PRC from the ARR_TXN_RLS_ADJ) per MW for ARRs gainned or lost by an AO due to Retail Load Shift. MISO Discount Factor for Feasible ARRs is applied to the dollar amounts transferred from Feasible ARRs.

C.10.2 Intermediate Calculations for FTR_ARR_ARR_TXN

IF — The "IF" logical statement is a conditional test and returns one value if a condition you specify evaluates to TRUE and another value if it evaluates to FALSE. {Example: IF (logical_test, THEN value_if_true, ELSE value_if_false) }

MIN — The mathematical minimum of the series of numbers in the succeeding parentheses.

ARR_DUR — ARR Duration; The number of months between the STARTTIME and STOPTIME of the ARR_TXN.

$AO\_FEAS\_TARG_{PK\_TYP}$ — Target Amount for an AO's Feasible ARRs ($);
$= \Sigma_{AO} ((1 / ARR\_DUR_{PK\_TYP}) * (ARR\_FEAS\_MW_{PK\_TYP} * ARR\_PRC_{PK\_TYP}))$

*MISO_FEAS_TARG $_{PK\_TYP}$ — Target Amount for all MISO's Feasible ARRs ($); The associated determinant on the FTR statement for on peak is MISO_ARR_FEAS_PK_TARG_DLS and for off peak is MISO_ARR_FEAS_TARG_DLS.
$= \Sigma_{MISO}$ ((1 / ARR_DUR $_{PK\_TYP}$) * (ARR_FEAS_MW $_{PK\_TYP}$ * ARR_PRC $_{PK\_TYP}$))

*MISO_FTR_TXN $_{PK\_TYP}$ — FTR Transaction Amount for all MISO ($); The associated determinant on the FTR statement for on peak is MISO_ARR_FTR_PK_SEAS_TXN_DLS and for off peak is MISO_ARR_FTR_SEAS_TXN_DLS.
$= \Sigma_{MISO}$ (FTR_ARR_FTR_TXN $_{PK\_TYP}$)

MISO_FEAS_DISC_FCT $_{PK\_TYP}$ — MISO Discount Factor for Feasible ARRs (factor).
IF MISO_FEAS_TARG $_{PK\_TYP}$ >= 0, THEN 1, ELSE
MIN ((MISO_FTR_TXN $_{PK\_TYP}$ / (MISO_FEAS_TARG $_{PK\_TYP}$ * -1)), 1)

AO_FEAS_ACT $_{PK\_TYP}$ — Actual Amount for an AO's Feasible ARRs ($).
= AO_FEAS_TARG $_{PK\_TYP}$ * MISO_FEAS_DISC_FCT $_{PK\_TYP}$

AO_INFEAS $_{PK\_TYP}$ — Amount for an AO's Infeasible ARRs ($).
$= \Sigma_{AO}$ ((1 / ARR_DUR $_{PK\_TYP}$) * (ARR_INFEAS_MW $_{PK\_TYP}$ * ARR_PRC $_{PK\_TYP}$))

AO_ARR_MO_RLS_ADJ — Monthly ARR RLS Adjustment Amount ($); for a peak type and stage. An AOs monthly increase or decrease in ARR revenue for ARRs gained or lost in the previous month due to Retail Load Shift, summarized by peak type and stage, total volume times average price per megawatt.
$= \Sigma_{ARR\_TXN\_RLS\_ADJ}$ (ARR_RLS_MW * ARR_RLS_PRC)

C.10.3 Charge Type Calculation for FTR_ARR_ARR_TXN

^*FTR_ARR_ARR_TXN — ARR Transaction Amount for an AO ($); the result is an AO's monthly total charge or credit for all their ARRs including adjustments for Retail Load Shift.
= ((AO_FEAS_ACT $_{ON\ PEAK}$ + AO_INFEAS $_{ON\ PEAK}$) + (AO_FEAS_ACT $_{OFF\ PEAK}$ + AO_INFEAS $_{OFF\ PEAK}$) + AO_ARR_MO_RLS_ADJ)

C.11 Auction Revenue Rights Infeasible Uplift Amount (FTR_ARR_INF_UPL)

Infeasible ARRs are funded via uplift to LTTR holders based on a ratio share of LTTR MWs held by an AO against all LTTR MWs in MISO. The LTTR MWs are those ARRs allocated as Stage 1A Feasible and Stage 1A Infeasible and excludes Stage 1B and Stage 2. The MW volume of each ARR owned by an AO may be adjusted due to retail load shifting that has occurred in the ARR Zone. During the settlement of these transactions only a portion of the AO's total settlement is processed depending on the duration of the ARR. This calculation is performed upon settlement or resettlement of the first calendar day of the month.

During the Second Planning Area transition period, Infeasible ARRs will be uplifted by Planning Area (Region) – to the First Plannng Area (MISO Classic or "MPA") or Second Planning Area (Southern Region or "SPA"). Each ARR will have a zero percent, fifty percent or 100 percent association to each region and will aggregate to one or both Planning Area totals. An AO's ratio share of each Planning Area's total Infeasible LTTR megawatts will determine the their uplift amount for each Planning Areas's total Infeasible dollars.

Note: In year 1 of the new Annual ARR Allocation methodology, there will not be any Infeasible ARRs.

Note: The calculations below are performed separately for Peak and Off-Peak ARRs and then aggregated together for the total FTR_ARR_INF_UPL amount.

An asterisk (*) denotes a billing determinant that is displayed on an AO's FTR statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

C.11.1Calculation Inputs for FTR_ARR_INF_UPL

*ARR_TXN	ARR Transaction; ARR allocated to the AO in the Annual ARR Allocation.
SRC_PA	Planning Area Association for ARR_TXN source node ("MPA" or "SPA"); There is such an association for all node types except interface nodes. When the source node is an interface node, the Planning Area Association for the ARR_TXN is determined by the sink node's association.
SNK_PA	Planning Area Association for ARR_TXN source node ("MPA" or "SPA"); There is such an association for all node types except interface nodes. When the source node is an interface node, the Planning Area Association for the ARR_TXN is determined by the source node's association
ARR_PRC	ARR Price ($); Price (PRC) per MW of the ARR_TXN.
ARR_LTTR_MW	LTTR MW (MW); MW value (VOL) of an ARR_TXN where STAGE is either 1AF or 1AIF.
ARR_INFEAS_MW	Infeasible ARR MWs (MW); MW value (VOL) of an ARR_TXN where STAGE is 1AIF.
PK_TYP	Peak Type ("On Peak" or "Off Peak"); variable that indicates whether the ARR_TXN is for On Peak or Off Peak based on the PEAK_FL on the ARR_TXN. A PEAK_FL of "Y" indicates the ARR_TXN is On Peak. A PEAK_FL of "N" indicates the ARR_TXN is Off Peak.
*ARR_TXN_RLS_ADJ	ARR Transaction Adjustment for Retail Load Shift; for a given peak type and stage. A summarized adjustment transaction representing the net MW volume and average price for all ARR's gained or lost by an AO of the stated peak type and stage due to Retail Load Shift.
ARR_RLS_LTTR_MW	LTTR ARR MW volume from Retail Load Shift (MW); for a given peak type and stage. The net adjustment volume from LTTR ARRs gained or lost by an AO for stage 1AF and 1AIF ARRs due to Retail Load Shift. This may be a positive or negative value.

C.11.2 Intermediate Calculations for FTR_ARR_INF_UPL

ARR_DUR

Duration of the ARR; The number of months between the STARTTIME and STOPTIME of the ARR_TXN.

ARR_PCT_{SPA}

ARR Percentage Allocation to Second Planning Area (SPA) (ratio).
The percentage of an Infeasible ARR which will be allocated to the SPA.

```
= IF SRC_PA = SPA AND SNK_PA = SPA
  THEN 100
  ELSE
        IF SRC_PA = SPA AND SNK = INT
        THEN 100
        ELSE
                IF SNK_PA = SPA AND SRC = INT
                THEN 100
                ELSE
                    IF SRC_PA = SPA OR SNK_PA = SPA
                    THEN 50
                    ELSE 0
```

ARR_PCT_{NPA}

ARR Percentage Allocation to First Planning Area (NPA) (ratio).
The percentage of an Infeasible ARR which will be allocated to the NPA.

```
= IF SRC_PA = NPA AND SNK_PA = NPA
  THEN 100
  ELSE
        IF SRC_PA = NPA AND SNK = INT
        THEN 100
        ELSE
                IF SNK_PA = NPA AND SRC = INT
                THEN 100
                ELSE
                    IF SRC_PA = NPA OR SNK_PA = NPA
                    THEN 50
                    ELSE 0
```

$AO\_LTTR\_MW_{PK\_TYP}$

NPA LTTR MW Amount for an AO (MW).

$= \Sigma_{AO} \left((ARR\_LTTR\_MW_{PK\_TYP} + ARR\_RLS\_LTTR\_MW_{PK\_TYP}) * ARR\_PCT_{NPA} \right)$

*MISO_LTTR_MW $_{PK\_TYP}$ — NPA LTTR MW Amount for all MISO (MW); the associated determinant on the FTR statement for on peak is MISO_ARR_PK_STG1A_VOL and for off peak is MISO_ARR_STG1A_VOL.
$= \Sigma_{MISO}$ (ARR_LTTR_MW $_{PK\_TYP}$)

AO_LTTR_RS $_{PK\_TYP}$ — NPA LTTR Ratio Share for an AO (ratio).
= (AO_LTTR_MW $_{PK\_TYP}$ / MISO_LTTR_MW $_{PK\_TYP}$)

*MISO_INFEAS_DLS $_{PK\_TYP}$ — NPA Dollar Amount for all MISO's Infeasible ARRs ($); the associated determinant on the FTR statement for on peak is MISO_ARR_PK_INFEAS_DLS and for off peak is MISO_ARR_INFEAS_DLS.
$= \Sigma_{MISO}$ ((1 / ARR_DUR $_{PK\_TYP}$) * (ARR_INFEAS_MW $_{PK\_TYP}$ * ARR_PCT $_{NPA}$ * ARR_PRC $_{PK\_TYP}$))

AO_SPA_LTTR_MW $_{PK\_TYP}$ — SPA LTTR MW Amount for an AO (MW).
$= \Sigma_{AO}$ ((ARR_LTTR_MW $_{PK\_TYP}$ + ARR_RLS_LTTR_MW $_{PK\_TYP}$) * ARR_PCT $_{SPA}$)

*MISO_SPA_LTTR_MW $_{PK\_TYP}$ — SPA LTTR MW Amount for all MISO (MW); the associated determinant on the FTR statement for on peak is MISO_SPA_ARR_PK_STG1A_VOL and for off peak is MISO_SPA _ARR _STG1A_VOL.
$= \Sigma_{MISO}$ (SPA_ARR_LTTR_MW $_{PK\_TYP}$)

AO_SPA_LTTR_RS $_{PK\_TYP}$ — SPA LTTR Ratio Share for an AO (ratio).
= (AO_SPA_LTTR_MW $_{PK\_TYP}$ / MISO_SPA_LTTR_MW $_{PK\_TYP}$)

*MISO_SPA_INFEAS_DLS $_{PK\_TYP}$ — Dollar Amount for all MISO SPA's Infeasible ARRs ($); the associated determinant on the FTR statement for on peak is MISO_SPA_ARR_PK_INFEAS_DLS and for off peak is MISO_SPA_ARR_INFEAS_DLS.
$= \Sigma_{MISO}$ ((1 / ARR_DUR $_{PK\_TYP}$) * ARR_INFEAS_MW $_{PK\_TYP}$ * ARR_PCT $_{SPA}$ * ARR_PRC $_{PK\_TYP}$))

C.11.3 Charge Type Calculation for FTR_ARR_INF_UPL

^*FTR_ARR_INF_UPL

ARR Infeasible Uplift Amount for an AO ($); the result is an AO's monthly total charge for infeasible ARRs.

$= [\ (AO\_LTTR\_RS_{ON\ PEAK} * MISO\_INFEAS\_DLS_{ON\ PEAK}) +$
$(AO\_LTTR\_RS_{OFF\ PEAK} * MISO\_INFEAS\_DLS_{OFF\ PEAK}) +$
$(AO\_SPA\_LTTR\_RS_{ON\ PEAK} * MISO\_SPA\_INFEAS\_DLS_{ON\ PEAK}) +$
$(AO\_SPA\_LTTR\_RS_{OFF\ PEAK} * MISO\_SPA\_INFEAS\_DLS_{OFF\ PEAK})$
$] * -1$

C.12 Auction Revenue Rights Stage 2 Distribution Amount (FTR_ARR_STG2_DIST)

The residual revenue (dollar amount left over after funding feasible ARRs) from the Annual FTR Auction is used to fund Stage 2 ARRs when funds exist. The funds are distributed pro-rata based on an AO's share of all Stage 2 MWs. The FTR system provides Market Settlements with the Nomination Cap and Allocated MW's per AO per ARR Zone. The Nomination Cap and Allocated MWs may be adjusted due to retail load shifting that has occurred in the ARR Zone. The difference between the Nomination Cap and Allocated MWs is the Stage 2 MWs. During the settlement of these transactions only a portion of the AO's total settlement is processed depending on the duration of the ARR. This calculation is performed upon settlement or resettlement of the first calendar day of the month.

Note: The calculations below are performed separately for Peak and Off-Peak ARRs and then aggregated together for the total FTR_ARR_STG2_DIST amount.

An asterisk (*) denotes a billing determinant that is displayed on an AO's FTR statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

C.12.1 Calculation Inputs for FTR_ARR_STG2_DIST

*ARR_TXN	ARR Transaction; ARR allocated to the AO in the Annual ARR Allocation.
PK_TYP	Peak Type ("On Peak" or "Off Peak"); variable that indicates whether the ARR_TXN is for On Peak or Off Peak based on the PEAK_FL on the ARR_TXN. A PEAK_FL of "Y" indicates the ARR_TXN is On Peak. A PEAK_FL of "N" indicates the ARR_TXN is Off Peak.
*MISO_FTR_TXN $_{PK\_TYP}$	FTR Transaction Amount for all MISO ($); please refer to the previously defined calculation definition of this component.

*MISO_FEAS_TARG $_{PK\_TYP}$	Target Amount for all MISO's Feasible ARRs ($); please refer to the previously defined calculation definition of this component.
MISO_FEAS_DISC_FCT$_{PK_TYP}$	MISO Discount Factor for Feasible ARRs (factor); please refer to the previously defined calculation definition of this component.
*AO_ARR_STG2_DET	ARR Stage2 Distribution Determinants; Nomination and Allocation information for an AO per ARR Zone.
AO_AZ_CAP_SHIFT$_{PK_TYP}$	ARR Zone Shifting Nomination Cap for an AO (MW); Nomination Cap (SHIFT_NOM) for Shifting MWs for an AO in an ARR Zone.
AO_AZ_CAP_NON_SHIFT$_{PK_TYP}$	ARR Zone Non-Shifting Nomination Cap for an AO (MW); Nomination Cap (NON_SHIFT_NOM) for Non-Shifting MWs for an AO in an ARR Zone.
AO_AZ_ALC_SHIFT$_{PK_TYP}$	ARR Zone Shifting Allocation for an AO (MW); Allocation (SHIFT_ALLOC) of Shifting MWs for an AO in an ARR Zone.
AO_AZ_ALC_NON_SHIFT$_{PK_TYP}$	ARR Zone Non-Shifting Allocation for an AO (MW); Allocation (NON_SHIFT_ALLOC) of Non-Shifting MWs for an AO in an ARR Zone.
*AO_ARR_STG2_DET_ADJ	ARR Stage2 Distribution Determinants Adjustments; Nomination and Allocation adjustments due to Retail Load Shift in an ARR Zone.
AO_AZ_CAP_RLS_DLT$_{PK_TYP}$	ARR Zone Nomination Cap Delta (MW); the delta volume (SHIFT_NOM from the AO_ARR_STG2_DET_ADJ) to be applied to the AO's Shifting Nomination Cap (AO_AZ_CAP_SHIFT) in the ARR Zone due to Retail Load Shift.
AO_AZ_ALC_RLS_DLT$_{PK_TYP}$	ARR Zone Allocation Delta (MW); the delta volume (SHIFT_ALLOC from the AO_ARR_STG2_DET_ADJ) to be) applied to the AO's Shifting Allocation (AO_AZ_ALC_SHIFT) in the ARR Zone due to Retail Load Shift.

C.12.2 Intermediate Calculations for FTR_ARR_STG2_DIST

IF — The "IF" logical statement is a conditional test and returns one value if a condition you specify evaluates to TRUE and another value if it evaluates to FALSE. {Example: IF (logical_test, THEN value_if_true, ELSE value_if_false) }

MAX — The mathematical maximum of the series of numbers in the succeeding parentheses.

$MISO\_FEAS\_ACT_{PK\_TYP}$ — Actual dollar amount of feasible ARRs for all MISO ($);
$= \Sigma_{MISO} (MISO\_FEAS\_TARG_{PK\_TYP} * MISO\_FEAS\_DISC\_FCT_{PK\_TYP})$

$MISO\_STG2\_DLS_{PK\_TYP}$ — Stage 2 dollar amount for all MISO ($);
$= MAX ((MISO\_FTR\_TXN\__{PK\_TYP} + MISO\_FEAS\_ACT_{PK\_TYP}), 0)$

$AO\_STG2\_MW_{PK\_TYP}$ — Stage 2 MW for an AO (MW);
$= \Sigma_{AO} MAX((((AO\_AZ\_CAP\_SHIFT_{PK\_TYP} + AO\_AZ\_CAP\_RLS\_DLT_{PK\_TYP}) + AO\_AZ\_CAP\_NON\_SHIFT_{PK\_TYP}) - ((AO\_AZ\_ALC\_SHIFT_{PK\_TYP} + AO\_AZ\_ALC\_RLS\_DLT_{PK\_TYP}) + AO\_AZ\_ALC\_NON\_SHIFT_{PK\_TYP})),0)$

$*MISO\_STG2\_MW_{PK\_TYP}$ — Stage 2 MW for all MISO (MW); The associated determinant on the FTR statement for on peak is MISO_ARR_STG2_PK_ALLOC_DENOM_VOL and for off peak is MISO_ARR_STG2_ALLOC_DENOM_VOL.
$= \Sigma_{MISO} ((AO\_AZ\_CAP\_SHIFT_{PK\_TYP} + AO\_AZ\_CAP\_NON\_SHIFT_{PK\_TYP}) - (AO\_AZ\_ALC\_SHIFT_{PK\_TYP} + AO\_AZ\_ALC\_NON\_SHIFT_{PK\_TYP}))$

$AO\_STG2\_RS_{PK\_TYP}$ — Stage 2 Ratio Share for an AO (ratio).
$= (AO\_STG2\_MW_{PK\_TYP} / MISO\_STG2\_MW\__{PK\_TYP})$

$AO\_STG2\_DIST_{ON\_PEAK}$ — On Peak Stage 2 Distribution amount for an AO ($).
IF { [$MISO\_STG2\_DLS_{ON\_PEAK} > 0$],
THEN [$-1 * (AO\_STG2\_RS_{ON\ PEAK} * MISO\_STG2\_DLS_{ON\_PEAK})$] ,
ELSE 0 }

$AO\_STG2\_DIST_{OFF\_PEAK}$ — Off Peak Stage 2 Distribution amount for an AO ($).
IF { [$MISO\_STG2\_DLS_{OFF\_PEAK} > 0$],
THEN [$-1 * (AO\_STG2\_RS_{OFF\ PEAK} * MISO\_STG2\_DLS_{OFF\_PEAK})$] ,
ELSE 0 }

C.12.3 Charge Type Calculation for FTR_ARR_STG2_DIST

^*FTR_ARR_STG2_DIST — ARR Stage 2 Distribution Amount for an AO ($); the result is an AO's monthly total credit for Stage 2 ARRs.

$= (AO\_STG2\_DIST_{ON\ PEAK} + AO\_STG2\_DIST_{OFF\ PEAK})$

D. Real-Time Charge Types

D.1 Real-Time Asset Energy Amount (RT_ASSET_EN)

The Real-Time Asset Energy Amount represents an AO's total Real-Time net energy cost (or credit) associated with its Load asset related Commercial Pricing Nodes and the withdrawal volume for DRR Type-II assets for an Operating Day. The Real-Time Asset Energy Amount is the net energy costs for an AO from its Load assets and transactions at those assets. The hourly amounts are summed to determine a daily total. Backed out Day-Ahead Virtual Schedule energy obligations are calculated separately from this Charge Type. The hourly Real-Time Asset Energy Amount is the hourly Real-Time LMP multiplied by the summation of the following AO related items:

1) The Hourly Billable Metered Volume at a Commercial Pricing Node, plus
2) The sum of the hourly Real-Time FBT Volume, plus
3) The LBA Residual Load if applicable, and less
4) The hourly Day-Ahead Asset Energy Volume, plus
5) The Real-Time Carved-Out Grandfathered Transaction volume, less
6) The Day-Ahead Carved-Out Grandfathered Transaction volume.

Hourly Billable Meter Volume is the Real-Time actual meter volume reported by the MP's Meter Data Management Agent (MDMA). In the absence of submitted MDMA Real-Time metered volume for a Load Zone, MISO estimates the volume.

Each LBA has a single AO designated as the LBA Residual Load owner. The LBA Residual Load Owner is assigned the unaccounted for energy (the residual of generation plus actual schedule interchange, less Load, less MISO State Estimator losses) for each and every hour. The Residual Load can be either positive or negative and is added into the AO's billable meter volume at one of its Commercial Pricing Nodes.

FBTs may be scheduled between most Commercial Pricing Nodes. The MP entering FBT with MISO determines whether the transaction is for the Day-Ahead or Real-Time Energy and Operating Reserve Market along with the Source, Sink and Delivery Point. When the seller of an FBT has the source defined at a Commercial Pricing Node where it owns an asset, the energy volume for the transaction is settled in this Charge Type. When the buyer of an FBT has the sink defined at a Commercial Pricing Node where it owns an asset, the energy volume for the transaction is settled in this Charge Type.

There are two types of Real-Time FBTs:

- IBS - Refers to the standard FBTs.
- PSEUDO - Refers to FBTs related to pseudo-tied Load and generation.

IBS FBTs can exist between any two AOs at any of the following Commercial Pricing Nodes types: Hubs (HUB), Interface (INT), Generation (GND), Load Zone (LZN), DRR and Aggregate Generation (FXD).

Pseudo FBTs are unique transactions specifically used with generation and Load within MISO that is pseudo-tied to an external Balancing Authority's Interface Commercial Pricing Node. Pseudo-tied generation and Load is not settled in MISO, but the energy volume is subject to congestion and loss charges between the sink and the source. The pseudo-tied asset is dynamically scheduled by DART. Each hour DART integrates the asset's metered volume into hourly values and then provides the volume to Market Settlements as a pseudo FBT for settlement. Only MISO can establish and schedule pseudo-tie FBTs.

Carved-Out GFA Transactions at a Commercial Pricing Node where the AO owns an Asset is settled in this Charge Type. These are special qualified transactions that permit an AO to schedule energy in either the Day-Ahead and Real-Time Markets, or just the Real-Time Market where they may be modified by responsible parties. All Day-Ahead Carved-Out GFA Transactions flow to the Real Time Market. The Real-Time Carved-Out GFA Transactions are settled only after subtracting out any Day-Ahead volume for the same transaction.

The Real-Time Asset Energy Amount, including billing determinants, is displayed on the Real-Time Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a billing determinant that is displayed on an AO's Real-Time statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.1.1 Calculation Inputs for RT_ASSET_EN

*CA_LOSS	Hourly Modeled BA Losses Volume (MWh); losses estimated inside each LBA as measured by the State Estimator. LBA Losses will display on the Real-Time Market Settlement statement for the AO that is the Residual Load Holder.
~~*D1_NI_PBK~~	~~Day 1 Net Inadvertent Payback Volume (MWh); the hourly amount of Day One Inadvertent Payback megawatts a LBA is either paying back or is receiving. Each LBA, working with an MP, selects a single generator within the LBA area (BAA) to act as the Asset being impacted by any megawatts being paid back or received. A positive value represents load while a negative value represents additional generation.~~
*DA_GFACO$_{Buyer}$	Hourly Day-Ahead Carved-Out GFA Transaction Volume where the AO is the buyer and owns an Asset at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The buyer is defined as the AO that receives the transaction volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the transaction will be listed once for each end of the transaction.
*DA_GFACO$_{Seller}$	Hourly Day-Ahead Carved-Out GFA Transaction Volume where the AO is the seller and owns an Asset at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The seller is defined as the AO that provides the transaction volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the transaction will be listed once for each end of the transaction.
*DA_SCHD	Hourly Day-Ahead Asset Schedule Volume (MWh); the Day-Ahead Asset Schedule Volume is the market cleared offered generation, bid Load or offered DRR schedule by asset. A positive schedule represents a Load obligation and a negative schedule represents a supply obligation. There can be only a single schedule per asset.

*DRR_ADJ_MTR	Demand Response Resource MW Reduction Volume (MWh); These values are derived from submitted Meter Data provided by the Asset Owner of a Demand Response Resource.
*EXE_{DRR}	Hourly Excessive Resource Energy Volume for a Demand Response Resource (MWh); for an AO at a Commercial Pricing Node. This value represents the energy output of a Resource beyond the Excessive Energy threshold.
*NAI	Hourly Net Actual Interchange (NAI) Volume (MWh); the summed, measured unilateral interchange of an LBA. These values are provided by the LBA operator to MISO. NAI for an LBA will display on the Real-Time Market Settlement statement for the AO that is the Residual Load Holder.
*NBPT	Hourly Modeled Net Benefit Price Threshold ($); a market wide price threshold modeled to represent the Hourly LMP price in which Demand Response Resources become beneficial to the Market.
NXE_{DRR}	Hourly Non-Excessive Resource Energy Volume for a Demand Response Resource (MWh); at a Commercial Pricing Node. This value represents the energy output of a DRR Resource circumscribed to its Excessive Energy Threshold. Please refer to the previously defined calculation definition of this component.
*RT_ACT_MTR	Hourly Real-Time Metered Actual Volume (MWh); metered volume may be actual or estimated provided by the MDMA.
*RT_ALT_MTR	Hourly Real-Time Metered Alternate Volume (MWh); MISO estimated energy volume at an asset Commercial Pricing Node.
*$RT\_BLL\_MTR_{DRRI}$	Real-Time Metered Billable Volume at a DRR I Commercial Pricing Node (MWh); billable asset volume. The injection volumes determined for a DRR Type-I unit for a given operating day based on Calculated Baseline data in the Demand Response Tool.
*RT_FIN_{Buyer}	Hourly Real-Time (non-pseudo) FBT Volume at a Commercial Pricing Node where the AO is the Transaction Buyer (MWh); only transactions at sink Commercial Pricing Nodes where the buyer owns the asset are settled in this charge type. The Buyer is defined as the AO that receives

	the FBT volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value.
*RT_FIN_{Seller}	Hourly Real-Time (non-pseudo) FBT Volume at a Commercial Pricing Node where the AO is the Transaction Seller (MWh); only transactions at source Commercial Pricing Nodes where the seller owns the asset are settled in this charge type. The Seller is defined as the AO that supplies the FBT volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value.
*RT_GFACO_{Buyer}	Hourly Real-Time Carved-Out GFA Transaction Volume where the AO is the buyer and owns an Asset at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. Each Day-Ahead Carved-Out GFA Transaction must have a corresponding Real-Time Carved-Out GFA Transaction, but a Real-Time Carved-Out Grandfathered Transaction does not need to have a corresponding Day-Ahead Transaction. The buyer is defined as the AO that receives the transaction volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the transaction will be listed once for each end of the transaction.
*RT_GFACO_{Seller}	Hourly Real-Time Carved-Out GFA Transaction Volume where the AO is the seller and owns an Asset at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. Each Day-Ahead Carved-Out GFA Transaction must have a corresponding Real-Time Carved-Out GFA Transaction, but a Real-Time Carved-Out Grandfathered Transaction does not need to have a corresponding Day-Ahead Transaction. The seller is defined as the AO that provides the transaction volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the transaction will be listed once for each end of the transaction.
*RT_LMP_EN	Hourly Real-Time LMP ($/MWh); at a Commercial Pricing Node. The Real-Time Energy and Operating Reserve Market clearing price for Energy at a given Commercial Pricing Node in the Transmission Provider Region, which is equivalent to the marginal cost of serving demand at the Commercial Pricing Node. The Real-Time Locational Margin Price includes the MCC and the MLC.

D.1.2 Intermediate Calculations for RT_ASSET_EN

IF	The "IF" logical statement is a conditional test and returns one value if a condition you specify evaluates to TRUE and another value if it evaluates to FALSE. { An example of the IF (logical_test, THEN value_if_true, ELSE value_if_false) }
BA_BLL_MTR	The Real-Time BA Meter Asset Volume Total (MWh); the value is used in calculating the Residual Load for an LBA. = $\Sigma_{BA\text{-}ASSETS}$ [IF (RT_ACT_MTR is Null , THEN RT_ALT_MTR , ELSE RT_ACT_MTR)]
BA_DRR_ADJ_MTR	The Real-Time BA DRR ADJ Volume Total (MWh); the value is used in calculating the Residual Load for an LBA. This value comprises DRR I DRR adjustment volumes only. = $\Sigma_{BA\text{-}ASSETS}$ DRR_ADJ_MTR
*RT_ADJ_MTR	Hourly Real-Time Residual Load Volume (MWh); Residual Load due to unaccounted for energy in an LBA. There is only a single Residual Load meter adjustment per LBA and it is assigned to only one AO Commercial Pricing Node. For all other Commercial Pricing Nodes, this RT_ADJ_MTR is zero. The adjustment volume is the negative equivalent of summing all the meter volumes in an LBAA, and adding to it the NAI, and total LBA Losses volume. = (BA_BLL_MTR + NAI + CA_LOSS + BA_DRR_ADJ_MTR) * (-1)
*RT_BLL_MTR	Real-Time Metered Billable Volume (MWh); billable asset volume at a Load Zone or DRRII Commercial Pricing Node. When meter data has been submitted by an MDMA, then the actual submitted volume is used for settlements, otherwise alternate volume calculated by the State Estimator is used. = IF (RT_ACT_MTR is Null , THEN RT_ALT_MTR , ELSE RT_ACT_MTR) + RT_ADJ_MTR ~~+ D1_NI_PBK~~

*^RT_DRR_ADJ_ASSET_VOL	Real-Time Demand Response Adjusted Volume (MWh); for a CPNode with a Demand Response Resource. The result represents the load adjustment determined by the LMP and the Net Benefit Price Threshold. $=\Sigma_{CN}$ { [DRR_ADJ_MTR * ((EXE_{DRR} * -1) / ($RT\_BLL\_MTR_{DRRI}$ + RT_DRRII_INJ_VOL))] + [IF RT_LMP_EN < NBPT THEN DRR_ADJ_MTR * (NXE_{DRR} / ($RT\_BLL\_MTR_{DRRi}$ + RT_DRRII_INJ_VOL)) ELSE 0] }
RT_FIN_NET	Hourly Real-Time Net FBT Load Obligation (MWh); for an AO at a Load Commercial Pricing Node; This volume represents any excess of FBT energy sold (and sourcing) less energy purchased (and sinking) at a Load Asset, $= \Sigma_{Schedule}$ (RT_FIN_{Seller}) + $\Sigma_{Schedule}$ [(-1) * RT_FIN_{Buyer}]
RT_GFACO_NET	Hourly Real-Time Net Carved-Out Grandfathered Transactions (MWh); for an AO at a Load Commercial Pricing Node. $= \Sigma_{Schedule}$ [(RT_GFACO_{Seller}) - (DA_GFACO_{Seller})] - $\Sigma_{Schedule}$ [(RT_GFACO_{Buyer}) - (DA_GFACO_{Buyer})]
RT_ASSET_VOL	Hourly Real-Time Asset Energy Volume (MWh); for an AO. This calculation is only performed for Commercial Pricing Nodes where the AO has a Load asset or a DRR Type-II asset (for the withdrawal volume).. The result represents the AO's total hourly net Real-Time energy volume at each of its Load Assets. = RT_BLL_MTR - DA_SCHD + RT_FIN_NET + RT_GFACO_NET + RT_DRR_ADJ_ASSET_VOL
RT_DRRII_INJ_VOL	Hourly Real-Time DRR II Injection Volume (MWh); Energy injection volume for a DRR II, calculated as minus one times the difference between the dispatch maximum and the billable meter load at the DRR II bus. = (RT_MAX_DSP - RT_BLL_MTR) * -1

D.1.3 Charge Type Calculation for RT_ASSET_EN

*^RT_ASSET_EN_HR

Hourly Real-Time Asset Energy Amount ($); for an AO. This calculation is only performed for Commercial Pricing Nodes where the AO has a Load asset or DRR Type II. The result represents the AO's total hourly charge or credit for all its Load assets. The formula result is per Hour and is rounded to the nearest cent. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement.

$= \Sigma_{CN} (\text{RT\_ASSET\_VOL} * \text{RT\_LMP\_EN})$

*RT_ASSET_EN

Real-Time Asset Energy Amount ($); for all AO related asset Commercial Pricing Nodes. The formula result is displayed in dollars ($).

$= \Sigma_{H} (\text{RT\_ASSET\_EN\_HR})$

D.2 Real-Time Distribution of Losses Amount (RT_LOSS_DIST)

Real-Time Distribution of Losses Amount is the charge type that distributes surplus collected losses to Load Zone AOs. This charge type is calculated hourly. The charge type has three main calculation routines: 1) the determination of the Marginal Losses Surplus to be distributed, 2) the allocation of the surplus into loss pools, and 3) the distribution of the loss pools to each AO within each loss pool.

On an hourly basis, MISO calculates the Marginal Loss Surplus as the sum of:

- The total Real-Time Over-Collected Losses, plus
- The total Day-Ahead Losses Rebate on GFAOBs FBTs Amount, plus
- The total Day-Ahead Losses Rebate on Carved-Out GFAs Charge Type Amount, plus
- The total Real-Time Losses Rebate on Carved-Out GFAs Charge Type Amount.

Real-Time Over-Collected Losses is a dollar value calculated by the DART every 5 minutes as the Real-Time Market is cleared and is aggregated to an hourly value. For additional information on Real-Time Over-Collected Losses, please refer to the Market Settlements BPM.

MISO regional transmission authority area is divided into Loss Pools. A Loss Pool is defined as a collection of LBAs for the purpose of distributing Marginal Losses Surplus. The relationships between LBAs and Loss Pools may vary over time and are maintained historically by Operating Days.

The total Marginal Losses Surplus is distributed among LBAAs based upon a loss (cost) distribution factor. This weighted distribution factor is determined for each Loss Pool by the estimated cost of Marginal Losses in the pool and by the average marginal cost of losses of any imported energy. Estimated Marginal Losses can either be positive or negative based upon the reference Bus that set the MLC for the Hour.

Within each Loss Pool, the hourly total Marginal Losses Surplus is distributed based upon Load consumed within the Loss Pool. All Load supplied by GFAOB FBTs and

Carved-Out GFA Transactions are excluded from surplus loss distributions since their losses are rebated in other Charge Types.

The Real-Time Loss Distribution Amount, including billing determinants, is displayed on the Real-Time Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a billing determinant that is displayed on an AO's Real-Time statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.2.1 Calculation Inputs for RT_LOSS_DIST

NAI	Hourly Net Actual Interchange Volume for a LBA (MWh).
*RT_GFACO$_{Seller}$	Hourly Real-Time Carved-Out GFA Transaction Volume where the AO is the seller and owns an Asset at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The seller is defined as the AO that provides the transaction volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the transaction will be listed once for each end of the transaction.
*RT_GFACO$_{Buyer}$	Hourly Real-Time Carved-Out GFA Transaction Volume where the AO is the buyer and owns an Asset at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The buyer is defined as the AO that receives the transaction volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the transaction will be listed once for each end of the transaction.
RT_LMP_LS	Hourly Real-Time Loss Component of LMP at a Commercial Pricing Node ($/MWh)
RT_OCL	Hourly Real-Time Over-Collected Losses ($); a total MISO wide calculated over-collected losses dollar value calculated in DART.

LRS_XMPT — Nodal Exemption of Withdrawal from Load Ration Share (flag); a "Y" value indicates that withdrawal at the Commercial Pricing Node is not included in an AO's Load Ratio Share for the Operating Day.

D.2.2 Intermediate Calculations for RT_LOSS_DIST

D.2.2.1 Intermediate Calculations for Loss Surplus Portion of RT_LOSS_DIST

AVG — The mathematical average of the value within the succeeding set of parentheses.

IF — The "IF" logical statement is a conditional test and returns one value if a condition you specify evaluates to TRUE and another value if it evaluates to FALSE. { An example of the IF (logical_test, THEN value_if_true, ELSE value_if_false) }

MAX — The mathematical maximum of the series of numbers in the succeeding parentheses.

MIN — The mathematical minimum of the series of numbers in the succeeding parentheses.

DA_GFAOB_RBT_LS_HR — Hourly Day-Ahead Losses Rebate on GFAOB FBTs ($); the sum of all the loss charges and credits that an AO was assessed for GFAOB FBTs in Day-Ahead FBT Loss Amount and calculates the AO's hourly rebate amount. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement. Please refer to the previously defined calculation definition of this component.

*MISO_GFAOB_LS_RBT — Hourly MISO total Day-Ahead Losses Rebate on GFAOB FBTs ($); the result is the sum of all AO hourly rebates.
$= \Sigma_{MISO}$ (DA_GFAOB_RBT_LS_HR)

DA_GFACO_RBT_LS_HR — Hourly Day-Ahead Losses Rebate on Carved-Out GFA Transaction Amounts ($); this calculation is performed for Commercial Pricing Nodes where the AO has Day-Ahead Carved-Out GFA Transactions. The result represents the AO's total hourly losses rebate of charges and credits that were assessed in the Day-Ahead Asset Energy Amount and Day-Ahead Non-Asset Energy Amount charge types related to Day-Ahead Carved-Out GFA Transactions. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement. Please refer to the previously defined calculation definition of this component.

MISO_DA_GFACO_RBT_LS_HR — Hourly MISO total Day-Ahead Losses Rebate on Carved-Out GFA Transactions ($); the result is the sum of all AO hourly rebates.
$= \Sigma_{MISO}$ (DA_GFACO_RBT_LS_HR)

RT_GFACO_RBT_LS_HR — Hourly Real-Time Losses Rebate on Carved-Out GFA Transaction Amounts ($); this calculation is performed for Commercial Pricing Nodes where the AO has Real-Time Carved-Out GFA Transactions. The result represents the AO's total hourly losses rebate of charges and credits that were assessed in the Real-Time Asset Energy Amount and Real-Time Non-Asset Energy Amount charge types related to Real-Time Carved-Out GFA Transactions. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement. Please refer to the previously defined calculation definition of this component.

MISO_RT_GFACO_RBT_LS_HR — Hourly MISO total Real-Time Losses Rebate on Carved-Out GFA Transactions ($); the result is the sum of all AO hourly rebates.
$= \Sigma_{MISO}$ (RT_GFACO_RBT_LS_HR)

*MISO_GFACO_LS_RBT — MISO Total of Loss Rebates on Carved-Out GFAs ($); total Day-Ahead and Real-Time Hourly MISO GFA Losses Rebate on Carved-Out GFA Transactions. The result is the sum of all AO hourly rebates.
= MISO_DA_GFACO_RBT_LS_HR + MISO_RT_GFACO_RBT_LS_HR

*^MISO_LOSS_SURPLUS — Hourly MISO Loss Surplus Amount ($); the total hourly loss dollars available for distribution. This value is rounded to the nearest cent.
= (RT_OCL + MISO_GFAOB_LS_RBT + MISO_GFACO_LS_RBT) * (-1)

D.2.2.2 Intermediate Calculations for Loss Pool to Total MISO Portion of RT_LOSS_DIST

RT_BLL_MTR — Real-Time Metered Billable Volume at a Commercial Pricing Node (MWh); billable asset volume. When generation, Load, or DRR meter data has been submitted by an MDMA, then the actual submitted volume is used for settlements; otherwise alternate volume calculated by the State Estimator is used. Please refer to the previously defined calculation definition of this component.

DA_GFAOB_{Buyer} — Hourly Day-Ahead Valid GFAOB Transaction Volume (MWh); at a Commercial Pricing Node where the AO is the Transaction Buyer. The equation represents a single validated transaction at a single Commercial Pricing Node. This equation is performed for each AO GFAOB Transaction where the AO is the transaction buyer. Please refer to the previously defined calculation definition of this component.

DA_GFAOB_BUYER_TOT — Hourly Total Day-Ahead Valid Option B Buying GFA Transaction Volume for an asset (MWh); this calculation is performed only at asset Commercial Pricing Nodes and represents the total buying GFAOB Transaction Volume for the asset.

$= \Sigma_{Asset}$ [IF (DA_GFAOB_{Buyer} = Asset Commercial Pricing Node) , THEN DA_GFAOB_{Buyer} , ELSE 0]

DA_GFAOB_{Seller} — Hourly Day-Ahead Valid GFAOB Transaction Volume (MWh); at a Commercial Pricing Node where the AO is the Transaction Seller. The equation represents a single validated transaction at a single Commercial Pricing Node. This equation is performed for each AO GFAOB Transaction where the AO is the transaction seller. Please refer to the previously defined calculation definition of this component.

DA_GFAOB_SELLER_TOT — Hourly Total Day-Ahead Validated Selling GFAOB Transaction Volume for an asset (MWh); this calculation is performed only at asset Commercial Pricing Nodes and represents the total selling GFAOB Transaction Volume for the Asset.

$= \Sigma_{Asset}$ [IF (DA_GFAOB_{Seller} = Asset Commercial Pricing Node) , THEN DA_GFAOB_{Seller} , ELSE 0]

RT_GFACO_BUYER_TOT — Hourly Total Buying Real-Time Carved-Out GFA Transaction Volume for an asset (MWh); this calculation is performed only at asset Commercial

Pricing Nodes and represents the total buying Carved-Out GFA Transaction Volume for the asset.
= Σ_{Asset} (RT_GFACO_{Buyer})

RT_GFACO_SELLER_TOT

Hourly Total Selling Real-Time Carved-Out GFA Transaction Volume for an asset (MWh); this calculation is performed only at asset Commercial Pricing Nodes and represents the total Selling Carved-Out GFA Transaction Volume for the asset.
= Σ_{Asset} (RT_GFACO_{Seller})

N_GFA_ARC

Hourly Real-Time Billable Schedule less GFA Transaction Volume and Real-Time ARC Adjustment (MWh); the Real-Time Billable asset volume is adjusted for the impact of GFAs and demand reduction from Demand Response Resources to prevent those transactions from influencing the disbursement of excess losses. For generation and DRRs, the impact of GFA Transactions lowers the total injection volume. For Load Zone Resources, the impact of GFA Transactions lowers the total withdrawal volume. An asset can only be supplying GFA transactions, or be supplied by GFA transactions at one time, not both simultaneously. The following calculation is performed at Commercial Pricing Nodes where there is an asset.
= [IF { (RT_BLL_MTR < 0),
THEN [MIN (0,
RT_BLL_MTR + DA_GFAOB_SELLER_TOT + RT_GFACO_SELLER_TOT)],
ELSE [MAX (0,
RT_BLL_MTR - DA_GFAOB_BUYER_TOT - RT_GFACO_BUYER_TOT)]] *
IF { LRS_XMPT="Y", THEN 0, ELSE 1 }

WDR_MTR

Hourly Withdrawal Meter Volume for an Asset at a Commercial Pricing Node (MWh); this step separates out load volume from all reported meter volume. External Bilateral Schedules, Internal Bilateral Schedules, and Virtual Schedules are not metered Asset volume and as such are not included in this variable.
= MAX (0, N_GFA_ARC)

LP_WDR_MTR

Total Hourly Withdrawal Meter Volume for all assets in a Loss Pool (MWh); this step sums all load volumes within a single Loss Pool.
= $\sum_{LP}$ (WDR_MTR)

INJ_MTR	Hourly Injection Meter Volume for an asset at a Commercial Pricing Node (MWh); this step separates out generation and DRR volume from all reported meter volume. External Bilateral Schedules, Internal Bilateral Schedules, and Virtual Schedules are not metered assets and as such are not included in this variable. = MIN (0, N_GFA_ARC) * (-1)
LP_INJ_MTR	Total Hourly Injection Meter Volume for all assets in a Loss Pool (MWh); net of validated GFA volume. = $\sum_{LP}$ (INJ_MTR)
MISO_INJ_MTR	Total Hourly Injection Meter Volume for all assets in MISO (MWh); this step sums all generation volumes within MISO net of validated GFA volume. = $\sum_{MISO}$ (INJ_MTR)
SCLD_GEN	Hourly Scaled Generation Volume for an asset (MWh); this value represents the amount of energy injection from each generation asset that is assumed to supply the Load within a Loss Pool. = IF { LP_INJ_MTR = 0, 0 , INJ_MTR * MIN [1, (LP_WDR_MTR / LP_INJ_MTR)] }
LP_SCLD_GEN	Total Hourly Scaled Generation Volume for all assets in a Loss Pool (MWh); this value represents the amount of energy injection within in a Loss Pool. = MIN (LP_WDR_MTR, LP_INJ_MTR)
MISO_SCLD_GEN	Total Hourly Scaled Generation Volume for all assets in MISO (MWh); this value represents the sum of all Hourly Scheduled Generation Volumes for all assets in MISO. = $\sum_{MISO}$ (LP_SCLD_GEN)
IMPORT_GEN	Hourly Energy Import Volume by asset (MWh); this variable represents the amount of Load or generation volume by asset that is used for determining the total Loss Pool Import Generation. It is assumed that for each asset that either WDR_MTR or SCLD_GEN is zero (both can be zero). = WDR_MTR - SCLD_GEN

LP_IMPORT_GEN	Total Hourly Energy Import Volume for a Loss Pool (MWh); this variable represents the amount of generation that must flow from other Loss Pools and/or from Interchange Schedules to make up for the lack of generation in this Loss Pool. For a Loss Pool that has more generation than Load, this value is zero. = LP_WDR_MTR – LP_SCLD_GEN
MISO_IMPORT_GEN	Total Hourly Energy Import Volume for all Loss Pools in MISO (MWh). = Σ_{MISO} (IMPORT_GEN)
LP_EXP_GEN	Hourly Energy Export Volume for a Loss Pool (MWh); this value represents the amount of excess generation assume to supply Load in other Loss Pools. = LP_INJ_MTR – LP_SCLD_GEN
MISO_EXP_GEN	Total Hourly Energy Export Volume for all Loss Pools in MISO (MWh). = Σ_{MISO} (LP_EXP_GEN)
MISO_RT_IMPORT_VOL	Total Net Hourly Real-Time Import Volume for MISO (MWh); this equation captures the net energy import volume for the entire MISO. = MAX (MISO_IMPORT_GEN – MISO_EXP_GEN, 0)
EXP_GEN	Hourly Energy Export Volume by asset (MWh); this variable represents the amount of excess generation from the asset that is assumed to supply Load in other Loss Pools where they are generation short, but does not account for generation being used for External Bilateral Schedule exports. For a Loss Pool that has less generation than Load, this value is zero. = (INJ_MTR - SCLD_GEN) * [MISO_IMPORT_GEN / (MISO_EXP_GEN + MISO_RT_IMPORT_VOL)]
MISO_EG_MLC	Total Hourly MISO Excess Generation MLC from all assets ($); the Excess Generation at each asset is multiplied by the Real-Time Locational MLC of LMP at the Commercial Pricing Node associated with the asset. = Σ_{MISO} (EXP_GEN * RT_LMP_LS)

INT_MLC

Hourly Average MLC of all MISO Interface Commercial Pricing Nodes ($/MWh); this value is used as an average cost for importing megawatts into MISO.

= AVG { IF [(Commercial Pricing Node is an Interface Node Type) , THEN $RT\_LMP\_LS_{\text{Interface Commercial Pricing Nodes}}$, ELSE 0] }

EG_MLC_EXT

Total Hourly Excess Generation MLC from PBTs ($); the net contribution to Excess Generation from all External Bilateral Schedules is calculated to

= MISO_RT_IMPORT_VOL * INT_MLC

IMPORT_LOSS_FCT

Hourly Import Loss Factor by Loss Pool ($); this value is calculated by Loss Pool and it is the MLC cost of excess generation and net Interchange Schedules to serve a generation deficient Loss Pools. This value is only calculated for Loss Pools and is not calculated for serving Interchange Schedule exports.

= (MISO_EG_MLC + EG_MLC_EXT) * (LP_IMPORT_GEN / MISO_IMPORT_GEN)

MLC_ASSET

Hourly Asset Loss Factor by asset ($); this value is the calculated weighted cost of MLC by asset. For Loads it is the entire Load multiplied by the MLC; for generation and DRRs it is the only portion of the metered volume that is assumed to serve Load in the loss pool multiplied by the MLC. The dollar impact of all generation and DRR volume that is not used in a Loss Pool to serve its own Loss Pool load is calculated in the Hourly Import Loss Factor value. This equation calculates a value for every Commercial Pricing Node that has an asset. Since a Commercial Pricing Node cannot have both Load and generation, at least either the Load or Scaled Generation value for each asset is zero.

= (SCLD_GEN - WDR_MTR) * RT_LMP_LS

LP_LOSS_MLC

Hourly Loss Pool MLC ($); this value represents the aggregated cost of losses in a Loss Pool netted against generation and DRR volume costs used to serve the Load. This formula represents the sum of all Hourly Asset Loss Factors within a Loss Pool plus the Hourly Import Loss Factor for the same Loss Pool. Since this value is only used to determine how Loss Distribution Surplus dollars are distributed, the formula result is capped at zero to prevent one Loss Pool from having to pay additional Loss Distribution Surplus to another.

= MIN { [$\sum_{LP}$ (MLC_ASSET) + IMPORT_LOSS_FCT] , 0 }

MISO_LOSS_MLC — Total Hourly Asset MLC for all MISO ($); this value represents the aggregated cost of losses in all of MISO.
$= \sum_{MISO}$ (LP_LOSS_MLC)

*^LP_FCT — Loss Pool to MISO Losses Distribution Factor at Loss Pool (Factor); the resultant value in comparing it to the total of all Loss Pools is used to determine how much Loss Distribution Surplus each Loss Pool gets.
= (LP_LOSS_MLC / MISO_LOSS_MLC)

D.2.2.3 Intermediate Calculations for Asset Load Ratio Share Portion of RT_LOSS_DIST

*^LP_LRS_FCT — Hourly Real-Time Distribution Factor for an Asset in a Loss Pool (factor); this factor is rounded to eight decimal places.
= (WDR_MTR / LP_WDR_MTR)

D.2.3 Charge Type Calculation for RT_LOSS_DIST

*^RT_LOSS_DIST_HR — Hourly Real-Time Distribution of Losses Amount for an AO ($); the formula result is rounded to the cent by Hour. The Distribution of Losses Amount for an AO is equal to the total dollars available by Hour multiplied by the Loss Pool Factor multiplied by the AO's LRS for each asset. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement.
$= \sum_{Assets}$ (MISO_LOSS_SURPLUS * LP_FCT * LP_LRS_FCT)

*RT_LOSS_DIST — Daily Real-Time Distribution of Losses Amount for an AO ($); is the sum of all hours of an Operating Day.
$= \sum$ (RT_LOSS_DIST_HR)

D.3 Real-Time Financial Schedule Congestion Amount (RT_FIN_CG)

The Real-Time FBT Congestion Amount represents an AO's total Real-Time FBT congestion costs and Carved-Out GFA Transaction congestion costs for an Operating Day. The Real-Time FBT Congestion Amount is calculated hourly for each buyer and seller of an FBT with the charge amount summed by AO into a daily total. This Charge Type consists of the sum of:

- FBT volume multiplied by the difference between two Commercial Pricing Nodes congestion components (sink minus delivery point for buyers and Delivery Point minus source for sellers), plus
- The net transaction volume of Real-Time Carved-Out GFA less Day-Ahead Carved-Out GFA Transaction volume, multiplied by the difference between two Commercial Pricing Nodes congestion components (sink minus Delivery Point for buyers and Delivery Point minus source for sellers)

Real-Time FBTs and Carved-Out GFA Transactions can exist between any AO and most Commercial Pricing Nodes. Each Transaction has the following elements defined:

- Energy source Commercial Pricing Node
- Energy sink Commercial Pricing Node
- Delivery Point
- Buying AO
- Selling AO
- Energy volume in megawatts
- Date including hours that it is applicable

For FBTs, the concept of a Delivery Point is incorporated to provide the parties to the transaction a location other than the source or sink where responsibility for congestion is transferred from seller to buyer. The Delivery Point can be any Commercial Pricing Node, including either the energy source or sink Commercial Pricing Node.

- The Real-Time FBT seller is responsible for the congestion charge difference between the Delivery Point and the source Commercial Pricing Node. When the Delivery Point is defined as the sink Commercial Pricing Node, the seller is responsible for the congestion between the Commercial Pricing Nodes.

- The Real-Time FBT buyer is responsible for the congestion charge difference between the sink and Delivery Point Commercial Pricing Node. When the Delivery Point is defined as the source Commercial Pricing Node, the buyer is responsible for the congestion between the Commercial Pricing Nodes.

For Carved-Out GFA Transactions, the Delivery Point is always the source Commercial Pricing Node and as such the transaction buyer is responsible for the congestion charge difference between the sink and source Commercial Pricing Nodes.

There are two types of Real-Time FBTs:

- IBS - Refers to the standard FBTs.
- PSEUDO - Refers to FBTs related to pseudo-tied Load and generation.

IBS FBTs can exist between any two AOs at any of the following Commercial Pricing Nodes types: Hubs (HUB), Interface (INT), Generation (GND), Load Zone (LZN), DRR and Aggregate Generation (FXD).

Pseudo FBTs are unique transactions specifically used with generation and Load within MISO that is pseudo-tied to an external Balancing Authority's Interface Commercial Pricing Node. Pseudo-tied generation and Load are not settled in MISO, but the energy volume is subject to congestion and loss charges between the sink and Delivery Point, and between the Delivery Point and the source. The pseudo-tied asset is dynamically scheduled by DART. Each hour DART integrates the asset's metered volume into hourly values and then provides the volume to Market Settlements as a pseudo FBT for settlement. Only MISO can establish and schedule pseudo FBTs.

The Real-Time FBT Congestion Amount, including billing determinants, is displayed on the Real-Time Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a billing determinant that is displayed on an AO's Real-Time statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.3.1 Calculation Inputs for RT_FIN_CG

*RT_FIN_{Buyer}	Hourly Real-Time (non-pseudo) FBT Volume where the AO is the Transaction Buyer (MWh); the Buyer is defined as the AO that receives the FBT volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value.
*RT_FIN_{Seller}	Hourly Real-Time (non-pseudo) FBT Volume where the AO is the Transaction Seller (MWh); the Seller is defined as the AO that supplies the FBT volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value.
*$RT\_FIN_{Pseudo\_Buyer}$	Hourly Real-Time (pseudo) FBT Volume where the AO is the Transaction Buyer (MWh); the Buyer is defined as the AO that receives the FBT volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value.
*$RT\_FIN_{Pseudo\_Seller}$	Hourly Real-Time (pseudo) FBT Volume where the AO is the Transaction Seller (MWh); the Seller is defined as the AO that supplies the FBT volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value.
*DA_GFACO_{Buyer}	Hourly Day-Ahead Carved-Out GFA Transaction Volume at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The buyer is defined as the AO that receives the transaction volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the FBT will be listed for each end of the transaction.
*DA_GFACO_{Seller}	Hourly Day-Ahead Carved-Out GFA Transaction Volume at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The seller is defined as the AO that provides the transaction volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the FBT will be listed for each end of the transaction.
*RT_GFACO_{Buyer}	Hourly Real-Time Carved-Out GFA Transaction Volume at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out

Transaction. All Day-Ahead Carved-Out GFA Transaction must have a corresponding Real-Time Carved-Out GFA Transaction, but a Real-Time Carved-Out Grandfathered Transaction does not need to have a corresponding Day-Ahead Transaction. The buyer is defined as the AO that receives the transaction volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the transaction will be listed once for each end of the transaction.

*RT_GFACO_{Seller}	Hourly Real-Time Carved-Out GFA Transaction Volume at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. Each Day-Ahead Carved-Out GFA Transaction must have a corresponding Real-Time Carved-Out GFA Transaction, but a Real-Time Carved-Out Grandfathered Transaction does not need to have a corresponding Day-Ahead Transaction. The seller is defined as the AO that provides the transaction volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the transaction will be listed once for each end of the transaction.
*$RT\_LMP\_CG_{DP}$	Hourly Real-Time Congestion Component of LMP at Delivery Point Commercial Pricing Node ($/MWh).
*$RT\_LMP\_CG_{SI}$	Hourly Real-Time Congestion Component of LMP at Sink Commercial Pricing Node ($/MWh).
*$RT\_LMP\_CG_{SO}$	Hourly Real-Time Congestion Component of LMP at Source Commercial Pricing Node ($/MWh).

D.3.2 Intermediate Calculations for RT_FIN_CG

RT_FIN_BUY_CG	Hourly Total Real-Time Buyer (non-pseudo) FBT Congestion Charge ($); the amount is the hourly total calculated congestion charge for all IBS type Real-Time FBTs where the AO is the buyer of the transaction. The buyer is defined as an AO that receives the transaction volume at the sink Commercial Pricing Node. $= \Sigma_{Transactions} [\ (RT_FIN_{Buyer})\ *\ (RT_LMP_CG_{SI}\ -\ RT_LMP_CG_{DP})\ ]$
RT_FIN_SELL_CG	Hourly Total Real-Time Seller (non-pseudo) FBT Congestion Charge ($); the amount is the hourly total calculated congestion charge for all IBS type Real-Time FBTs where the AO is the seller of the transaction. The

seller is defined as an AO that supplies the transaction volume at the source Commercial Pricing Node.
$= \Sigma_{Transactions} [(RT\_FIN_{Seller}) * (RT\_LMP\_CG_{DP} - RT\_LMP\_CG_{SO})]$

RT_FIN_PSD_BUY_CG — Hourly Total Real-Time Buyer Pseudo FBT Congestion Charge ($); the amount is the hourly total calculated congestion charge for all pseudo type Real-Time FBTs where the AO is the buyer of the transaction. The buyer is defined as an AO that receives the transaction volume at the sink Commercial Pricing Node.
$= \Sigma_{Transactions} [(RT\_FIN_{Pseudo\_Buyer}) * (RT\_LMP\_CG_{SI} - RT\_LMP\_CG_{DP})]$

RT_FIN_PSD_SELL_CG — Hourly Total Real-Time Seller Pseudo FBT Congestion Charge ($); the amount is the hourly total calculated congestion charge for all pseudo type Real-Time FBTs where the AO is the seller of the transaction. The seller is defined as an AO that supplies the transaction volume at the source Commercial Pricing Node.
$= \Sigma_{Transactions} [(RT\_FIN_{Pseudo\_Seller}) * (RT\_LMP\_CG_{DP} - RT\_LMP\_CG_{SO})]$

RT_GFACO_BUY_CG — Hourly Total Real-Time Buyer Carved-Out GFA Transaction Congestion Charge ($); the amount is the hourly total calculated congestion charge for all Carved-Out GFA Transactions where the AO is the buyer of the transaction. The buyer is defined as an AO that receives the transaction volume at the sink Commercial Pricing Node.
$= \Sigma_{Transactions} [(RT\_GFACO_{Buyer} - DA\_GFACO_{Buyer}) * (RT\_LMP\_CG_{SI} - RT\_LMP\_CG_{DP})]$

RT_GFACO_SELL_CG — Hourly Total Real-Time Seller Carved-Out GFA Transaction Congestion Charge ($); the amount is the hourly total calculated congestion charge for all Carved-Out GFA Transaction where the AO is the seller of the transaction. The seller is defined as an AO that supplies the transaction volume at the source Commercial Pricing Node.
$= \Sigma_{Transactions} [(RT\_GFACO_{Seller} - DA\_GFACO_{Seller}) * (RT\_LMP\_CG_{DP} - RT\_LMP\_CG_{SO})]$

D.3.3 Charge Type Calculation for RT_FIN_CG

*^RT_FIN_CG_HR

Hourly Real-Time FBT Congestion Hourly Amount ($); this calculation is performed for AOs that have Real-Time FBTs and/or Carved-Out GFA Transactions. The result represents the AOs' total hourly congestion charge or credit for all their Real-Time FBTs and Carved-Out GFA Transactions. The result is rounded to the nearest cent. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement.

= RT_FIN_BUY_CG + RT_FIN_SELL_CG + RT_FIN_PSD_BUY_CG + RT_FIN_PSD_SELL_CG + RT_GFACO_BUY_CG + RT_GFACO_SELL_CG

*RT_FIN_CG

Real-Time FBT Congestion Amount ($); is a daily total amount due MISO from an AO from all the Real-Time FBTs and Carved-Out GFA Transactions. The formula result is displayed in dollars.

= Σ_H (RT_FIN_CG_HR)

D.4 Real-Time Financial Schedule Loss Amount (RT_FIN_LS)

The Real-Time FBT Loss Amount represents an AO's total Real-Time FBT loss costs and Carved-Out GFA Transaction congestion costs for an Operating Day. The Real-Time FBT Loss Amount is calculated hourly for each buyer and seller and summed by AO into a daily total. This Charge Type consists of the sum of:

- FBT volume multiplied by the difference between two Commercial Pricing Nodes losses components (sink minus Delivery Point for buyers and Delivery Point minus source for sellers), plus
- The net transaction volume of Real-Time Carved-Out GFA less Day-Ahead Carved-Out GFA Transaction volume, multiplied by the difference between two Commercial Pricing Nodes losses components (sink minus Delivery Point for buyers and Delivery Point minus source for sellers)

Real-Time FBT and Carved-Out GFA Transaction can exist between any AO and most Commercial Pricing Nodes. Each transaction has the following elements defined:

- Energy source Commercial Pricing Node
- Energy sink Commercial Pricing Node
- Delivery Point
- Buying AO
- Selling AO
- Energy volume in megawatts
- Date including hours that it is applicable

For FBTs, the concept of a Delivery Point is incorporated to provide the parties to the transaction a location other than the source or sink where responsibility for congestion and losses is transferred from seller to buyer. The Delivery Point can be any Commercial Pricing Node, including either the energy source or sink Commercial Pricing Node.

- The Real-Time FBT seller is responsible for the loss charge difference between the Delivery Point and the source Commercial Pricing Node. When the Delivery Point is defined as the sink Commercial Pricing Node, the seller is responsible for the losses between the Commercial Pricing Nodes.

- The Real-Time FBT buyer is responsible for the loss charge difference between the sink and Delivery Point Commercial Pricing Node. When the Delivery Point is defined as the source Commercial Pricing Node, the buyer is responsible for the losses between the Commercial Pricing Nodes.

For Carved-Out GFA Transactions, the Delivery Point is always the source Commercial Pricing Node and as such the transaction buyer is responsible for the losses charge difference between the sink and source Commercial Pricing Nodes.

There are two types of Real-Time FBTs:

- IBS - Refers to the standard FBTs.
- PSEUDO - Refers to FBTs related to pseudo-tied Load and generation.

IBS FBTs can exist between any two AOs at any of the following Commercial Pricing Nodes types: Hubs (HUB), Interface (INT), generation (GND), Load Zone (LZN), DRR and aggregate generation (FXD).

Pseudo FBTs are unique transactions specifically used with generation and Load within MISO that is pseudo-tied to an external Balancing Authority's Interface Commercial Pricing Node. Pseudo-tied generation and Load is not settled in MISO, but the energy volume is subject to congestion and loss charges between the sink and the source. The pseudo-tied asset is dynamically scheduled by the DART. Each hour DART integrates the asset's metered volume into hourly values and then provides the volume to Market Settlements as a pseudo FBT for settlement. Only MISO can establish and schedule pseudo FBTs.

The Real-Time FBT Loss Amount, including billing determinants, is displayed on the Real-Time Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a billing determinant that is displayed on an AO's Real-Time statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.4.1 Calculation Inputs for RT_FIN_LS

*RT_FIN_{Buyer}	Hourly Real-Time (non-pseudo) FBT Volume where the AO is the Transaction Buyer (MWh); the Buyer is defined as the AO that receives the FBT volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value.
*RT_FIN_{Seller}	Hourly Real-Time (non-pseudo) FBT Volume where the AO is the Transaction Seller (MWh); the Seller is defined as the AO that supplies the FBT volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value.
*$RT\_FIN_{Pseudo\text{-}Buyer}$	Hourly Real-Time (pseudo) FBT Volume where the AO is the Transaction Buyer (MWh); the Buyer is defined as the AO that receives the FBT volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value.
*$RT\_FIN_{Pseudo\text{-}Seller}$	Hourly Real-Time (pseudo) FBT Volume where the AO is the Transaction Seller (MWh); the Seller is defined as the AO that supplies the FBT volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value.
*DA_GFACO_{Buyer}	Hourly Day-Ahead Carved-Out GFA Transaction Volume at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The buyer is defined as the AO that receives the transaction volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the FBT will be listed for each end of the transaction.
*DA_GFACO_{Seller}	Hourly Day-Ahead Carved-Out GFA Transaction Volume at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The seller is defined as the AO that provides the transaction volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the FBT will be listed for each end of the transaction.

*RT_GFACO_{Buyer} — Hourly Real-Time Carved-Out GFA Transaction Volume at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. Each Day-Ahead Carved-Out GFA Transaction must have a corresponding Real-Time Carved-Out GFA Transaction, but a Real-Time Carve-Out Grandfathered Transaction does not need to have a corresponding Day-Ahead Transaction. The buyer is defined as the AO that receives the transaction volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the transaction will be listed once for each end of the transaction.

*RT_GFACO_{Seller} — Hourly Real-Time Carved-Out GFA Transaction Volume at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. All Day-Ahead Carve-Out GFA Transaction must have a corresponding Real-Time Carve-Out GFA Transaction, but a Real-Time Carved-Out Grandfathered Transaction does not need to have a corresponding Day-Ahead Transaction. The seller is defined as the AO that provides the transaction volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the transaction will be listed once for each end of the transaction.

*$RT\_LMP\_LS_{DP}$ — Hourly Real-Time Loss Component of LMP at Delivery Point Commercial Pricing Node ($/MWh).

*$RT\_LMP\_LS_{SO}$ — Hourly Real-Time Loss Component of LMP at Source Commercial Pricing Node ($/MWh).

*$RT\_LMP\_LS_{SI}$ — Hourly Real-Time Loss Component of LMP at Sink Commercial Pricing Node ($/MWh).

D.4.2 Intermediate Calculations for RT_FIN_LS

RT_FIN_BUY_LS — Hourly Total Real-Time Buyer FBT Loss Charge ($); the amount is the hourly total calculated loss charge for all IBS type Real-Time FBTs where the AO is the buyer of the transaction. The buyer is defined as an AO that receives the transaction volume at the sink Commercial Pricing Node.

$$= \Sigma_{Transactions} [(RT\_FIN_{Buyer}) * (RT\_LMP\_LS_{SI} - RT\_LMP\_LS_{DP})]$$

RT_FIN_SELL_LS

Hourly Total Real-Time Seller FBT Loss Charge ($); the amount is the hourly total calculated loss charge for all IBS type Real-Time FBTs where the AO is the seller of the transaction. The seller is defined as an AO that supplies the transaction volume at the source Commercial Pricing Node.

$= \Sigma_{Transactions} [(RT\_FIN_{Seller}) * (RT\_LMP\_LS_{DP} - RT\_LMP\_LS_{SO})]$

RT_FIN_PSD_BUY_LS

Hourly Total Real-Time Buyer Pseudo FBT Loss Charge ($); the amount is the hourly total calculated loss charge for all pseudo type Real-Time FBTs where the AO is the buyer of the transaction. The buyer is defined as an AO that receives the transaction volume at the sink Commercial Pricing Node.

$= \Sigma_{Transactions} [(RT\_FIN_{Pseudo\_Buyer}) * (RT\_LMP\_LS_{SI} - RT\_LMP\_LS_{DP})]$

RT_FIN_PSD_SELL_LS

Hourly Total Real-Time Seller Pseudo FBT Loss Charge ($); the amount is the hourly total calculated loss charge for all pseudo type Real-Time FBTs where the AO is the seller of the transaction. The seller is defined as an AO that supplies the transaction volume at the source Commercial Pricing Node.

$= \Sigma_{Transactions} [(RT\_FIN_{Pseudo\_Seller}) * (RT\_LMP\_LS_{DP} - RT\_LMP\_LS_{SO})]$

RT_GFACO_BUY_LS

Hourly Total Real-Time Buyer Carved-Out GFA Transaction Losses Charge ($); the amount is the hourly total calculated losses charge for all Carved-Out GFA Transactions where the AO is the buyer of the transaction. The buyer is defined as an AO that receives the transaction volume at the sink Commercial Pricing Node.

$= \Sigma_{Transactions} [(RT\_GFACO_{Buyer} - DA\_GFACO_{Buyer}) * (RT\_LMP\_LS_{SI} - RT\_LMP\_LS_{DP})]$

RT_GFACO_SELL_LS

Hourly Total Real-Time Seller Carved-Out GFA Transaction Losses Charge ($); the amount is the hourly total calculated losses charge for all Carved-Out GFA Transactions where the AO is the seller of the transaction. The seller is defined as an AO that supplies the transaction volume at the source Commercial Pricing Node.

$= \Sigma_{Transactions} [(RT\_GFACO_{Seller} - DA\_GFACO_{Seller}) * (RT\_LMP\_LS_{DP} - RT\_LMP\_LS_{SO})]$

D.4.3 Charge Type Calculation for RT_FIN_LS

*^RT_FIN_LS_HR

Hourly Real-Time FBT Loss Hourly Amount ($); this calculation is performed for AOs that have Real-Time FBTs and/or Carved-Out GFA Transactions. The result represents the AO's total hourly loss charge or credit for all their Real-Time FBTs and Carved-Out GFA Transactions. The result is rounded to the nearest cent. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement.

= RT_FIN_BUY_LS + RT_FIN_SELL_LS + RT_FIN_PSD_BUY_LS + RT_FIN_PSD_SELL_LS + RT_GFACO_BUY_LS + RT_GFACO_SELL_LS

*RT_FIN_LS

Real-Time FBT Loss Amount ($); is a daily total amount due MISO from an AO from all the Real-Time FBTs and Carved-Out GFA Transactions. The formula result is displayed in dollars.

= Σ_H (RT_FIN_LS_HR)

D.5 Real-Time Congestion Rebate on Carve-Out Grandfathered Agreements (RT_GFACO_RBT_CG)

The Real-Time Congestion Rebate on Carved-Out GFAs Amount represents an AO's total Operating Day rebate of all congestion charges and credits paid in the Real-Time FBT Congestion Amount Charge Type to Carved-Out GFAs Transactions. The rebate amount is calculated hourly by AO for every valid Carved-Out GFA Transaction where it is buying and/or selling and then is summed to a daily total. Since the original congestion amount can be a charge or credit, likewise the rebate can be a charge or credit depending upon the Commercial Pricing Nodes that are being settled.

For additional information on Carve-Out GFAs Transactions, please refer to the Market Settlements BPM.

The Real-Time Congestion Rebate on Carved-Out GFAs Amount, including determinants, is displayed on the Real-Time Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a determinant that is displayed on an AO's Real-Time statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.5.1 Calculation Inputs for RT_GFACO_RBT_CG

*DA_GFACO_{Buyer}	Hourly Day-Ahead Carved-Out GFA Transaction Volume where the AO is the buyer (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The buyer is defined as the AO that receives the transaction volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value.

*DA_GFACO_{Seller}	Hourly Day-Ahead Carved-Out GFA Transaction Volume where the AO is the seller (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The seller is defined as the AO that provides the transaction volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value.
*RT_GFACO_{Buyer}	Hourly Real-Time Carved-Out GFA Transaction Volume where the AO is the buyer at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. All Day-Ahead Carved-Out GFA Transaction must have a corresponding Real-Time Carved-Out GFA Transaction, but a Real-Time Carved-Out Grandfathered Transaction does not need to have a corresponding Day-Ahead Transaction. The buyer is defined as the AO that receives the transaction volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the transaction will be listed once for each end of the transaction.
*RT_GFACO_{Seller}	Hourly Real-Time Carved-Out GFA Transaction Volume where the AO is the seller at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. Each Day-Ahead Carve-Out GFA Transaction must have a corresponding Real-Time Carved-Out GFA Transaction, but a Real-Time Carved-Out Grandfathered Transaction does not need to have a corresponding Day-Ahead Transaction. The seller is defined as the AO that provides the transaction volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the transaction will be listed once for each end of the transaction.
*$RT\_LMP\_CG_{SO}$	Hourly Real-Time Congestion Component of the LMP at the source Commercial Pricing Node ($/MWh).
*$RT\_LMP\_CG_{SI}$	Hourly Real-Time Congestion Component of the LMP at the sink Commercial Pricing Node ($/MWh).
*$RT\_LMP\_CG_{DP}$	Hourly Real-Time Congestion Component of the LMP at the Delivery Point Commercial Pricing Node ($/MWh).

D.5.2 Intermediate Calculations for RT_GFACO_RBT_CG

RT_GFACO_BUY_CG

Hourly Total Real-Time Carved-Out GFA Buyer Transaction Congestion Charges ($); the amount is the hourly total calculated congestion charges for all Carved-Out GFA Transactions where the AO is the buyer of the transaction. The buyer is defined as an AO that receives the transaction volume at the sink Commercial Pricing Node.

$= \Sigma_{Transactions} [(RT\_GFACO_{Buyer} - DA\_GFACO_{Buyer}) * (RT\_LMP\_CG_{SI} - RT\_LMP\_CG_{DP})]$

RT_GFACO_SELL_CG

Hourly Total Real-Time Carved-Out GFA Seller Transaction Congestion Charges ($); the amount is the hourly total calculated congestion charges for all Carved-Out GFA Transactions where the AO is the seller of the transaction. The seller is defined as an AO that supplies the transaction volume at the source Commercial Pricing Node.

$= \Sigma_{Transactions} [(RT\_GFACO_{Seller} - DA\_GFACO_{Seller}) * (RT\_LMP\_CG_{DP} - RT\_LMP\_CG_{SO})]$

D.5.3 Charge Type Calculation for RT_GFACO_RBT_CG

*^RT_GFACO_RBT_CG_HR

Hourly Real-Time Congestion Rebate on Carved-Out GFA Transaction Amounts ($); this calculation is performed for Commercial Pricing Nodes where the AO has Real-Time Carved-Out GFA Transactions. The result represents the AO's total hourly congestion rebate of charges and credits that were assessed in the Real-Time FBT Congestion Amount charge type related to Real-Time Carved-Out GFA Transactions. The result is rounded to the nearest cent. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement.

$= (RT\_GFACO\_BUY\_CG + RT\_GFACO\_SELL\_CG) * (-1)$

*RT_GFACO_RBT_CG

Real-Time Congestion Rebate on Carved-Out GFA Transaction Amount ($); a daily total amount due MISO from an AO from all rebates of congestion on Real-Time Carved-Out GFA Transactions. The formula result is displayed in dollars.

$= \Sigma_{H} (RT\_GFACO\_RBT\_CG\_HR)$

D.6 Real-Time Losses Rebate on Carved-Out Grandfathered Agreements (RT_GFACO_RBT_LS)

The Real-Time Losses Rebate on Carved-Out GFAs Amount represents an AO's total Operating Day rebate of all loss charges and credits paid in the Real-Time FBT Loss Amount charge type related to Carve-Out GFAs Transactions. The rebate amount is calculated hourly by AO for every valid Carved-Out GFA Transaction where it is buying and/or selling and then is summed to a daily total. Since the original losses amount can be a charge or credit, likewise the rebate can be a charge or credit depending upon the Commercial Pricing Nodes that are being settled.

For additional information on Carved-Out GFA l Transactions, please refer to the Market Settlements BPM.

The Real-Time Losses Rebate on Carved-Out GFAs Amount, including determinants, is displayed on the Real-Time Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a determinant that is displayed on an AO's Real-Time statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.6.1 Calculation Inputs for RT_GFACO_RBT_LS

*DA_GFACO_{Buyer}	Hourly Day-Ahead Carved-Out GFA Transaction Volume where the AO is the buyer (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The buyer is defined as the AO that receives the transaction volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value.

$*DA\_GFACO_{Seller}$ Hourly Day-Ahead Carved-Out GFA Transaction Volume where the AO is the seller (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The seller is defined as the AO that provides the transaction volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value.

$*RT\_GFACO_{Buyer}$ Hourly Real-Time Carved-Out GFA Transaction Volume where the AO is the buyer at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. All Day-Ahead Carved-Out GFA Transaction must have a corresponding Real-Time Carve-Out GFA Transaction, but a Real-Time Carved-Out Grandfathered Transaction does not need to have a corresponding Day-Ahead Transaction. The buyer is defined as the AO that receives the transaction volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the transaction will be listed once for each end of the transaction.

$*RT\_GFACO_{Seller}$ Hourly Real-Time Carved-Out GFA Transaction Volume where the AO is the seller at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carve-Out Transaction. All Day-Ahead Carved-Out GFA Transaction must have a corresponding Real-Time Carved-Out GFA Transaction, but a Real-Time Carved-Out Grandfathered Transaction does not need to have a corresponding Day-Ahead Transaction. The seller is defined as the AO that provides the transaction volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the transaction will be listed once for each end of the transaction.

$*RT\_LMP\_LS_{SO}$ Hourly Real-Time Loss Component of the LMP at the source Commercial Pricing Node ($/MWh).

$*RT\_LMP\_LS_{SI}$ Hourly Real-Time Loss Component of the LMP at the sink Commercial Pricing Node ($/MWh).

$*RT\_LMP\_LS_{DP}$ Hourly Real-Time Loss Component of the LMP at the Delivery Point Commercial Pricing Node ($/MWh).

D.6.2 Intermediate Calculations for RT_GFACO_RBT_LS

RT_GFACO_BUY_LS — Hourly Total Real-Time Carved-Out GFA Buyer Transaction Losses Charges ($); the amount is the hourly total calculated Loss charges for all Carved-Out GFA Transactions where the AO is the buyer of the transaction. The buyer is defined as an AO that receives the transaction volume at the sink Commercial Pricing Node.

$= \Sigma_{Transactions} [(RT\_GFACO_{Buyer} - DA\_GFACO_{Buyer}) * (RT\_LMP\_LS_{SI} - RT\_LMP\_LS_{DP})]$

RT_GFACO_SELL_LS — Hourly Total Real-Time Carved-Out GFA Seller Transaction Losses Charges ($); the amount is the hourly total calculated loss charges for all Carved-Out GFA Transactions where the AO is the seller of the transaction. The seller is defined as an AO that supplies the transaction volume at the source Commercial Pricing Node.

$= \Sigma_{Transactions} [(RT\_GFACO_{Seller} - DA\_GFACO_{Seller}) * (RT\_LMP\_LS_{DP} - RT\_LMP\_LS_{SO})]$

D.6.3 Charge Type Calculation for RT_GFACO_RBT_LS

*^RT_GFACO_RBT_LS_HR — Hourly Real-Time Losses Rebate on Carved-Out GFA Transaction Amounts ($); this calculation is performed for Commercial Pricing Nodes where the AO has Real-Time Carved-Out GFA Transactions. The result represents the AO's total hourly losses rebate of charges and credits that were assessed in the Real-Time Asset Energy Amount and Real-Time Non-Asset Energy Amount charge type related to Real-Time Carved-Out GFA Transactions. The result is rounded to the nearest cent. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement.

$= (RT\_GFACO\_BUY\_LS + RT\_GFACO\_SELL\_LS) * (-1)$

*RT_GFACO_RBT_LS — Real-Time Losses Rebate on Carved-Out GFA Transaction Amount ($); is a daily total amount due MISO from an AO from all rebates of Losses on Real-Time Carved-Out GFA Transactions. The formula result is displayed in dollars.

$= \Sigma_{H} (RT\_GFACO\_RBT\_LS\_HR)$

D.7 Real-Time Market Administration Amount (RT_ADMIN)

The Real-Time Market Administration Amount in conjunction with the Day-Ahead Market Administration Amount, collectively referred to as Schedule 17, is designed to recover the cost of operating the Day-Ahead and Real-Time Energy and Operating Reserve Markets. The Day-Ahead and Real-Time Market Administration Amounts are charged separately.

For each AO for an Operating Day, Market Settlements assesses an administration charge on the AO's participation in the Real-Time Energy and Operating Reserve Market. The AO's Real-Time Energy and Operating Reserve Market participation volume is calculated at each Commercial Pricing Node for each Hour and summed for the entire Operating Day. The resulting daily market participation volume is multiplied by the hourly Energy and Operating Reserve Markets Administration Rate. An AO's Real-Time hourly participation volume at a Commercial Pricing Node is based on the total directional energy volume, into and out of the Commercial Pricing Node, by the AO.

The use of FBTs and Carved-Out GFA Transactions do not increase an AO's administration charge at a Commercial Pricing Node provided:

1) The AO has net Real-Time generation and sells Real-Time FBTs and/or net Real-Time Carved-Out GFA Transactions. (Asset schedules in excess of the sold FBT and Carved-Out GFA Transaction volume increase an AO's market participation volume and are subject to Day-Ahead market administration charge).
2) The AO buys Real-Time FBTs and/or net Real-Time Carved-Out GFA Transactions and then consumes the electricity as Load. (The Load consumed in excess of the bought transaction volume increases an AO's market participation volume and is subject to Day-Ahead market administration charge).
3) The AO sells net PBTs and sells Real-Time (non-Pseudo) FBTs. (The PBTs sold in excess of the sold Real-Time FBT volume increase an AO's market participation volume and is subject to Real-Time market administration charge).

4) The AO buys Real-Time FBTs and then buys net PBTs. (The PBTs bought in excess of the purchased FBT volume increase an AO's market participation volume and is subject to Real-Time market administration charge).

Pseudo Real-Time FBTs are unique transactions specifically used with generation and Load within MISO that are pseudo-tied to an external Balancing Authority's Interface Commercial Pricing Node. Pseudo-tied generation and Load energy are not settled in MISO, but the volume is subject to congestion and loss charges between the sink and the source along with administration charges. Since the energy volume at the source and sink is not settled, the buyer and seller of the pseudo Real-Time FBT cannot have corresponding PBTs or asset imbalances exempt from administration charges.

Combined Cycle and Cross Compound registered generation assets consist of more than one generation assets at a single location. Although each generation asset has a separately defined Commercial Pricing Node, an aggregate Commercial Pricing Node is also created that represents all the Combined Cycle or Cross Compound generation assets. AOs can submit Generation Offers by hour at the individual Generator or at the aggregate level. For settlements, all individual Combined Cycle and Cross Compound generation asset information is summed to the aggregate node representing the entire asset. Whether an AO has submitted individual or aggregate Offers, all asset related settlements are performed at the aggregate level. The directional volume methodology related to a Combined Cycle and Cross Compound registered generation asset is performed at the aggregate Commercial Pricing Node. All generation and non-pseudo Real-Time FBT volumes at any individual generation asset are rolled up to the aggregate node. This allows individual offered and cleared Generators to supply non-pseudo Real-Time FBTs at the aggregate Commercial Pricing Node without being assessed additional administration charges.

In accordance with the Tariff, all assets meeting the administrative charge exemption are not subject to the Day-Ahead Market Administrative Amount charge type. All transactions and schedules originating at, or terminating at, the asset Commercial Pricing Node are subject to this charge type.

Market Settlements uses the administration rate in effect at the time of the Operating Day to calculate the Market Administration Amount.

The Real-Time Market Administration Amount, including billing determinants, is displayed on the Real-Time Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a billing determinant that is displayed on an AO's Real-Time statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.7.1 Calculation Inputs for RT_ADMIN

DA_DRRII_SCHD_VOL — Hourly Day-Ahead DRR II Schedule Volume (MWh); the calculated volume representing injection for a DRR Type-II in the Day-Ahead Market. This injection volume for the DRR Type-II is calculated as minus one times the difference between the Day-Ahead dispatch maximum and the Day-Ahead Schedule withdrawal bid volume for the DRR Type-II. Please refer to the previously defined calculation definition of this component.

DA_GFACO_{Buyer} — Hourly Day-Ahead Carved-Out GFA Transaction Volume where the AO is the buyer (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The buyer is defined as the AO that receives the transaction volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value.

DA_GFACO_{Seller} — Hourly Day-Ahead Carved-Out GFA Transaction Volume where the AO is the seller (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The seller is defined as the AO that provides the transaction volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value.

DA_PHYS_{Buyer} — Hourly Day-Ahead PBT Volume (MWh); at a Commercial Pricing Node where the AO is the Buyer (i.e., the AO is buying energy from MISO)

DA_PHYS_{Seller}	Hourly Day-Ahead PBT Volume (MWh); at a Commercial Pricing Node where the AO is the Seller (i.e., the AO is selling energy to MISO)
*DA_SCHD	Hourly Day-Ahead Asset Energy Volume per schedule (MWh); the Day-Ahead Asset Energy volume is the market cleared bid and offered generation or Load schedule by asset. A positive schedule represents a Load obligation and a negative schedule represents a supply obligation.
*DRR_ADJ_MTR	Demand Response Resource MW Reduction Volume (MWh); These values are derived from submitted Meter Data provided by the Asset Owner of a Demand Response Resource.
*ENERGY_MKT_RATE	Hourly Energy Markets Administration Rate ($/MWh)
*SCHEDULE_17_ASSET	Administrative Charge Daily Exemption Flag for an Asset ("Exempt" or not shown); whenever an asset is exempt from the administrative Schedule 17 charges, this flag will display as an attribute of the asset on the Day-Ahead and Real-Time statements and is equal to "EXEMPT". When an asset is not exempted, this tag will not be shown and it is to be assumed that the asset is subject to Day-Ahead and Real-Time Administrative Amount charge types.
RT_DRRII_INJ_VOL	Hourly Real-Time DRR II Injection Volume (MWh); the energy injection volume for a DRR Type-II, calculated as minus one times the difference between the dispatch maximum and the billable meter load at the DRR Type-II bus. Please refer to the previously defined calculation definition of this component.
$*RT\_FIN_{Buyer}$	Hourly Real-Time (non-pseudo) FBT Volume at a Commercial Pricing Node where the AO is the Transaction Buyer (MWh); the Buyer is defined as the AO that receives the FBT volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value.

$*RT\_FIN_{Seller}$ — Hourly Real-Time (non-pseudo) FBT Volume at a Commercial Pricing Node where the AO is the Transaction Seller (MWh); the Seller is defined as the AO that supplies the FBT volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value.

$*RT\_FIN_{Pseudo\text{-}Buyer}$ — Hourly Real-Time (pseudo) FBT Volume at a Commercial Pricing Node where the AO is the Transaction Buyer (MWh); the Buyer is defined as the AO that receives the FBT volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value.

$*RT\_FIN_{Pseudo\text{-}Seller}$ — Hourly Real-Time (pseudo) FBT Volume at a Commercial Pricing Node where the AO is the Transaction Seller (MWh); the Seller is defined as the AO that supplies the FBT volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value.

$*RT\_GFACO_{Buyer}$ — Hourly Real-Time Carved-Out GFA Transaction Volume where the AO is the buyer at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. Each Day-Ahead Carved-Out GFA Transaction must have a corresponding Real-Time Carved-Out GFA Transaction, but a Real-Time Carved-Out Grandfathered Transaction does not need to have a corresponding Day-Ahead Transaction. The buyer is defined as the AO that receives the transaction volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the transaction will be listed once for each end of the transaction.

$*RT\_GFACO_{Seller}$ — Hourly Real-Time Carved-Out GFA Transaction Volume where the AO is the seller at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. Each Day-Ahead Carve-Out GFA Transaction must have a corresponding Real-Time Carved-Out GFA Transaction, but a Real-Time Carved-Out Grandfathered Transaction does not need to have a corresponding Day-Ahead Transaction. The seller is defined as the AO that provides the transaction volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the transaction will be listed once for each end of the transaction.

*RT_PHYS_Buyer — Hourly Real-Time PBT Volume (MWh); at a Commercial Pricing Node where the AO is the Buyer (i.e., the AO is buying energy from MISO)

*RT_PHYS_Seller — Hourly Real-Time PBT Volume (MWh); at a Commercial Pricing Node where the AO is the Seller (i.e., the AO is selling energy to MISO)

D.7.2 Intermediate Calculations for RT_ADMIN

ABS — The mathematical absolute of the value within the succeeding set of parentheses.

IF — The "IF" logical statement is a conditional test and returns one value if a condition you specify evaluates to TRUE and another value if it evaluates to FALSE. { An example of the IF (logical_test, THEN value_if_true, ELSE value_if_false) }

MAX — The mathematical maximum of the series of numbers in the succeeding parentheses.

MIN — The mathematical minimum of the series of numbers in the succeeding parentheses.

*RT_BLL_MTR — Hourly Real-Time Metered Billable Volume (MWh); please refer to the previously defined calculation definition of this component.

RT_ASSET_IMB — Hourly Real-Time Asset Imbalance (MWh); the difference between an asset's Real-Time volume and its Day-Ahead volume.
RT_BLL_MTR - DA_SCHD + DRR_ADJ_MTR + RT_DRRII_INJ_VOL - DA_DRRII_SCHD_VOL

NET_RT_PHYS_BUY — Hourly Administration Volume resulting from PBT Buying (MWh); Real-Time volume greater than Day-Ahead and Selling Real-Time volume less than Day-Ahead at a Commercial Pricing Node.

$$= MAX\{ 0, [\Sigma RT\_PHYS_{Buyer} - \Sigma DA\_PHYS_{Buyer}] \} + MAX\{ 0, [\Sigma DA\_PHYS_{Seller} - \Sigma RT\_PHYS_{Seller}] \}$$

NET_RT_PHYS_SELL — Hourly Administration Volume resulting from PBT Selling (MWh); Real-Time volume greater than Day-Ahead and Buying Real-Time volume less than Day-Ahead at a Commercial Pricing Node.

$$= MAX\{ 0, [\Sigma RT\_PHYS_{Seller} - \Sigma DA\_PHYS_{Seller}] \} + MAX\{ 0, [\Sigma DA\_PHYS_{Buyer} - \Sigma RT\_PHYS_{Buyer}] \}$$

NET_RT_GFACO_BUY

Hourly Administration Volume resulting from Net Buying Real-Time GFA Transactions (MWh); Real-Time volume greater than Day-Ahead and Selling Real-Time volume less than Day-Ahead at a Commercial Pricing Node.

= MAX { 0, [Σ RT_GFACO$_{Buyer}$) - Σ DA_GFACO$_{Buyer}$)] } + MAX { 0 , [Σ DA_GFACO$_{Seller}$) - Σ RT_GFACO$_{Seller}$)] }

NET_RT_GFACO_SELL

Hourly Administration Volume resulting from Net Selling Real-Time Carved-Out GFA Transactions (MWh); Real-Time volume greater than Day-Ahead and Buying Real-Time volume less than Day-Ahead at a Commercial Pricing Node.

= MAX { 0 , [Σ RT_GFACO$_{Seller}$) - Σ DA_GFACO$_{Seller}$)] } + MAX { 0 , (Σ DA_GFACO$_{Buyer}$) - Σ RT_GFACO$_{Buyer}$)] }

RT_NET_BUY_ADMIN

Hourly Directional Buying Administration Volume (MWh); for an AO at a Non-Interface Commercial Pricing Node; This equation represents the directional methodology for energy flowing into a non-pseudo Real-Time FBT and net Real-Time GFA Transactions at a Non-interface Commercial Pricing Node for an AO.

= IF [SCHEDULE_17_ASSET = "EXEMPT" for the AO's asset ,
THEN 0 ,
ELSE (MAX { MAX (0 , RT_ASSET_IMB) ,
[Σ (RT_FIN$_{Buyer}$) + NET_RT_GFACO_BUY] })]

RT_NET_BUY_ADMIN_INT

Hourly Directional Buying Administration Volume for an AO at an Interface Commercial Pricing Node or EAR Commercial Pricing Node(MWh); this equation represents the directional methodology for energy flowing into a non-pseudo Real-Time FBT at an Interface Commercial Pricing Node.

= MAX [Σ (RT_FIN$_{Buyer}$) , NET_RT_PHYS_BUY] + NET_RT_GFACO_BUY

RT_NET_SELL_ADMIN

Hourly Directional Selling Administration Volume (MWh); for an AO at a Non-interface Commercial Pricing Node. This equation represents the directional methodology for energy flowing from a non-pseudo Real-Time FBT and Net Real-Time GFA Transactions at a Non-Interface Commercial Pricing Node.

= IF [SCHEDULE_17_ASSET = "EXEMPT" for the AO's asset ,

THEN 0 ,
ELSE (MAX { ABS [MIN (0 , RT_ASSET_IMB)] ,
[Σ (RT_FIN_{Seller}) + NET_RT_GFACO_SELL] })]

RT_NET_SELL_ADMIN_INT

Hourly Directional Selling Administration Volume for an AO at an Interface Commercial Pricing Node (MWh); this equation represents the directional methodology for energy flowing from a non-pseudo Real-Time FBT at an Interface Commercial Pricing Node.
= MAX [Σ (RT_FIN_{Seller}) , NET_RT_PHYS_SELL] + NET_RT_GFACO_SELL

RT_PSEUDO_VOL

Hourly Pseudo Real-Time FBT Volume (MWh); for an AO at a Commercial Pricing Node.
= Σ ($RT\_FIN_{Pseudo\text{-}Buyer}$) + Σ ($RT\_FIN_{Pseudo\text{-}Seller}$)

*RT_ADMIN_VOL

Real-Time Administration Volume (MWh); for an AO at a Commercial Pricing Node.
= RT_NET_SELL_ADMIN + RT_NET_SELL_ADMIN _INT + RT_NET_BUY_ADMIN + RT_NET_BUY_ADMIN _INT + RT_PSEUDO_VOL

D.7.3 Charge Type Calculation for RT_ADMIN

*^RT_ADMIN_HR

Hourly Real-Time Market Administration Amount ($); for an AO. The formula result is per Hour and is rounded to the nearest cent. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement.
= RT_ADMIN_VOL * ENERGY_MKT_RATE

*RT_ADMIN

Real-Time Market Administration Amount (MWh); per AO. The formula result is displayed in dollars.
= Σ_H (RT_ADMIN_HR)

D.8 RT Schedule 24 Allocation Amount (RT_SCHD_24_ALC)

MISO's Tariff includes Schedule 24 – a cost mechanism by which LBAs recover the cost of labor and material associated with market operations.

The Real-Time Schedule 24 Allocation amount constitutes the collected monies, on the Real-Time Energy and Operating Reserve Market, used to fund Schedule 24 distributions back to the LBAs. This charge type is calculated by multiplying the Real-Time Schedule 24 Administrative volume (in MWh) by the Schedule 24 Allocation Rate (in $/MWh) to obtain an hourly dollar amount. The aggregation of Day-Ahead and Real-Time Schedule 24 Allocation amounts is equal to the full daily distribution of Schedule 24 funds back to the LBAs. For more information on and calculation details of the Day-Ahead Schedule 24 Allocation Amount Charge Type please see Section B.5 of this document.

For each AO for an Operating Day, Market Settlements assesses an administration charge on the AO's participation in the Real-Time Energy and Operating Reserve Market. The AO's Real-Time Energy and Operating Reserve Market participation volume is calculated at each Commercial Pricing Node for each hour. An AO's Real-Time hourly participation volume at a Commercial Pricing Node is based on the total directional energy volume into and out of the Commercial Pricing Node. Transaction volumes associated with Carved-Out Grandfathered Agreements are excluded from this calculation. The resulting hourly market participation volume is multiplied by the hourly Schedule 24 Allocation Rate and then summed to a daily total.

In accordance with the Tariff, all assets meeting the Real-Time Market Administration Amount (Schedule 17) charge exemption are not subject to the Real-Time Schedule 24 Allocation Amount charge type. All transactions and schedules originating at, or terminating at, the exempt asset Commercial Pricing Node are not subject to this charge type.

Market Settlements uses the Schedule 24 Allocation Rate in effect for the Operating Day to calculate the Real-Time Schedule 24 Allocation Amount. The Real-Time

Schedule 24 Allocation Amount, including determinants, is displayed on the Real-Time Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a determinant that is displayed on an AO's Real-Time statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.8.1 Calculation Inputs for RT_SCHD_24_ALC

* SCHD_24_ALC_RATE	Hourly Schedule 24 Allocation Rate ($/MWh).
DA_DRRII_SCHD_VOL	Hourly Day-Ahead DRR II Schedule Volume (MWh); the calculated volume representing injection for a DRR Type-II in the Day-Ahead Market. This injection volume for the DRR Type-II is calculated as minus one times the difference between the Day-Ahead dispatch maximum and the Day-Ahead Schedule withdrawal bid volume for the DRR Type-II. Please refer to the previously defined calculation definition of this component.
*DA_GFACO_{Buyer}	Hourly Day-Ahead Carved-Out GFA Transaction Volume where the AO is the buyer and owns an Asset at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The buyer is defined as the AO that receives the transaction volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the FBT will be listed for each end of the transaction.
*DA_GFACO_{Seller}	Hourly Day-Ahead Carved-Out GFA Transaction Volume where the AO is the seller and owns an Asset at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The seller is defined as the AO that provides the transaction volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the FBT will be listed for each end of the transaction.

*DA_PHYS_{Buyer}	Hourly Day-Ahead PBT Volume (MWh); at a Commercial Pricing Node where the AO is the Buyer (i.e., the AO is buying energy from MISO)
*DA_PHYS_{Seller}	Hourly Day-Ahead PBT Volume (MWh); at a Commercial Pricing Node where the AO is the Seller (i.e., the AO is selling energy to MISO)
*DA_SCHD	Hourly Day-Ahead Asset Energy Volume per schedule (MWh); the Day-Ahead Asset Energy volume is the market cleared bid and offered generation or Load schedule by asset. A positive schedule represents a Load obligation and a negative schedule represents a supply obligation.
*DRR_ADJ_MTR	Demand Response Resource MW Reduction Volume (MWh); These values are derived from submitted Meter Data provided by the Asset Owner of a Demand Response Resource.
*SCHEDULE_17_ASSET	Administrative Charge Daily Exemption Flag for an Asset ("Exempt" or not shown); whenever an asset is exempt from the administrative (Schedule 17 and 24) charges, this flag will display as an attribute of the asset on the Day-Ahead and Real-Time statements and is equal to "EXEMPT". When an asset is not exempted, this tag will not be shown and it is to be assumed that the asset is subject to Day-Ahead and Real-Time administrative charges.
*RT_BLL_MTR	Hourly Real-Time Metered Billable Volume (MWh); please refer to the previously defined calculation definition of this component.
RT_DRRII_INJ_VOL	Hourly Real-Time DRR II Injection Volume (MWh); the energy injection volume for a DRR Type-II, calculated as minus one times the difference between the dispatch maximum and the billable meter load at the DRR Type-II bus~~. ~~. Please refer to the previously defined calculation definition of this component.
*RT_FIN_{Buyer}	Hourly Real-Time (non-pseudo) FBT Volume at a Commercial Pricing Node where the AO is the Transaction Buyer (MWh); the Buyer is defined as the AO that receives the FBT volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value.

*RT_FIN_{Seller} — Hourly Real-Time (non-pseudo) FBT Volume at a Commercial Pricing Node where the AO is the Transaction Seller (MWh); the Seller is defined as the AO that supplies the FBT volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value.

*$RT\_FIN_{Pseudo\text{-}Buyer}$ — Hourly Real-Time (pseudo) FBT Volume at a Commercial Pricing Node where the AO is the Transaction Buyer (MWh); the Buyer is defined as the AO that receives the FBT volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value.

*$RT\_FIN_{Pseudo\text{-}Seller}$ — Hourly Real-Time (pseudo) FBT Volume at a Commercial Pricing Node where the AO is the Transaction Seller (MWh); the Seller is defined as the AO that supplies the FBT volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value.

*RT_GFACO_{Buyer} — Hourly Real-Time Carved-Out GFA Transaction Volume where the AO is the buyer at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. Each Day-Ahead Carved-Out GFA Transaction must have a corresponding Real-Time Carved-Out GFA Transaction, but a Real-Time Carved-Out Grandfathered Transaction does not need to have a corresponding Day-Ahead Transaction. The buyer is defined as the AO that receives the transaction volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the transaction will be listed once for each end of the transaction.

*RT_GFACO_{Seller} — Hourly Real-Time Carved-Out GFA Transaction Volume where the AO is the seller at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. Each Day-Ahead Carve-Out GFA Transaction must have a corresponding Real-Time Carved-Out GFA Transaction, but a Real-Time Carved-Out Grandfathered Transaction does not need to have a corresponding Day-Ahead Transaction. The seller is defined as the AO that provides the transaction volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the transaction will be listed once for each end of the transaction.

*RT_PHYS_{Buyer} Hourly Real-Time PBT Volume (MWh); at a Commercial Pricing Node where the AO is the Buyer (i.e., the AO is buying energy from MISO)

*RT_PHYS_{Seller} Hourly Real-Time PBT Volume (MWh); at a Commercial Pricing Node where the AO is the Seller (i.e., the AO is selling energy to MISO)

D.8.2 Intermediate Calculations for RT_SCHD_24_ALC

ABS The mathematical absolute of the value within the succeeding set of parentheses.

IF The "IF" logical statement is a conditional test and returns one value if a condition you specify evaluates to TRUE and another value if it evaluates to FALSE. { An example of the IF (logical_test, THEN value_if_true, ELSE value_if_false) }

MAX The mathematical maximum of the series of numbers in the succeeding parentheses.

MIN The mathematical minimum of the series of numbers in the succeeding parentheses.

RT_ASSET_IMB Hourly Real-Time Asset Imbalance (MWh); the difference between an asset's Real-Time volume and its Day-Ahead volume.
RT_BLL_MTR - DA_SCHD + DRR_ADJ_MTR + RT_DRRII_INJ_VOL - DA_DRRII_SCHD_VOL

NET_RT_PHYS_BUY Hourly Administration Volume resulting from PBT Buying (MWh); Real-Time volume greater than Day-Ahead and Selling Real-Time volume less than Day-Ahead at a Commercial Pricing Node.

$$= MAX \{ 0, [\Sigma RT\_PHYS_{Buyer} - \Sigma DA\_PHYS_{Buyer}] \} + MAX \{ 0 , [\Sigma DA\_PHYS_{Seller} - \Sigma RT\_PHYS_{Seller}] \}$$

NET_RT_PHYS_SELL Hourly Administration Volume resulting from PBT Selling (MWh); Real-Time volume greater than Day-Ahead and Buying Real-Time volume less than Day-Ahead at a Commercial Pricing Node.

$$= MAX \{ 0 , [\Sigma RT\_PHYS_{Seller} - \Sigma DA\_PHYS_{Seller}] \} + MAX \{ 0 , [\Sigma DA\_PHYS_{Buyer} - \Sigma RT\_PHYS_{Buyer}] \}$$

NET_RT_GFACO_BUY

Hourly Administration Volume resulting from Net Buying Real-Time GFA Transactions (MWh); Real-Time volume greater than Day-Ahead and Selling Real-Time volume less than Day-Ahead at a Commercial Pricing Node.

$= \text{MAX}\{ \ 0, [\ \Sigma \text{RT\_GFACO}_{Buyer}) \ - \ \Sigma \text{DA\_GFACO}_{Buyer}) \ ] \ \} \ +$

$\text{MAX}\{ \ 0 , \ [\ \Sigma \text{DA\_GFACO}_{Seller} \ ) \ - \ \Sigma \text{RT\_GFACO}_{Seller} \ ) \ ] \ \}$

NET_RT_GFACO_SELL

Hourly Administration Volume resulting from Net Selling Real-Time Carved-Out GFA Transactions (MWh); Real-Time volume greater than Day-Ahead and Buying Real-Time volume less than Day-Ahead at a Commercial Pricing Node.

$= \text{MAX}\{ \ 0 , \ [\ \Sigma \text{RT\_GFACO}_{Seller} \ ) \ - \ \Sigma \text{DA\_GFACO}_{Seller} \ ) \ ] \ \} \ +$

$\text{MAX}\{ \ 0 , \ (\ \Sigma \text{DA\_GFACO}_{Buyer} \ ) \ - \ \Sigma \text{RT\_GFACO}_{Buyer} \ ) \ ] \ \}$

RT_NET_BUY_S24_ADMIN

Hourly Schedule 24 Administration Volume for an AO at a Non-Interface Commercial Pricing Node (MWh); this equation represents the volume from buying imbalance enery or non-pseudo Real-Time FBTs at a Non-interface Commercial Pricing Node for an AO.

= IF [SCHEDULE_17_ASSET = "EXEMPT" for the AO's asset,
THEN 0 ,
ELSE (MAX { MAX (0 , RT_ASSET_IMB – NET_RT_GFACO_BUY),
Σ (RT_FIN_{Buyer}) })]

RT_NET_BUY_S24_ADMIN_INT

Hourly Schedule 24 Administration Volume for an AO at an Interface Commercial Pricing Node or EAR Commercial Pricing Node (MWh); this equation represents the volume from buying imbalance energy or non-pseudo Real-Time FBTs at an Interface Commercial Pricing Node.

= MAX [Σ (RT_FIN_{Buyer}) , NET_RT_PHYS_BUY]

RT_NET_SELL_S24_ADMIN

Hourly Schedule 24 Administration Volume for an AO at a Non-interface Commercial Pricing Node (MWh); this equation represents the volume from selling imbalance energy or non-pseudo Real-Time FBTs at a Non-Interface Commercial Pricing Node.

= IF [SCHEDULE_17_ASSET = "EXEMPT" for the AO's asset,
THEN 0 ,
ELSE (MAX { ABS [MIN (0 , RT_ASSET_IMB + NET_RT_GFACO_SELL)] ,
Σ (RT_FIN_{Seller}) })]

RT_NET_SELL_S24_ADMIN_INT — Hourly Schedule 24 Administration Volume for an AO at an Interface Commercial Pricing Node (MWh); this equation represents the volume from selling imbalance energy or non-pseudo Real-Time FBTs at an Interface Commercial Pricing Node.
= MAX [Σ (RT_FIN_{Seller}) , NET_RT_PHYS_SELL]

RT_PSEUDO_VOL — Hourly Pseudo Real-Time FBT Volume (MWh); for an AO at a Commercial Pricing Node.
= Σ ($RT\_FIN_{Pseudo\text{-}Buyer}$) + Σ ($RT\_FIN_{Pseudo\text{-}Seller}$)

*RT_S24_ADMIN_VOL — Real-Time Schedule 24 Administration Volume (MWh); for an AO at a Commercial Pricing Node.
= RT_NET_SELL_S24_ADMIN + RT_NET_SELL_S24_ADMIN_INT
+ RT_NET_BUY_S24_ADMIN +
RT_NET_BUY_S24_ADMIN_INT + RT_PSEUDO_VOL

D.8.3 Charge Type Calculation for RT_SCHD_24_ALC

*^RT_SCHD_24_ALC_HR — Hourly Real-Time Schedule 24 Allocation Amount ($); per AO. The result represents the AO's hourly Real-Time Schedule 24 Allocation charge for their Real-Time Energy and Operating Reserve Market Participation and rounded to the nearest cent. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement.
= RT_S24_ADMIN_VOL * SCHD_24_ALC_RATE

^*RT_SCHD_24_ALC — Real-Time Schedule 24 Allocation Amount ($); per AO. The result represents the AO's total Operating Day Real-Time Schedule 24 Allocation charge for their Real-Time Energy and Operating Reserve Market Participation. The formula result is displayed in dollars and is rounded to the nearest cent.
= Σ_H (RT_SCHD_24_ALC_HR)

D.9 RT Schedule 24 Distribution Amount (RT_SCHD_24_DIST)

The Real-Time Distribution amount is the credit to LBAs as a reimbursement for their Operational Expenses due to their functions in the Energy and Operating Reserve Market. Funding for the Schedule 24 Distribution comes from the combination of Day-Ahead and Real-Time Schedule 24 Allocation amounts. Sections B.5 and D.8 describe the Day-Ahead and Real-Time Schedule 24 Allocation Charge Types, respectively. Each LBA is related to an AO account to which the Schedule 24 Distribution amount is assigned as a credit.

Each LBA is assigned a portion of the total Schedule 24 Allocation for the Operating Day proportional to how its expenses compare to the total expense amount for all LBAs.

The Real-Time Schedule 24 Distribution Amount, including determinants, is displayed on the Real-Time Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a determinant that is displayed on an AO's Real-Time statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.9.1 Calculation for RT_SCHD_24_DIST

*MISO_SCHED_24_DIST_MN_OP_CST

MISO Total Schedule 24 Distribution Monthly Operating Cost ($); represents the aggregated monthly operational cost amount reported to MISO by all LBAs. This is the target figure to collect and re-distribute to the LBAs participating in the Schedule 24 cost reimbursement program and it is displayed in the Market-Wide Determinant Section (MKT_DET_TYP) of the Real-Time Settlement Statement.

* LBA_SCHED_24_DIST_MN_OP_CST

Schedule 24 Distribution Monthly Operating Cost amount for LBA ($); represents the integrated monthly operational cost amount reported to MISO for each LBA. The sum of all the LBAs' Schedule 24 Distribution Monthly Operating Costs equals MISO Total Schedule 24 Distribution Monthly Operating Cost. This is the target figure to collect and re-distribute to each LBA participating in the Schedule 24 cost reimbursement program and it is displayed in the Market-Wide Determinant Section (MKT_DET_TYP) of the Real-Time Settlement Statement.

D.9.2 Intermediate Calculations for RT_SCHD_24_DIST

RT_SCHD_24_DIST_FCT

Real-Time Schedule 24 Distribution factor (factor); for an AO, represents the pro rata payout of the hourly sum of the Day-Ahead and Real-Time Schedule 24 Allocations that are to be credited to the LBA represented by the AO.

= LBA_SCHED_24_DIST_MN_OP_CST / MISO_SCHED_24_DIST_MN_OP_CST

*MISO_RT_SCHD_24_DIST

MISO Real-Time Schedule 24 Distribution Amount ($); the formula result is per Hour and represents the hourly sum of the Day-Ahead and Real-Time Schedule 24 Allocations (collections) based on Day-Ahead and Real-Time Energy and Operating Reserve Markets functions and the hourly total of funds available for distribution to the LBAs eligible for Schedule 24 cost recovery. A negative amount represents a credit to the LBAs.

= DA_SCHD_24_ALC_HR + RT_SCHD_24_ALC_HR

D.9.3 Charge Type Calculation for RT_SCHD_24_DIST

*^RT_SCHD_24_DIST_HR

Hourly Real-Time Schedule 24 Distribution Amount ($); per AO. The result represents the AO's hourly Real-Time Schedule 24 Distribution credit rounded to the nearest cent. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement.

= MISO_RT_SCHD_24_DIST * RT_SCHD_24_DIST_FCT

*^RT_SCHD_24_DIST

Real-Time Schedule 24 Distribution Amount ($); per AO. The result represents the AO's total Operating Day Real-Time Schedule 24 Distribution credit. The formula result is displayed in dollars and is rounded to the nearest cent.

= Σ_H (RT_SCHD_24_DIST_HR)

D.10 Real-Time Miscellaneous Amount (RT_MISC)

The Real-Time Miscellaneous Amount charge type is a mechanism that allows MISO to issue charges and/or credits based on specific requirements to either one AO or to the entire market. MISO follows a strict internal approved procedure process prior to initiating this charge. This charge type can be used for charges or credits ordered by the IMM. This specific charge type facilitates the following charges and/or credits:

- A charge or credit applied to a single AO (referred to as Method A)
- A charge or credit applied to a single AO with the opposite charge or credit spread to all other AOs based on the Operating Day's: 1) LRS, 2) Market Ratio Share (MRS), 3) FTR Ratio Share (FRS) or 4) LBA-specific LRS (referred to as Method B).
- A charge or credit applied to all AOs based on an Operating Day's: 1) LRS, 2) MRS, 3) FRS or 4) LBA-specific LRS (referred to as Method C).

The Real-Time Energy and Operating Reserve Market Settlement Statement specifically lists each miscellaneous charge along with:

- A reference identifier
- The reason for the charge
- Whether the charge or credit is for a single AO or the entire market
- The ratio share being applied if applicable
- The amount of the charge or credit.

The following must be known in order to apply a single miscellaneous transaction:

1) Determine the total transaction miscellaneous charge or credit amount.
2) Determine whether the full amount is for a single AO (Method A or B) or is to be allocated to the entire market (Method C).
3) If in step 2 the full amount is for a single AO, determine whether all other AOs are responsible for paying for or collecting the amount that is given to the single AO. (Method B when all other AOs are responsible, Method A if they are not)
4) If either Method C was chosen in step 2 or if Method B was chosen in step 3, determine which distribution ratio share allocation method must be used (LRS, MRS, FRS or LBA-specific LRS)

LRS is equal to an AO's total hourly Load divided by the total hourly Load for all MISO.

MRS is equal to an AO's total hourly Day-Ahead and Real-Time Administration Volume divided by the total hourly Day-Ahead and Real-Time Administration Volume for all MISO.

FRS is equal to an AO's total hourly FTR Profile Volume divided by the total hourly AO FTR Profile Volume for all MISO.

LBA-specific LRS is equal to an AO's total hourly Load in the specified LBA divided by the total hourly Load for the specified LBA.

The Real-Time Miscellaneous Amount, including billing determinants, is displayed on the Real-Time Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a billing determinant that is displayed on an AO's Real-Time statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.10.1 Calculation Inputs for RT_MISC

There are no calculation inputs.

D.10.2 Intermediate Calculations for RT_MISC

METHOD_A	The charge or credit applied to a single AO ($); this charge only applies to the AO that matches the single Designated AO that is identified to receive the full charge or credit.
METHOD_B	The daily charge or credit applied by AO based on LRS, MRS, FRS, or LBA-specific LRS for an Operating Day ($).
METHOD_C	The daily charge or credit applied by AO based on LRS, MRS, FRS, or LBA-specific LRS for an Operating Day ($).

D.10.3 Charge Type Calculation for RT_MISC

^*RT_MISC_RECORD	Individual Real-Time Miscellaneous Transaction Record ($); the charge or credit resulting from a miscellaneous transaction for an AO. The result is rounded to the nearest cent and displayed in dollars. = METHOD_A + METHOD_B + METHOD_C
*RT_MISC	Daily Real-Time Miscellaneous Transaction Record ($); the total charge or credit resulting from all miscellaneous transactions for an AO. = Σ (RT_MISC_RECORD)

D.11 Real-Time Net Inadvertent Distribution (RT_NI_DIST)

Real-Time Net Inadvertent Distribution is the daily allocation to AOs of any energy dollars that result from MISO BA Net Inadvertent for an Operating Day. On an hourly basis each LBA is tasked with balancing their energy generation supply, their load and their Net Scheduled Interchange (NSI). The difference between the NSI and the NAI is Net Inadvertent. The hourly energy cost of the Net Inadvertent is calculated by averaging the LMP from all generators in the LBA times the volume of the inadvertent for that same Hour. The dollar impact for all hours in an Operating Day for all MISO LBAs is summed and is allocated to AOs based on the AO's participation in the Day-Ahead and Real-Time Energy Markets for the Operating Day.

The Real-Time Net Inadvertent Distribution Amount, including billing determinants, is displayed on the Real-Time Energy Market Settlement Statement.

An asterisk (*) denotes a billing determinant that is displayed on an AO's Real-Time statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.11.1 Calculation Inputs for RT_NI_DIST

NSI	Hourly Net Scheduled Interchange Volume for a LBA (MWh).
NAI	Hourly Net Actual Interchange Volume for a LBA (MWh).
RT_LMP_EN	Hourly Real-Time LMP ($/MWh); at a Commercial Node. The Real-Time Energy Market clearing price for Energy at a given Commercial Node in the Transmission Provider Region, which is equivalent to the marginal cost of serving demand at the Commercial Node. The Real-Time Locational Margin Price includes the MCC and the MLC. These values are only provided for nodes where the AO has assets, transactions, and schedules.

D.11.2 Intermediate Calculations for RT_NI_DIST

AVG	The mathematical average of the value within the succeeding set of parentheses.

IF	The "IF" logical statement is a conditional test and returns one value if a condition you specify evaluates to TRUE and another value if it evaluates to FALSE. { An example of the IF (logical_test, THEN value_if_true, ELSE value_if_false) }
DA_ADMIN_VOL	Hourly Day-Ahead Market Administration Volume (MWh); for an AO. Please refer to the previously defined calculation definition of this component.
*RT_ADMIN_VOL	Hourly Real-Time Market Administration Volume (MWh); for an AO. Please refer to the previously defined calculation definition of this component.
RT_GEN_BA_LMP	Hourly LBA Generation Average LMP ($/MWh); the equation represents the average of all generation asset Commercial Nodes in a LBA. = AVG [IF (Commercial Node = generation asset , RT_LMP_EN , 0)]
BA_NI_VAL	LBA Net Inadvertent Cost ($); the calculation is performed for each LBA. = (NAI – NSI) * RT_GEN_BA_LMP
MISO_NI_HR	MISO Hourly Total Net Inadvertent Cost ($). = Σ_{MISO} (BA_NI_VAL)
*MISO_NI	MISO Daily Total Net Inadvertent Cost ($). = Σ_{H} (MISO_NI_HR)
AO_MKT_VOL	Daily AO Administration Volume (MWh). = Σ_{H} (RT_ADMIN_VOL + DA_ADMIN_VOL)
MISO_MKT_VOL	MISO Total Day-Ahead and Real-Time Administration Volume (MWh); for all AOs by Operating Day. = Σ_{MISO} (AO_MKT_VOL)
^*NI_DIST_FCT	Daily Net Inadvertent Distribution Factor by AO (factor); this factor is rounded to eight decimal places. = AO_MKT_VOL / MISO_MKT_VOL

D.11.3 Charge Type Calculation for RT_NI_DIST

^*RT_NI_DIST	Daily Real-Time Net Inadvertent Distribution Amount ($); for an AO for an Operating Day. The formula result is rounded to the nearest cent and is displayed in dollars ($). = MISO_NI * NI_DIST_FCT

D.12 Real-Time Non-Asset Energy Amount (RT_NASSET_EN)

The Real-Time Non-Asset Energy Amount represents an AO's daily Real-Time net energy cost (or credit) related to Commercial Pricing Nodes where the AO does not own generation, Load, or DRR assets for the Operating Day. The amount is calculated hourly for each AO at each Commercial Pricing Node where the AO does not own generation or Load assets. The AO's hourly non-asset energy volume at each Commercial Pricing Node is multiplied by the LMP for the node and is summed into an Operating Day amount. In addition, energy wheeled across High-Voltage Direct-Current (HVDC) transmission facilities contributes to the AO's energy obligation. These transactions are represented by an energy purchase at the transaction source CPNode and a sale at the transaction sink CPNode during the operating hour. The hourly non-asset energy volume is equal to:

1) Real-Time PBT purchases, less
2) Real-Time PBT sales, less
3) Net impact of Day-Ahead PBTs (Day-Ahead purchases less sales), plus
4) Real-Time (non-pseudo) FBTs sales, less
5) Real-Time (non-pseudo) FBTs purchases, plus
6) Net impact of Real-Time Carved-Out GFA Transaction sales at non-interface Commercial Pricing Nodes, minus
7) Net impact of Real-Time Carved-Out GFA Transaction purchases at non-interface Commercial Pricing Nodes.

PBTs can only be scheduled at Interface Commercial Pricing Nodes and represent energy being sold into or purchased out of MISO by an AO. All Day-Ahead cleared PBTs have corresponding Real-Time PBTs that participants may alter prior to the close of the Real-Time Energy and Operating Reserve Market. An AO may also choose to create new Real-Time PBTs. Both transactions, whether they are new Real-Time PBTs or Real-Time PBTs created from Day-Ahead PBTs, are settled in this charge type.

FBTs can be scheduled between any two Commercial Pricing Nodes. The MP entering the FBT determines whether the FBT is for the Day-Ahead or Real-Time Energy and Operating Reserve Market. Real-Time FBTs scheduled at Commercial Pricing Nodes other than where the AO owns generation or Load is settled in the Real-Time Non-Asset Energy Amount charge type.

There are two types of Real-Time FBTs:

- IBS - Refers to the standard FBTs.
- PSEUDO - Refers to FBTs related to pseudo-tied Load and generation.

IBS FBTs can exist between any two AOs at any of the following Commercial Pricing Nodes types: Hubs (HUB), Interface (INT), Generation (GND), Load Zone (LZN), DRR and Aggregate Generation (FXD).

Real-Time Pseudo FBTs are unique transactions specifically used with generation and Load within MISO that is pseudo-tied to an external Balancing Authority's Interface Commercial Pricing Node. Pseudo-tied generation and Load is not settled in MISO, but the energy volume is subject to congestion and loss charges between the sink and the source. The pseudo-tied asset is dynamically scheduled by DART. Each hour DART integrates the asset's metered volume into hourly values and then provides the volume to Market Settlements as a pseudo FBT for settlement. Only MISO can establish and schedule pseudo FBTs.

Real-Time Carved-Out Grandfathered Transactions allow a participant to deliver energy into MISO, receive energy out of MISO, or move energy within MISO. With PBTs, energy is brought into or out MISO at defined Interfaces Commercial Pricing Nodes. The energy moved in PBTs is settled at the Interface Commercial Pricing Nodes and MISO is assumed to be the counterparty to the transaction. Carved-Out Grandfathered Transactions are not PBTs because there is always a source and sink along with a buyer and seller. Characteristics of Carved-Out Grandfathered Transactions are:

- There is a specifically defined buyer and seller.
- The transaction source and sink can be any settlement Commercial Pricing Node.
- The transaction has a Delivery Point for settling congestion and losses like FBTs, but the Delivery Point is always defined as the source Commercial Pricing Node. This results in the transaction buyer being charged congestion and losses between the sink and source.

- All congestion and losses charges between the sink and source are rebated.
- When an Interface Commercial Pricing Node is defined as the sink or source, it is assumed that the transaction continues beyond that Commercial Pricing Node. For example if there is a transaction between a Generator and an Interface Commercial Pricing Node, it is assumed that the energy is received at the Generator Commercial Pricing Node, travels to the Interface Commercial Pricing Node, and then continues out of MISO. This results in the energy being settled only at the Generator.
- Transactions are scheduled through the WebTrans.
- Transactions can be entered in the Day-Ahead Market and flow through to the Real-Time Market similar to PBTs.

When an AO has a Carved-Out GFA Transaction with a sink or source defined at a Commercial Pricing Node where the AO owns the asset, the energy is settled in the Asset Energy Charge Type. When an AO has a Carved-Out GFA Transactions with a sink or source not defined at a Commercial Pricing Node where the AO owns the asset, the energy is settled in the Non-Asset Energy Charge Type.

For transactions involving energy wheeled across a High-Voltage Direct-Current (HVDC) transmission line, the Real-Time Non-Asset Energy amount is calculated in the following manner: a purchase and offsetting sale are calculated by multiplying the Real-Time transaction volume, net of Day-Ahead volume by the LMP at the transaction source CPNode and by the inverse of the LMP at the transaction sink CPNode. The net amount is added to the Real-Time Non-Asset energy amount for the hour.

The Real-Time Non-Asset Energy Amount, including billing determinants, is displayed on the Real-Time Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a billing determinant that is displayed on an AO's Real-Time statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.12.1Calculations Inputs for RT_NASSET_EN

*DA_GFACOBuyer — Hourly Day-Ahead Carved-Out GFA Transaction Volume where the AO is the buyer and does not own an Asset at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The buyer is defined as the AO that receives the transaction volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value. Note these transactions will display on the settlement statement above the AO's Assets. If the AO is both the buyer and seller, the transaction will be listed once for each end of the transaction. Transactions at Interface Commercial Pricing Nodes are not settled because they are assumed to come into MISO and continue to another Commercial Pricing Node.

*DA_GFACO_{Seller} — Hourly Day-Ahead Carved-Out GFA Transaction Volume where the AO is the seller and does not own an Asset at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. The seller is defined as the AO that provides the transaction volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value. Note these transactions will display on the settlement statement above the AO's Assets. If the AO is both the buyer and seller, the transaction will be listed once for each end of the transaction. Transactions at Interface Commercial Pricing Nodes are not settled because they are assumed to come out of MISO and continue onward.

*DA_PHYS_{Buyer} — Hourly Day-Ahead PBT Volume where the AO is the Buyer (MWh); a Buyer is defined as an AO that receives energy from MISO, at a MISO defined interface Commercial Pricing Node or EAR Commercial Pricing Node, for export out of MISO.

*DA_PHYS_{Seller} — Hourly Day-Ahead PBT Volume where the AO is the Seller (MWh); a Seller is defined as an AO that supplies energy to MISO, at a MISO defined Interface Commercial Pricing Node, for import into MISO.

*RT_GFACO$_{Buyer}$ Hourly Real-Time Carved-Out GFA Transaction Volume where the AO is the buyer and does not own an Asset at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. Each Day-Ahead Carved-Out GFA Transaction must have a corresponding Real-Time Carved-Out GFA Transaction, but a Real-Time Carved-Out Grandfathered Transaction does not need to have a corresponding Day-Ahead Transaction. The buyer is defined as the AO that receives the transaction volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value. Note these transactions will display on the settlement statement above the AOs Assets. If the AO is both the buyer and seller, the transaction will be listed once for each end of the transaction. Transactions at Interface Commercial Pricing Nodes are not settled because they are assumed to come into MISO and continue to another Commercial Pricing Node.

*RT_GFACO$_{Seller}$ Hourly Real-Time Carved-Out GFA Transaction Volume where the AO is the seller and does not own an Asset at the Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. Each Day-Ahead Carved-Out GFA Transaction must have a corresponding Real-Time Carved-Out GFA Transaction, but a Real-Time Carved-Out Grandfathered Transaction does not need to have a corresponding Day-Ahead Transaction. The seller is defined as the AO that provides the transaction volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value. Note these transactions will display on the settlement statement above the AO's Assets. If the AO is both the buyer and seller, the transaction will be listed once for each end of the transaction. Transactions at Interface Commercial Pricing Nodes are not settled because they are assumed to come out of MISO and continue onward.

*RT_FIN$_{Buyer}$ Hourly Real-Time (non-pseudo) FBT Volume at a Commercial Pricing Node where the AO is the Transaction Buyer and does not own an Asset at the Commercial Pricing Node (MWh); only transactions at sink Commercial Pricing Nodes where the buyer does not own an asset are settled in this charge type. The Buyer is defined as the AO that receives the FBT volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value. Note these FBTs will display on the settlement statement above the AOs Assets. If the AO is both the buyer and seller, the FBT will be list once for each end of the transaction.

*RT_FIN$_{Seller}$	Hourly Real-Time (non-pseudo) FBT Volume at a Commercial Pricing Node where the AO is the Transaction Seller and does not own an Asset at the Commercial Pricing Node (MWh); only transactions at source Commercial Pricing Nodes where the seller does not own an asset are settled in this charge type. The Seller is defined as the AO that supplies the FBT volume at the source Commercial Pricing Node. The transaction volume is always presented as a positive value. Note these FBTs will display on the settlement statement above the AO's Assets. If the AO is both the buyer and seller, the FBT will be listed once for each end of the transaction.
*RT_PHYS_INT$_{Buyer}$	Dispatch Interval (5 minute) Real-Time PBT Volume where the AO is the Buyer (MW); a Buyer is defined as an AO that receives energy from MISO, at a MISO defined Interface Commercial Pricing Node or EAR Commercial Pricing Node, for export out of MISO. There are 288 Dispatch Interval values for a given Operating Day.
*RT_PHYS_INT$_{Seller}$	Dispatch Interval (5 minute) Real-Time PBT Volume where the AO is the Seller (MWh); a Seller is defined as an AO that supplies energy to MISO, at a MISO defined Interface Commercial Pricing Node, for import into MISO. There are 288 Dispatch Interval values for a given Operating Day.
*RT_LMP_EN	Hourly Real-Time LMP ($/MWh); at a Commercial Pricing Node. The Real-Time Energy and Operating Reserve Market clearing price for Energy at a given Commercial Pricing Node in the Transmission Provider Region, which is equivalent to the marginal cost of serving demand at the Commercial Pricing Node. The Real-Time Locational Margin Price includes the MCC and the MLC.
*RT_LMP_EN_INT	Dispatch Interval Real-Time LMP ($/MWh); The Dispatch Interval LMP price at a MISO defined Interface Commercial Pricing Node. There are 288 Dispatch Interval values for a given Operating Day.
*RT_PHYS$_{HVDC}$	Hourly Real-Time PBT Volume where the AO is wheeling energy across a HVDC transmission line. Applicable volume corresponds to Physical Bilateral transactions with Schedule Type of "HVDC".

*DA_PHYS_{HVDC} — Hourly Day-Ahead PBT Volume where the AO is wheeling energy across a HVDC transmission line. Applicable volume corresponds to Physical Bilateral transactions with Schedule Type of "HVDC".

*$RT\_LMP\_EN_{HVDC\_SRC}$ — Hourly Real-Time LMP ($/MWh); at a Commercial Pricing Node which is the source of HVDC transaction.

*$RT\_LMP\_EN_{HVDC\_SNK}$ — Hourly Real-Time LMP ($/MWh); at a Commercial Pricing Node which is the sink of HVDC transaction

D.12.2Intermediate Calculations for RT_NASSET_EN

$DA\_PHYS\_VOL_{Buyer}$ — Total Hourly Day-Ahead PBT load obligation volume for an AO (MWh); at a single Interface Commercial Pricing Node or EAR Commercial Pricing Node where the AO is buying PBTs from MISO.
$= \Sigma_{Transactions} (DA\_PHYS_{Buyer})$

$DA\_PHYS\_VOL_{Seller}$ — Total Hourly Day-Ahead PBT supply obligation volume for an AO (MWh); at a single Interface Commercial Pricing Node where the AO is selling PBTs to MISO.
$= \Sigma_{Transactions} ((-1) * DA\_PHYS_{Seller})$

$DA\_PHYS\_VOL_{Net}$ — Net Total Hourly Day-Ahead PBT obligation volume at a Commercial Pricing Node (MWh).
$= DA\_PHYS\_VOL_{Buyer} + DA\_PHYS\_VOL_{Seller}$

$DA\_GFACO\_VOL_{Buyer}$ — Total Hourly Day-Ahead Carved-Out GFA Transaction supply obligation volume for an AO at a single Non-Interface Commercial Pricing Node (MWh); The AO is buying Day-Ahead Carved-Out GFA Transactions and as such the supply acts as an injection at the Commercial Pricing Node.
$= \Sigma_{Transactions} ((-1) * DA\_GFACO_{Buyer})$

$DA\_GFACO\_VOL_{Seller}$ — Total Hourly Day-Ahead Carved-Out GFA Transaction load obligation volume for an AO at a single Non-Interface Commercial Pricing Node (MWh); The AO is selling Day-Ahead Carved-Out GFA Transactions and as such the supply acts as a withdrawal at the Commercial Pricing Node.
$= \Sigma_{Transactions} (DA\_GFACO_{Seller})$

$DA\_GFACO\_VOL_{Net}$ — Net Total Hourly Day-Ahead Carved-Out GFA Transaction obligation volume at a Non-Interface Commercial Pricing Node (MWh).
$= DA\_GFACO\_VOL_{Buyer} + DA\_GFACO\_VOL_{Seller}$

$RT\_FIN\_VOL_{Buyer}$ Total Hourly Real-Time (non-pseudo) FBT supply obligation volume for an AO (MWh); at a single Commercial Pricing Node that does not represent Generation Resource or Load where the AO is sinking (receiving) FBTs.
$= \Sigma_{Transactions} (\ (-1) \ * \ RT\_FIN_{Buyer} \ )$

$RT\_FIN\_VOL_{Seller}$ Total Hourly Real-Time (non-pseudo) FBT load obligation volume for an AO (MWh); at a single Commercial Pricing Node that does not represent generation, DRR or Load where the AO is sourcing (supplying) FBTs.
$= \Sigma_{Transactions} (RT\_FIN_{Seller})$

$RT\_FIN\_VOL_{Net}$ Net Hourly Real-Time (non-pseudo) FBT obligation volume at a Commercial Pricing Node (MWh).
$= RT\_FIN\_VOL_{Buyer} \ + \ RT\_FIN\_VOL_{Seller}$

$RT\_PHYS\_VOL\_INT_{Buyer}$ Total Dispatch Interval Real-Time PBT Load obligation volume for an AO (MW); at a single Interface Commercial Pricing Node or EAR Commercial Pricing Node where the AO is buying PBTs from MISO. The calculation is performed for each 5 minute Dispatch Interval.
$= \Sigma_{Transactions} (RT\_PHYS\_INT_{Buyer})$

$RT\_PHYS\_VOL\_INT_{Seller}$ Total Dispatch Interval Real-Time PBT supply obligation volume for an AO (MWh); at a single Interface Commercial Pricing Node where the AO is selling PBTs to MISO. The calculation is performed for each 5 minute Dispatch Interval.
$= \Sigma_{Transactions} (\ (-1) \ * \ RT\_PHYS\_INT_{Seller})$

$RT\_PHYS\_VOL\_INT_{Net}$ Net Total Dispatch Interval Real-Time PBT obligation volume at a Commercial Pricing Node (MWh). The calculation is performed for each 5 minute Dispatch Interval.
$= RT\_PHYS\_VOL\_INT_{Buyer} \ + \ RT\_PHYS\_VOL\_INT_{Seller}$

$RT\_GFACO\_VOL_{Buyer}$ Total Hourly Real-Time Carved-Out GFA Transaction supply obligation volume for an AO at a single Non-Interface Commercial Pricing Node (MWh); the AO is buying Real-Time Carved-Out GFA Transactions and as such the supply acts as an injection at the Commercial Pricing Node.
$= \Sigma_{Transactions} (\ (-1) \ * \ RT\_GFACO_{Buyer} \ )$

$RT\_GFACO\_VOL_{Seller}$ Total Hourly Real-Time Carved-Out GFA Transaction load obligation volume for an AO at a single Non-Interface Commercial Pricing Node

(MWh); the AO is selling Real-Time Carved-Out GFA Transactions and as such the supply acts as a withdrawal at the Commercial Pricing Node.
$= \Sigma_{Transactions}$ (RT_GFACO_{Seller})

$RT\_GFACO\_VOL_{Net}$ — Net Total Hourly Real-Time Carved-Out GFA Transaction obligation volume at a Non-Interface Commercial Pricing Node (MWh).
$= RT\_GFACO\_VOL_{Buyer} + RT\_GFACO\_VOL_{Seller}$

RT_NASSET_VOL — Hourly Real-Time Non-Asset Energy Volume (MWh); for an AO at a Commercial Pricing Node. This calculation is only performed for Commercial Pricing Nodes where the AO does not own generation, Load Zone, or DRR asset, and excludes PBTs. The result represents the AO's total hourly net energy volume at each Commercial Pricing Node where it does not own an asset.
$= RT\_FIN\_VOL_{Net} + (RT\_GFACO\_VOL_{Net} - DA\_GFACO\_VOL_{Net})$

D.12.3 Charge Type Calculation for RT_NASSET_EN

RT_PHYS_EN_HR — Hourly Real-Time Physical Energy Amount ($); for an AO. This calculation is the sum of the 5 minute Dispatch Interval net volume (minus the DA volume for that hour) multiplied by the associated 5 minute LMP. This calculation is only performed at Commercial Pricing Nodes where the AO does not own the asset. The result represents the AO's total hourly net physical energy activity.

$$= \Sigma_{CN} \{ (1/12) * \sum_{i=1}^{12} ((RT\_PHYS\_VOL\_INT_{Net\ i} - DA\_PHYS\_VOL_{NET}) * RT\_LMP\_EN\_INT_{i})$$

*^RT_NASSET_EN_HR — Hourly Real-Time Non-Asset Energy Amount ($); for an AO. This calculation is only performed at Commercial Pricing Nodes where the AO does not have one or more assets. The result represents the AO's total hourly net non-asset market energy activity other than virtual schedules. The formula result is per Hour and is rounded to the nearest cent. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement.

$$= \Sigma_{CN}\ RT\_PHYS\_EN\_HR + (RT\_NASSET\_VOL * RT\_LMP\_EN) + [(RT\_PHYS_{HVDC} - DA\_PHYS_{HVDC}) * RT\_LMP\_EN_{HVDC\_SRC}] - [(RT\_PHYS_{HVDC} - DA\_PHYS_{HVDC}) * RT\_LMP\_EN_{HVDC\_SNK}]$$

*RT_NASSET_EN

Real-Time Non-Asset Energy Amount ($); for all AO related non-asset Commercial Pricing Nodes. The formula result is displayed in dollars.

$= \Sigma_{H}$ (RT_NASSET_EN_HR)

D.13 Real-Time Revenue Neutrality Uplift Amount (RT_RNU)

Real-Time Revenue Neutrality Uplift Amount is a charge type set up as a revenue distribution balancing mechanism for charges and credits that have no other distribution method to AOs. On an hourly basis, all charges and credits that have no other distribution method are summed, and the subsequent total charge or credit for the Hour is distributed to AOs based on their LRS.

An AO's LRS is determined by:

- Summing the volumes of the AO's assets that are consuming energy (acting as Load) for an Hour plus the sum of all Real-Time PBTs volume where the AO is buying the transaction volume for export out of MISO (these are wheel out schedules from MISO and do not include wheel through schedules or EAR Export Schedules) net of Carved-Out transaction MW and absent LRS_XMPT exclusions, and
- Dividing the result by the sum of all AO assets that are consuming energy during the same Hour plus the sum of all Real-Time PBTs volume where AO's are buying the transaction volume for export out of MISO (these are wheel out schedules from MISO and do not include wheel through schedules or EAR Export Schedules) net of Carved-Out transaction MW and absent LRS_XMPT exclusions.

The following charges and/or credits are distributed through this charge type:

- Revenue Inadequacy Uplift
- JOA Uplift
- GFAOB FBT Congestion Rebate Distribution Amount Uplift
- Carved-Out GFA Congestion Rebate Distribution Amount Uplift
- Real-Time RSG MWPs Second Pass Distribution Uplift
- Real Time Contingency Reserve Deployment Failure Charge Uplift Amount
- Real Time Price Volatility Make-Whole Payment Uplift
- Demand Response Compensation Uplift
- Real-Time Total Mileage Uplift
- Day Ahead Ramp Capability Amount
- Real Time Ramp Capability Amount

There is a detailed explanation listed below for each charge/credit that is funded through this Charge Type.

The Real-Time Revenue Neutrality Uplift Amount, including billing determinants, is displayed on the Real-Time Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a billing determinant that is displayed on an AO's Real-Time statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.13.1 Revenue Inadequacy Uplift

Revenue Inadequacy ensures on an hourly basis that MISO is not revenue short or long for each Hour. Specifically, Revenue Inadequacy verifies that revenue related to energy and losses remain balanced. The revenue for the Day-Ahead and Real-Time Markets are calculated and tracked separately. Day-Ahead and Real-Time hourly revenue shortfalls and excesses are dispersed through this charge type.

Day-Ahead Over-Collected Losses is a dollar value calculated by the DART every Hour in the Day-Ahead Market cleared solution. Real-Time Over-Collected Losses is a dollar value calculated by the DART every 5 minutes as the Real-Time Market is cleared and is aggregated to an hourly value.

For additional information on Revenue Inadequacy, please refer to the Market Settlements BPM.

D.13.1.1 Calculation Inputs for the Day-Ahead Portion of MISO Revenue Inadequacy Uplift

DA_LMP_CG	Hourly Day-Ahead Congestion Component of LMP ($/MWh).
DA_OCL	Hourly Day-Ahead Over-Collected Losses ($); a total MISO wide calculated over-collected losses dollar value calculated in DART.

DA_VSCHD	Hourly Day-Ahead Net Virtual Schedule Volume for a Commercial Pricing Node for an AO (MWh); the Day-Ahead Net Virtual Schedule Volume is the net Day-Ahead Energy and Operating Reserve Market cleared Bid and Offered Virtual Schedule volume by AO by Commercial Pricing Node by Hour. A positive volume represents a net Load obligation and a negative volume represents a net supply obligation.

D.13.1.2 Intermediate Calculations for the Day-Ahead Portion of MISO Revenue Inadequacy Uplift

MAX	The mathematical maximum of the series of numbers in the succeeding parentheses.
MIN	The mathematical minimum of the series of numbers in the succeeding parentheses.
DA_ASSET_EN_HR	Hourly Day-Ahead Asset Energy Amount ($); for an AO. This calculation is only performed for Commercial Pricing Nodes where the AO has a generation, Load Zone, or DRR asset. The result represents the AO's total hourly charge or credit for all its assets and is rounded to the nearest cent. Please refer to the previously defined calculation definition of this component.
DA_ASSET_VOL	Hourly Day-Ahead Asset Volume (MWh); for an AO for a Commercial Pricing Node. This calculation is only performed for Commercial Pricing Nodes where the AO has a generation, Load Zone, or DRR asset. The result represents the AO's total hourly net energy volume at each of its assets. Please refer to the previously defined calculation definition of this component.
DA_FIN_LS_HR	Hourly Day-Ahead FBT Loss Hourly Amount ($); this calculation is performed for all AOs that have Day-Ahead FBTs and/or Carved-Out GFA Transactions. The result represents the AO's total hourly loss charge or credit for all its Day-Ahead FBTs and Carved-Out GFA Transactions. The result is rounded to the nearest cent. Please refer to the previously defined calculation definition of this component.
DA_NASSET_EN_HR	Hourly Day-Ahead Non-Asset Energy Amount ($); for an AO. This calculation is only performed for Commercial Pricing Nodes where the AO does not have an asset. The result represents the AO's total hourly charge or credit for all their non-asset market energy activity other than

Virtual Schedules and is rounded to the nearest cent. Please refer to the previously defined calculation definition of this component.

DA_NASSET_VOL — Hourly Day-Ahead Non-Asset Energy Amount (MWh); for an AO for a Commercial Pricing Node. This calculation is only performed for Commercial Pricing Nodes where the AO does not have one or more assets. The result represents the AO's total hourly net non-asset market energy activity other than Virtual Schedules at each Commercial Pricing Node. Please refer to the previously defined calculation definition of this component.

DA_VIRT_EN_HR — Hourly Day-Ahead Virtual Energy Amount ($); for an AO. The result represents the AO's total hourly charge or credit for all cleared Virtual Energy Bids and Offers for all Commercial Pricing Nodes in the Day-Ahead Energy and Operating Reserve Market. The formula result is per Hour and rounded to the nearest cent. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement. Please refer to the previously defined calculation definition of this component.

MISO_DA_EC — Total MISO Day-Ahead Hourly Energy Charge Amount ($); Represents the total MISO Energy Charge from all energy volumes for each AO at each Commercial Pricing Node multiplied by the respective Day-Ahead LMP.

$$= \Sigma_{AO} (DA\_ASSET\_EN\_HR) + \Sigma_{AO} (DA\_NASSET\_EN\_HR) + \Sigma_{AO} (DA\_VIRT\_EN\_HR)$$

MISO_DA_CC — Total MISO Day-Ahead Hourly Congestion Charge Amount ($); Represents the total MISO Congestion Charge from all energy volumes for each AO at each Commercial Pricing Node multiplied by the respective congestion Day-Ahead LMP Commercial Pricing Node.

$$= \Sigma_{MISO} [\Sigma_{AO\text{-}CN} (DA\_ASSET\_VOL * DA\_LMP\_CG)] + \Sigma_{MISO} [\Sigma_{AO\text{-}CN} (DA\_NASSET\_VOL * DA\_LMP\_CG)] + \Sigma_{MISO} [\Sigma_{AO\text{-}CN} (DA\_VSCHD * DA\_LMP\_CG)]$$

MISO_DA_RI — Total MISO Day-Ahead Revenue Inadequacy Amount ($); a positive amount represents a surplus of revenue whereas a negative amount represents a shortfall.

$$= MISO\_DA\_EC + DA\_FIN\_LS\_HR - DA\_OCL - MISO\_DA\_CC$$

D.13.1.3 Calculation Inputs for the Real-Time Portion of MISO Revenue Inadequacy Uplift

DA_OCL	Hourly Day-Ahead Over-Collected Losses ($); a total MISO wide calculated over-collected losses dollar value calculated in DART.
RT_LMP_CG	Hourly Real-Time Congestion Component of LMP ($/MWh).
RT_LMP_CG_INT	Dispatch Interval (5 Minute) Real-Time Congestion Component of LMP ($/MWh).
RT_OCL	Hourly Real-Time Over-Collected Losses ($); a total MISO wide calculated over-collected losses dollar value calculated in DART.
DA_VSCHD	Hourly Day-Ahead Net Virtual Schedule Volume for a Commercial Pricing Node for an AO (MWh); the Day-Ahead Net Virtual Schedule Volume is the net Day-Ahead Energy and Operating Reserve Market cleared Bid and Offered Virtual Schedule volume by AO by Commercial Pricing Node by Hour. A positive volume represents a net Load obligation and a negative volume represents a net supply obligation.

D.13.1.4 Intermediate Calculations for the Real-Time Portion MISO Revenue Inadequacy Uplift

MAX	The mathematical maximum of the series of numbers in the succeeding parentheses.
MIN	The mathematical minimum of the series of numbers in the succeeding parentheses.
RT_VIRT_EN_HR	Hourly Real-Time Virtual Energy Amount ($); for an AO. The hourly total due MISO from an AO for backing out all the AO's net Day-Ahead Virtual schedules. The formula result is per Hour and rounded to the nearest cent. Please refer to the previously defined calculation definition of this component.

RT_ASSET_EN_HR	Hourly Real-Time Asset Energy Amount ($); for an AO. This calculation is only performed for Commercial Pricing Nodes where the AO has a generation, Load Zone, or DRR asset. The result represents the AO's total hourly charge or credit for all its assets. The formula result is per Hour and is rounded to the nearest cent. Please refer to the previously defined calculation definition of this component.
RT_ASSET_VOL	Hourly Real-Time Asset Volume (MWh); for an AO. This calculation is only performed for Commercial Pricing Nodes where the AO has a generation, Load Zone, or DRR asset. The result represents the AO's total hourly net Real-Time energy volume at each of their assets. Please refer to the previously defined calculation definition of this component.
RT_DRR_UPL_HR	Hourly Demand Response Allocation Uplift Charge ($); for an Asset Owner in a Reserve Zone.
RT_FIN_LS_HR	Hourly Real-Time FBT Loss Hourly Amount ($); this calculation is performed for AOs that have Real-Time FBTs and/or Carved-Out GFA Transactions. The result represents the AO's total hourly loss charge or credit for all their Real-Time FBTs and Carved-Out GFA Transactions. The result is rounded to the nearest cent. Please refer to the previously defined calculation definition of this component.
RT_NASSET_EN_HR	Hourly Real-Time Non-Asset Energy Amount ($); for an AO. This calculation is only performed at Commercial Pricing Nodes where the AO does not have one or more assets. The result represents the AO's total hourly net non-asset market energy activity other than virtual and physical (PBT) schedules. The formula result is per Hour and is rounded to the nearest cent. Please refer to the previously defined calculation definition of this component.
RT_NASSET_VOL	Hourly Real-Time Non-Asset Energy Amount (MWh); for an AO. This calculation is only performed for Commercial Pricing Nodes where the AO does not have one or more assets. The result represents the AO's total hourly net non-asset market energy activity other than virtual and physical (PBT) Schedules at each Commercial Pricing Node. Please refer to the previously defined calculation definition of this component.
RT_PHYS_EN_HR	Hourly Real-Time Physical Energy Amount ($); for an AO. This calculation sums the 5 minute Dispatch Interval net volume (minus the

DA volume for that hour) multiplied by the associated 5 minute LMP. This calculation is only performed at Commercial Pricing Nodes where the AO does not own the asset. The result represents the AO's total hourly net physical energy activity. Please refer to the previously defined calculation definition of this component.

$RT\_PHYS\_VOL\_INT_{Net}$ — Net Total Dispatch Interval Real-Time PBT obligation volume at a Commercial Pricing Node (MW). The calculation is performed for each 5 minute Dispatch Interval. Please refer to the previously defined calculation definition of this component.

$DA\_PHYS\_VOL_{Net}$ — Net Total Hourly Day-Ahead PBT obligation volume at a Commercial Pricing Node (MWh). Please refer to the previously defined calculation definition of this component.

MISO_NI_HR — MISO Hourly Total Net Inadvertent Cost ($); A positive amount represents the estimated cost of energy leaving MISO. A negative amount represents the estimated cost of energy entering MISO. Please refer to the previously defined calculation definition of this component.

MISO_RT_EC — Total MISO Real-Time Hourly Energy Charge Amount ($); Represents the total MISO Energy Charge from all energy volumes for each AO at each Commercial Pricing Node multiplied by the respective Real-Time LMP.

$= \Sigma_{AO} (RT\_ASSET\_EN\_HR) + \Sigma_{AO} (RT\_NASSET\_EN\_HR) + \Sigma_{AO} (RT\_VIRT\_EN\_HR) + \Sigma_{AO} (RT\_DRR\_UPL\_HR)$

MISO_RT_CC — Total MISO Real-Time Hourly Congestion Charge Amount ($); Represents the total MISO Congestion Charge from all energy volumes for each AO at each Commercial Pricing Node multiplied by the respective congestion Real-Time LMP Commercial Pricing Node.

$$= \Sigma_{MISO} [\Sigma_{AO\text{-}CN} (RT\_ASSET\_VOL * RT\_LMP\_CG)] + \Sigma_{MISO} [\Sigma_{AO\text{-}CN} (RT\_NASSET\_VOL * RT\_LMP\_CG)] + \Sigma_{MISO} [\Sigma_{AO\text{-}CN} \{ (1/12) * \sum_{i=1}^{12} ((RT\_PHYS\_VOL\_INT_{NET\ i} - DA\_PHYS\_VOL_{Net}) * RT\_LMP\_CG\_INT_i) \}] + \Sigma_{MISO} [\Sigma_{AO\text{-}CN} (DA\_VSCHD * RT\_LMP\_CG) * (-1)] +$$

Σ_{CN} [(NXE - DA_SCHD_{GEN} - DA_DRRII_SCHD_VOL + RT_FIN_NET + RT_GFACO_NET) * RT_LMP_CC] +

Σ_{CN} [(EXE * RT_LMP_CC)]

MISO_RT_RI — Total MISO Real-Time Revenue Inadequacy Amount ($); a positive amount represents a surplus of revenue whereas a negative amount represents a shortfall.

= MISO_RT_EC + RT_FIN_LS_HR - RT_OCL - DA_OCL - MISO_RT_CC + MISO_NI_HR

D.13.1.5 Intermediate Calculations for Determining MISO Revenue Inadequacy Uplift

MISO_RT_HR_CG — Total MISO Real-Time Hourly Congestion Amount ($); the amount of congestion dollars available from the Real-Time Energy and Operating Reserve Market.

= Σ_{MISO} (RT_ASSET_VOL * RT_LMP_CG) +

Σ_{MISO} (RT_FIN_CG_HR) +

Σ_{MISO} (RT_NASSET_VOL * RT_LMP_CG) +

$$\Sigma_{MISO} \left[(1/12) * \sum_{i=1}^{12} \left((RT\_PHYS\_VOL\_INT_{NET\ i} - DA\_PHYS\_VOL_{Net}) * RT\_LMP\_CG\_INT_i \right) \right] +$$

Σ_{MISO} [(-1) * DA_VSCHD * RT_LMP_CG]

MISO_RT_POS_CG — Total MISO Real-Time Hourly Positive Congestion Amount ($); the amount of positive congestion dollars available for JOA offset.

= MAX (0, MISO_RT_HR_CG)

MISO_RT_JOA — Total MISO Real-Time Hourly JOA Charges ($); the total hourly net dollars collected by MISO for JOA seams coordinated dispatching. In the Real-Time Market, ISOs may request that MISO redispatch generation to relieve a constrained path. Likewise MISO can request other ISOs to redispatch to relieve a constrained path. Please refer to the previously defined calculation definition of this component.

MISO_RT_JOA_AR — Net MISO Real-Time Hourly JOA Account Receivable ($); the total hourly net dollars collected by MISO for JOA seams coordinated dispatching.

= MIN (0, MISO_RT_JOA) * (-1)

MISO_RT_JOA_AP	Net MISO Real-Time Hourly JOA Account Payable ($); the total hourly net dollars paid by MISO for JOA seams coordinated dispatching. = MAX (0, MISO_RT_JOA)
MISO_RT_HR_CG_FOR_JOA	Total MISO Real-Time Hourly Congestion Fund Available to Fund Real-Time JOA Account Payable ($); represents the total available dollars for funding JOA shortfalls. In the event this fund is not sufficient to fully fund the Real-Time JOA Accounts Payable, any additional funds are collected through the Real-Time Revenue Neutrality Uplift Charge Type. = MISO_RT_POS_CG + MISO_RT_JOA_AR
MISO_RT_HR_CG_FOR_FTR	Total MISO Real-Time Hourly Congestion Fund Available to Real-Time Congestion Funds ($); an hourly total used in determining Real-Time Congestion Funds for Allocation with the Real-Time Revenue Neutrality Uplift.. = MAX [0 , (MISO_RT_HR_CG_FOR_JOA - MISO_RT_JOA_AP)]
MISO_RT_HR_CG_FND	Total MISO Real-Time Hourly Congestion Fund after JOA offset ($); the total funding is the sum of all excess congestion funds where funding exceeded hourly FTR revenue allocation requirement, plus any Hour that had negative congestion. = MIN (0 , MISO_RT_HR_CG - MISO_RT_POS_CG) + MISO_RT_HR_CG_FOR_FTR
*^MISO_LOSS_SURPLUS	Hourly MISO Loss Surplus Amount ($); the total hourly loss dollars available for distribution. This value is rounded to the nearest cent. Please refer to the previously defined calculation definition of this component.
MISO_LOSS_MLC	Total Hourly Asset MLC for all MISO ($); this value represents the aggregated cost of losses in all of MISO. Please refer to the previously defined calculation definition of this component.
MISO_LOSS_DIST_UPLIFT	Total MISO Hourly Loss Distribution Uplift ($); whenever the estimated cost of marginal losses by the Load within a given Loss Pool does not exceed the cost of Marginal Losses of its generation and imports, no Marginal Losses Surplus are allocated to the Loss Pool. If all the Loss Pools within MISO are not allocated any Marginal Losses Surplus, then this amount must be uplifted to AOs. = IF (MISO_LOSS_MLC = 0 , MISO_LOSS_SURPLUS, 0)

*^RI_UPLIFT — Total MISO Hourly Revenue Inadequacy Uplift ($); Represents the total Day-Ahead and Real-Time Revenue Inadequacy that did not get funded from congestion that must be uplifted to AOs.
= [(MISO_DA_RI + MISO_RT_RI + MISO_RT_HR_CG_FND) * (-1)] + MISO_LOSS_DIST_UPLIFT

D.13.2 Joint Operating Agreement Uplift

JOAs are arrangements with MISO and bordering ISOs that enable one ISO on an hourly basis to request the other to re-dispatch to relieve, or make available, additional transmission flowgate capacity for use by the requesting ISO. There are hours when it may be more economical for a bordering ISO to make additional flowgate capacity available then it is for an ISO to re-dispatch its own Resources. This capability is available in both the Day-Ahead and Real-Time Markets, but it works slightly differently between the two markets. The costs incurred to re-dispatch is paid for by the ISO that utilized the additional capacity.

For the Day-Ahead Market, either ISO can request from the other additional flowgate capacity. Both ISOs will coordinate their requests when they are solving for their Day-Ahead Markets. When this occurs, it is expected that the flowpath will be bound and congestion will occur across the flow path. The responding ISO will bill the requesting ISO the amount of megawatt capacity made available multiplied by the shadow price the flowgate. The shadow price of the flowgate is equal to the per megawatt cost to re-dispatch generation to make available the additional flowgate capacity. For MISO, any funds received for Day-Ahead Market coordination will be added to the Day-Ahead Congestion Fund and any funds paid will reduce the Day-Ahead Congestion Fund. If during an Hour there are not sufficient funds in the Day-Ahead Congestion Fund to pay for requested additional flowgate capacity, the additional funds are collected as an uplift in this charge type. For specific information on the impact of Day-Ahead JOA charges and credits to the Day-Ahead Congestion Fund, please refer to the FTR Hourly Allocation Amount Charge Type.

For the Real-Time Market, only the monitoring flowgate ISO can request additional flowgate capacity. The JOA defines for each flowgate who is designated as the monitoring ISO. When a monitoring ISO requests additional capacity, the responding ISO bills the requesting ISO the capacity made available multiplied by the shadow price of the flowgate. If a responding ISO has its flowgate capacity less than its designated limit and the requesting ISO is also less than their designated limit, then the responding ISO pays the requesting ISO the capacity difference between the requestor's limit and the requestor's actual flowgate volume multiplied by the requesting ISO's shadow price. For MISO, any funds received for Real-Time coordination will be added to the Real-Time Congestion Fund and any funds paid will reduce the Real-Time Congestion Fund. If during an Hour there are not sufficient funds in the Real-Time Congestion Fund to pay for requested additional flowgate capacity, the additional funds are collected as uplift in this charge type.

D.13.2.1 Calculation Inputs for the Day-Ahead Portion of MISO JOA Uplift

MISO_DA_SP	Hourly MISO Day-Ahead Shadow Price for a single Flowgate ($/MWh); the Day-Ahead Energy Market clearing price for a Flowgate is equivalent to the cost of congestion across the defined flowgate per MWh. There are many flowgates between MISO and Counter Party ISOs. Each Flowgate will have a unique Shadow Price per Hour.
CP_DA_SP	Hourly Counter Party ISO Day-Ahead Shadow Price for a single Flowgate ($/MWh); the Day-Ahead Energy and Operating Reserve Market clearing price for a Flowgate is equivalent to the cost of congestion across the defined flowgate per MWh. There are many flowgates between MISO and Counter Party ISOs. Each Flowgate will have a unique Shadow Price per Hour.
DA_MW_RESPONSE	Hourly MWh Adjustment to a Day-Ahead MISO Firm Flow Entitlement (FFE) Flowgate (MWh); a positive value indicates that MISO requested additional FFEs and a negative value indicates that the Counter Party ISO requested additional FFEs. A party can only request additional FFE, they cannot request a reduction in FFE.

D.13.2.2 Intermediate Calculations for Determining Day-Ahead Portion of MISO JOA Uplift

IF	The “IF” logical statement is a conditional test and returns one value if a condition you specify evaluates to TRUE and another value if it evaluates to FALSE. { An example of the IF (logical_test, THEN value_if_true, ELSE value_if_false) }

DA_JOA_FG — Single Hour Day-Ahead Flowgate Charge or Credit for MISO ($); the charge or credit resulting from a Day-Ahead JOA coordination event. A positive value indicates a charge to MISO; a negative value represents a credit to MISO. The shadow price of the party that is reducing their FFE is always used to determine the cost of the response.
= IF (DA_MW_RESPONSE < 0 , THEN MISO_DA_SP , ELSE CP_DA_SP) * DA_MW_RESPONSE

MISO_DA_JOA — Hourly MISO Day-Ahead JOA ($); the total MISO Day-Ahead cost for all JOA flowgates for a single Hour. A positive amount represents a net payable for MISO while a negative value represents a net receivable for MISO.
= $\Sigma_{JOA\text{-}FG}$ DA_JOA_FG

D.13.2.3 Calculation Inputs for the Real-Time Portion of MISO JOA Uplift

MISO_RT_SP — Hourly MISO Real-Time Shadow Price for a single Flowgate ($/MWh); the Real-Time Energy and Operating Reserve Market clearing price for a Flowgate is equivalent to the cost of congestion across the defined flowgate per MWh. There are many flowgates between MISO and Counter Party ISOs. Each Flowgate will have a unique Shadow Price per Hour.

CP_RT_SP — Hourly Counter Party ISO Real-Time Shadow Price for a single Flowgate ($/MWh); the Real-Time Energy and Operating Reserve Market clearing price for a Flowgate is equivalent to the cost of congestion across the defined flowgate per MWh. There are many flowgates between MISO and Counter Party ISOs. Each Flowgate will have a unique Shadow Price per Hour.

DA_MW_RESPONSE — Hourly MWh Adjustment to a Day-Ahead MISO FFE Flowgate (MWh); a positive value indicates that MISO requested additional FFEs and a negative value indicates that the Counter Party ISO requested additional FFEs. Please refer to the previously defined calculation definition of this component.

MISO_RT_MF — Hourly MISO Real-Time Energy and Operating Reserve Market Flow for a Flowgate (MWh); this value is the actual megawatt flow that occurred across the flowgate for an Hour.

CP_RT_MF	Hourly Counter Party ISO Real-Time Energy and Operating Reserve Market Flow for a Flowgate (MWh); this value is the actual megawatt flow that occurred across the flowgate for an Hour.
CP_FFE	ISO Counter Party FFE for a Flowgate (MWh); the allowable flowgate capacity for the ISO.
MISO_FFE	MISO FFE for a Flowgate (MWH); the allowable flowgate capacity for MISO.
RTO_MON	Real-Time Flowgate Monitoring ISO ("MISO" or "PJM"); every flowgate has a designated ISO as the monitoring party. This value designates the monitoring ISO.

D.13.2.4 Intermediate Calculations for Determining Real-Time Portion of MISO JOA Uplift

MISO_RT_JOA	Hourly MISO Real-Time JOA ($); the total MISO Real-Time cost for all JOA flowgates for a single Hour. A positive amount represents a net payable for MISO while a negative value represents a net receivable for MISO.

= $\Sigma_{JOA\text{-}FG}$ (
if(MON_RTO = “MISO”,
Then if (0 > (CP_FFE + DA_MW_RESPONSE) > CP_RT_MF ,
Then if (CP_RT_MF > (CP_FFE + DA_MW_RESPONSE),
Then if ((CP_FFE + DA_MW_RESPONSE) < 0 < CP_RT_MF,
Then if ((CP_FFE + DA_MW_RESPONSE) < CP_RT_MF < 0,
Then if ((CP_FFE + DA_MW_RESPONSE) < 0 = CP_RT_MF,
Then if (0 < CP_RT_MF < (CP_FFE + DA_MW_RESPONSE),
Then if (CP_RT_MF < 0 < (CP_FFE + DA_MW_RESPONSE),
Then (((CP_FFE + DA_MW_RESPONSE) – CP_RT_MF) * CP_SP),
Else (((CP_FFE + DA_MW_RESPONSE) – CP_RT_MF) * CP_SP),
End if),
Else (0),
End if),
Else (0),
End if),
Else (CP_RT_MF * MISO_SP),
End if),
Else ((CP_RT_MF – (CP_FFE + DA_MW_RESPONSE)) * MISO_SP),
End if),

```
    Else (((CP_FFE + DA_MW_RESPONSE) – CP_RT_MF) * CP_SP),
    End if ),
```

```
= if ( MON_RTO <> "MISO",
   Then if ( 0 > (MISO_FFE + DA_MW_RESPONSE) > MISO_RT_MF,
      Then if (MISO_RT_MF > (MISO_FFE + DA_MW_RESPONSE),
          Then if ((MISO_FFE + DA_MW_RESPONSE) < 0 < MISO_RT_MF,
             Then if ((MISO_FFE + DA_MW_RESPONSE) < MISO_RT_MF < 0,
                Then if ( (MISO_FFE + DA_MW_RESPONSE) < 0 = MISO_RT_MF,
                   Then if ( 0 < MISO_RT_MF < (MISO_FFE + DA_MW_RESPONSE),
                        Then if ( MISO_RT_MF < 0 < (MISO_FFE + DA_MW_RESPONSE),
                        Then (((MISO_FFE + DA_MW_RESPONSE) – MISO_RT_MF) * MISO_SP),
                   Else (((MISO_FFE + DA_MW_RESPONSE) – MISO_RT_MF) * MISO_SP),
                   End if ),
                  Else ( 0 ),
                End if ),
             Else ( 0 ),
             End if ),
           Else (MISO_RT_MF * CP_SP),
           End if ),
        Else ((MISO_RT_MF – (MISO_FFE + DA_MW_RESPONSE)) * CP_SP),
        End if ),
    Else (((MISO_FFE + DA_MW_RESPONSE) – MISO_RT_MF) * MISO_SP),
    End if ),
)
```

MISO_RT_JOA_AP	<u>Hourly MISO Real-Time JOA Accounts Payable</u> ($); the total MISO accounts payable for all JOA flowgates for a single Hour. = IF (MISO_RT_JOA > 0 , THEN MISO_RT_JOA , ELSE 0)
MISO_RT_JOA_AR	<u>Hourly MISO Real-Time JOA Accounts Receivable</u> ($); the total MISO accounts receivable for all JOA flowgates for a single Hour. = IF { MISO_RT_JOA < 0 , THEN [MISO_RT_JOA * (-1)] , ELSE 0 }

D.13.2.5 Intermediate Calculations for Determining MISO JOA Uplift

MAX	The mathematical maximum of the series of numbers in the succeeding parentheses.

MISO_DA_HR_CG_FOR_JOA Total MISO Day-Ahead Hourly Congestion Fund Available to Fund Day-Ahead JOA Account Payable ($); represents the total available dollars for funding JOA shortfalls. In the event this fund is not sufficient to fully fund the Day-Ahead JOA Accounts Payable, any additional funds are collected through the Day-Ahead Revenue Neutrality Uplift Charge Type. Please refer to the previously defined calculation definition of this component.

MISO_DA_JOA_UPLIFT Total MISO Day-Ahead Hourly JOA Uplift ($); Represents the amount of JOA accounts payable that did not get funded from the Day-Ahead Congestion Fund that must be uplifted to AOs.
= MAX [0 , (MISO_DA_JOA_AP - MISO_DA_HR_CG_FOR_JOA)]

MISO_RT_HR_CG_FOR_JOA Total MISO Real-Time Hourly Congestion Fund Available to Fund Real-Time JOA Account Payable ($); represents the total available dollars for funding JOA shortfalls. In the event this fund is not sufficient to fully fund the Real-Time JOA Accounts Payable, any additional funds are collected through the Real-Time Revenue Neutrality Uplift Charge Type. Please refer to the previously defined calculation definition of this component.

MISO_RT_JOA_UPLIFT Total MISO Real-Time Hourly JOA Uplift ($); Represents the amount of JOA Accounts Payable that did not get funded from the Real-Time Congestion Fund that must be uplifted to AOs.
= MAX [0 , (MISO_RT_JOA_AP - MISO_RT_HR_CG_FOR_JOA)]

*^JOA_MISO_UPLIFT Total MISO Hourly Revenue JOA Uplift ($); Represents the total Day-Ahead and Real-Time JOA that did not get funded from congestion that must be uplifted to AOs.
= MISO_DA_JOA_UPLIFT + MISO_RT_JOA_UPLIFT

D.13.3 Option B Grandfathered Agreement Financial Schedule Congestion Rebate Distribution Amount Uplift

The Real Time GFAOB Congestion Rebate Distribution Amount represents the congestion rebates that were not funded from MISO held Option B FTRs.

GFAOB Transactions are charged the Marginal Cost of Congestion of the LMP per the Day-Ahead FBT Congestion Amount (DA_FIN_CG) charge type. The charges are rebated to the AO per the Day-Ahead Congestion Rebate on GFAOBs Amount

(DA_GFAOB_RBT_CG) charge type. The congestion charge rebate is primarily funded through MISO held FTRs revenues representing the Option B (GFA or ECCH) transaction volume. Any funding shortfall is collected from AOs in this uplift.

For additional information on GFAOBs Congestion Rebates, please refer to the Market Settlements BPM.

D.13.3.1 Calculation Inputs for MISO_RT_GFAOB_DIST

There are no calculation inputs.

D.13.3.2 Intermediate Calculations for MISO_RT_GFAOB_DIST

MAX	The mathematical maximum of the series of numbers in the succeeding parentheses.
MISO_OB_FTR_TARG_CR	Total Hourly Option B FTR Target Credit Allocation Amount for MISO Held Option B FTRs ($); this value represents the total target hourly FTR credits for MISO held Option B FTRs provided there are sufficient congestion dollars available. Please refer to the previously defined calculation definition of this component.
FTR_HR_ALC_FCT	Hourly MISO FTR Allocation Factor (factor); this factor determines on an hourly basis the pro rata payout of collected congestion dollars divided by the total target FTR credits for the same hour. A factor of one indicates that there was sufficient congestion to fully fund all FTRs for the hour. Please refer to the previously defined calculation definition of this component.
DA_GFAOB_RBT_CG_HR	Hourly Day-Ahead Congestion Rebate on GFAOB Transaction Amount ($); The result represents the AO's total hourly rebate of charges and credits per Commercial Pricing Node that were assessed in the Day-Ahead FBT Congestion Amount on Option B Transactions. Please refer to the previously defined calculation definition of this component.
MISO_GFAOB_RBT_CG	Hourly MISO GFAOB Congestion Rebates ($); the total of all congestion dollars rebated on Option B Grandfathered Day-Ahead Transactions per Hour. $= \Sigma_{MISO}$ (DA_GFAOB_RBT_CG_HR)

*^MISO_RT_GFAOB_DIST	Hourly Real Time GFAOB Congestion Rebate Distribution Amount ($); the total amount needed to fund the Day-Ahead GFAOB Transaction congestion rebates that did not get funded from MISO held FTRs. This amount is limited so that excess congestion is not distributed through this charge type. = MAX { 0 , [(-1) * MISO_GFAOB_RBT_CG] - [(-1) * FTR_HR_ALC_FCT * MISO_OB_FTR_TARG_CR] }

D.13.4 Carved-Out Grandfathered Agreement Congestion Rebate Distribution Amount Uplift

The Real Time Carved-Out GFA Congestion Rebate Distribution Amount (MISO_RT_GFACO-DIST) represents the congestion rebates that were not funded from MISO held Carved-Out FTRs.

Day-Ahead Carved-Out GFA Transactions are charged the Marginal Cost of Congestion of the LMP per the Day-Ahead FBT Congestion Amount (DA_FIN_CG) charge type. The charges are rebated to the AO per the Day-Ahead Congestion Rebate on Carved-Out GFAs Amount (DA_GFACO_RBT_CG) charge type. The congestion charge rebate is primarily funded through MISO held FTRs revenues representing the Carved-Out GFA volume. Any funding shortfall is collected from AOs in this uplift.

Real-Time Carved-Out GFA Transactions are charged the Marginal Cost of Congestion of the LMP per the Real-Time FBT Congestion Amount (RT_FIN_CG) charge type. The charges are rebated to the AO per the Real-Time Congestion Rebate on Carved-Out GFAs Amount (DA_GFACO_RBT_CG) charge type. The congestion charge rebate is primarily funded through MISO held FTRs revenues representing the Carved-Out GFA volume. Any funding shortfall is collected from AOs in this uplift.

For additional information on Carved-Out GFAs Transactions, please refer to the Market Settlements BPM.

D.13.4.1 Calculation Inputs for MISO_RT_GFACO_DIST

There are no calculation inputs.

D.13.4.2 Intermediate Calculations for MISO_RT_GFACO_DIST

MAX	The mathematical maximum of the series of numbers in the succeeding parentheses.
MISO_CO_FTR_TARG_CR	Total Hourly Carved-Out FTR Target Credit Revenue Allocation Amount for MISO Held Carved-Out FTRs ($); this value represents the total target hourly FTR credits for MISO held Carved-Out FTRs provided there are sufficient congestion dollars available. Please refer to the previously defined calculation definition of this component.

FTR_HR_ALC_FCT — Hourly MISO FTR Allocation Factor (factor); this factor determines on an hourly basis the pro rata payout of collected congestion dollars divided by the total target FTR credits for the same Hour. A factor of one indicates that there was sufficient congestion to fully fund all FTRs for the Hour. Please refer to the previously defined calculation definition of this component.

DA_GFACO_RBT_CG_HR — Hourly Day-Ahead Congestion Rebate on Carved-Out GFA Transaction Amount ($); the result represents the AO's total hourly rebate of charges and credits per Commercial Pricing Node that were assessed in the Day-Ahead FBT Congestion Amount on Carved-Out GFA Transactions. Please refer to the previously defined calculation definition of this component.

MISO_DA_GFACO_RBT_CG — Hourly MISO Day-Ahead Carved-Out GFA Congestion Rebates ($); the Day-Ahead total of all congestion dollars rebated on Carved-Out Grandfathered Day-Ahead Transactions per Hour.
$= \Sigma_{MISO}$ (DA_GFACO_RBT_CG_HR)

RT_GFACO_RBT_CG_HR — Hourly Real-Time Congestion Rebate on Carved-Out GFA Transaction Amounts ($); this calculation is performed for Commercial Pricing Nodes where the AO has Real-Time Carved-Out GFA Transactions. The result represents the AO's total hourly congestion rebate of charges and credits that were assessed in the Real-Time FBT Congestion Amount charge type related to Real-Time Carved-Out GFA Transactions. Please refer to the previously defined calculation definition of this component.

MISO_RT_GFACO_RBT_CG — Hourly MISO Real-Time Carved-Out GFA Congestion Rebates ($); the Real-Time total of all congestion dollars rebated on Carved-Out Grandfathered Real-Time Transactions per Hour.
$= \Sigma_{MISO}$ (RT_GFACO_RBT_CG_HR)

^*MISO_RT_GFACO_DIST — Hourly Total Carved-Out GFA Congestion Rebate Distribution Amount ($); the total amount needed to fund the Day-Ahead and Real-Time Carved-Out GFA Transaction congestion rebates that did not get funded from MISO held Carved-Out FTRs. This amount is limited so that excess congestion is not distributed through this charge type.

= MAX { 0 , [(-1) * (MISO_DA_GFACO_RBT_CG + MISO_RT_GFACO_RBT_CG)] -
[(-1) * FTR_HR_ALC_FCT * MISO_CO_FTR_TARG_CR] }

D.13.5 Real-Time Revenue Sufficiency Guarantee Make Whole Payments Second Pass Distribution Uplift

The Real-Time (RT) Revenue Sufficiency Guarantee (RSG) Make Whole Payment (MWP) Second Pass Distribution Uplift is the secondary funding mechanism for the RT RSG MWP Amount credited to AOs.

RT RSG Second Pass distribution is used to fund RT RSG MWPs attributable to Transmission De-rates and Topology Adjustments, Intra-Hour Demand Changes, and any residual amount not otherwise attributable to the two aforementioned reasons or collected via RT RSG MWP First Pass distribution. The total Real-Time RSG Second Pass Distribution Amount Uplift is collected from AOs based on their Real-Time LRS in this charge type.

D.13.5.1 Calculation Inputs for MISO_RT_RSG_DIST2

CANCEL_FL	Hourly Real-Time Unit Commitment Cancellation Flag (flag); represents if a given RAC commitment has been cancelled by MISO. 'Y' means yes and 'N' means no.
RT_RSG_ASSET_CR_HR	Hourly Real-Time RSG Credit Amount for a Generation Resource asset ($); this is the hourly credit amount that a Generation Resource receives for the Real-Time Energy and Operating Reserve Market.
*RT_RSG_DIST1_HR	Hourly Real-Time RSG First Pass Distribution Amount ($); for an AO. Please refer to the description of RT_RSG_DIST1 in this document for more details about this determinant.

D.13.5.2 Intermediate Calculations for MISO_RT_RSG_DIST2

*MISO_RT_RSG_DIST1	Hourly MISO Real-Time RSG First Pass Distribution Amount ($); represents the sum of all RSG First Pass Distribution Amounts charged to all AOs. = $\sum_{MISO}$ (RT_RSG_DIST1_HR)

*MISO_RT_RSG_MWP — Hourly MISO Real-Time RSG MWPs Total Amount ($); represents the sum of all Real-Time RSG Make-Whole Payments, excluding commitment cancellations.
=∑ MISO (IF CANCEL_FL = 'Y' THEN 0, ELSE RT_RSG_ASSET_CR_HR)

*MISO_RT_RSG_MWP_CNCL — Hourly Real-Time RSG MWP Amount ($); for an AO. The result is rounded to the nearest cent. This amount represents the total amount for the Operating Hour paid to units whose commitments were subsequently cancelled.
= $\sum_{MISO}$ (IF CANCEL_FL = 'Y' THEN RT_RSG_ASSET_CR_HR , ELSE 0)

*^MISO_RT_RSG_DIST2 — Hourly MISO Real-Time RSG Second Pass Distribution Uplift Amount ($); the hourly amount is only calculated when total Make Whole Payments exceed the amount which can be distributed via the first pass charge type (RT_RSG_DIST1).
= [MISO_RT_RSG_MWP * (-1)] - MISO_RT_RSG_DIST1 + [MISO_RT_RSG_MWP_CNCL * (-1)]

D.13.6 Real Time Contingency Reserve Deployment Failure Charge Uplift Amount

The Real-Time Contingency Deployment Failure Charge Uplift Amount represents the offsetting credits to the Revenue Neutrality Uplift Charge Type funded by the charges incurred by Resources that fail to deploy Contingency Reserves at or above the Contingency Reserve Deployment Instruction. The mentioned charge to generation consists in the Real-Time Contingency Deployment Failure Charge Amount (RT_ASM_CRDFC).

D.13.6.1 Calculation Inputs for MISO_CRDFC_UPLIFT

*MISO_CRDFC_UPLIFT — Hourly Real-Time Contingency Response Deployment Failure Uplift Amount ($); this represents the total funds collected through the RT_ASM_CRDFC Charge Type from all AOs.

D.13.6.2 Intermediate Calculations for MISO_CRDFC_UPLIFT

There are no intermediate calculations.

D.13.7 Price Volatility Make-Whole Payment Uplift

The Real-Time Price Volatility Make-Whole Payment Uplift Amount represents the charges to the Revenue Neutrality Uplift Charge Type used to fund the credits received by Resources through the Real Time Price Volatility Make-Whole Payment Amount Charge Type (RT_PV_MWP).

D.13.7.1 Calculation Inputs for MISO_PV_MWP_UPLIFT

*MISO_PV_MWP_UPLIFT	Hourly Real-Time Price Volatility Make-Whole Payment Uplift Amount ($); this represents the total funds collected through the RT_PV_MWP Charge Type from all AOs.

D.13.7.2 Intermediate Calculations for MISO_PV_MWP_UPLIFT

There are no intermediate calculations.

D.13.8Demand Response Compensation Uplift

The Real-Time Demand Response Compensation Uplift is the secondary funding mechanism for the Demand Response Allocation Uplift Amount credited to AOs.

Demand Response Compensation Uplift represents the compensation amount not recovered from the Demand Response Allocation Uplift (RT_DRR_UPL). The total Demand Response Compensation Uplift is collected from AOs based on their Real-Time LRS in this charge type (MISO_DRR_COMP_UPL).

D.13.8.1 Calculation Inputs for MISO_DRR_COMP_UPL

DRR_COMP_{ZN}	Demand Response Resource Compensation by Reserve Zone: For each Reserve Zone, the Hourly Demand Response Resource Compensation.
$DRR\_COMP\_VOL_{zn}$	Demand Response Reserve Zone Compensation Volume (MWh); for a Reserve Zone with Demand Response Resource. The result represents the load adjustment determined by the LMP and the Net Benefit Price Threshold.
$ZN\_RT\_EN\_PUR\_VOL_{ZN}$	Hourly Real-Time Energy Purchases Volume for a Reserve Zone (MWh);

D.13.8.2 Intermediate Calculations for MISO_DRR_COMP_UPL

*MISO_DRR_COMP_UPL — Hourly MISO Real-Time Demand Response Compensation Uplift ($); the hourly amount is only calculated when total Demand Response compensation amount exceeds the amount which can be distributed via the first pass charge type (RT_DRR_UPL).

$$= \sum DRR\_COMP_{ZN} * \{ 1 - MIN [(ZN\_RT\_EN\_PUR\_VOL_{ZN} / DRR\_COMP\_VOL_{zn}) , 1] \}$$

D.13.9Real-Time Total Mileage Uplift

The Real-Time Total Mileage Uplift is the funding mechanism for the Additional Regulation Mileage Uplift Amount credited to AOs though Real Time Regulation Amount (RT_ASM_REG) and the amount charged to AOs through RT_ASM_EXE_DFE_DEP for Failure Mileage Performance Test.

D.13.9.1 Calculation Inputs for MISO_TOT_MIL_UPL

*ADD_REG_MIL_VOL — Additional Regulation Mileage Volume (MWh); at a Commercial Pricing Node. The amount of Target Regulation Mileage above the Hourly Real-Time Cleared Regulating Reserve.

*MISO_EDEDC_FMPT_UPL — Hourly Real-Time Excessive/Deficient Energy Deployment Charge Uplift Amount for Failure Regulating Mileage Performance Test ($); The total amount collected through the RT_ASM_EXE_DFE_DEP Charge Type from all AOs for Failure Mileage Performance Test (RT_ASM_EXE_DFE_DEP_MIL_HR).

*RT_REG_MIL_MCP — Real-Time Regulation Mileage Market Clearing Price ($/MW); at a Commercial Pricing Node.

D.13.9.2 Intermediate Calculations for MISO_TOT_MIL_UPL

*MISO_FMPT_UPL — Hourly MISO Real-Time Failure Mileage Performance Test Uplift ($). The amount collected through the Failure Mileage Performance Test (RT_ASM_EXE_DFE_DEP_MIL_HR) in RT_ASM_EXE_DFE_DEP.
= (-1) * MISO_EDEDC_FMPT_UPL

*MISO_MIL_COMP_UPL — Hourly MISO Real-Time Mileage Compensation Uplift ($). This is the compensation to Resources that provide frequency regulation service based on MISO Instructions.
$= \sum_{MISO} (ADD\_REG\_MIL\_VOL_{CN} * RT\_REG\_MIL\_MCP_{CN})$

*MISO_TOT_MIL_UPL — Hourly MISO Real-Time Mileage Uplift ($). The sum of MISO Real-Time Failure Mileage Performance Test Uplift and MISO Real-Time Mileage Compensation Uplift.
= MISO_FMPT_UPL + MISO_MIL_COMP_UPL

D.13.10 Ramp Capability Distribution Uplift

The Ramp Capability Distribution Uplift is the funding mechanism for the Day-Ahead Ramp Capability Amount and Real-Time Ramp Capability Amount credited to AOs.

The total Ramp Capability Distribution Uplift is collected from AOs based on their Real-Time LRS in this charge type.

D.13.10.1 Calculation Inputs for MISO_RC_DIST

DA_RC_AMT_HR — Hourly Day-Ahead Ramp Capability Amount ($); Please refer to the description of DA_RC_AMT in this document for more details about this determinant.

RT_RC_AMT_HR — Hourly Real-Time Ramp Capability Amount ($); Please refer to the description of RT_RC_AMT in this document for more details about this determinant.

D.13.10.2 Intermediate Calculations for MISO_RC_DIST

*^MISO_RC_DIST — Hourly MISO Ramp Capability Distribution Uplift ($); the hourly amount is the sum of the Hourly Day-Ahead Ramp Capability Amounts and Hourly Real-Time Ramp Capability Amount.

$= \sum_{Hour} (DA\_RC\_AMT\_HR, RT\_RC\_AMT\_HR)$

D.13.11 Calculation Inputs for RT_RNU

$*RT\_PHYS_{Buyer}$ — Hourly Real-Time PBT Volume where the AO is the Buyer (MWh); a Buyer is defined as an AO that receives energy from MISO, at a MISO defined Interface Commercial Pricing, for export out of MISO.

$*RT\_PHYS_{Seller}$ — Hourly Real-Time PBT Volume where the AO is the Seller (MWh); a Seller is defined as an AO that supplies energy to MISO, at a MISO defined Interface Commercial Pricing Node, for import into MISO.

D.13.11.1 Intermediate Calculations for RT_RNU

*^RI_UPLIFT — Total MISO Hourly Revenue Inadequacy Uplift ($); Represents the total Day-Ahead and Real-Time Revenue Inadequacy that did not get funded from congestion that must be uplifted to AOs. Please refer to the previously defined calculation definition of this component.

*^JOA_MISO_UPLIFT	Total MISO Hourly Revenue JOA Uplift ($); Represents the total Day-Ahead and Real-Time JOA that did not get funded from congestion that must be uplifted to AOs. Please refer to the previously defined calculation definition of this component.
*^MISO_RT_GFAOB_DIST	Hourly Real Time GFAOB Congestion Rebate Distribution Amount ($); the total amount needed to fund the Day-Ahead GFAOB Transaction congestion rebates that did not get funded from MISO held FTRs. Please refer to the previously defined calculation definition of this component.
^MISO_RT_GFACO_DIST	Hourly Total Carved-Out GFA Congestion Rebate Distribution Amount ($); the total amount needed to fund the Day-Ahead and Real-Time Carved-Out GFA Transaction congestion rebates that did not get funded from MISO held Carved-Out FTRs. Please refer to the previously defined calculation definition of this component.
*^MISO_RT_RSG_DIST2	Hourly MISO Real-Time RSG Second Pass Distribution Uplift Amount ($); the hourly amount is only calculated when MISO Real-Time committed volume exceeds the total MISO Real-Time RSG Distribution Volume. Please refer to the previously defined calculation definition of this component.
*^MISO_RC_DIST	Hourly MISO Ramp Capability Distribution Uplift ($); the hourly amount is the sum of the Hourly Day-Ahead Ramp Capability Amounts and Hourly Real-Time Ramp Capability Amount.
MISO_RT_RNU	MISO Hourly Revenue Neutrality Adjustment Credit or Charge Amount ($); the total hourly Revenue Neutrality Amount to be dispersed to AOs. = RI_UPLIFT + JOA_MISO_UPLIFT + MISO_RT_RSG_DIST2 + MISO_RT_GFAOB_DIST + MISO_RT_GFACO_DIST + MISO_CRDFC_UPLIFT + MISO_PV_MWP_UPLIFT + MISO_DRR_COMP_UPL + MISO_TOT_MIL_UPL + MISO_RC_DIST
N_GFA_ARC	Hourly Real-Time Billable Schedule less Grandfathered Agreement Transaction Volume and Real-Time ARC Adjustment (MWh); please refer to the previously defined calculation definition of this component.
RT_PHYS_EXP	Hourly Total Real-Time Physical Export Volume for an AO (MWh); the daily sum of PBT export volumes originating inside of MISO, excluding EAR Export Schedules and CTS transactions. Each transaction is evaluated on its own and then summed per AO. Note that the following

equation nets out physical schedule imports and wheel through transactions. This total results in the exclusion of wheel through transactions and imports.

= $\Sigma_{AO\text{ - Transactions}}$ (MAX { [IF RT_PHYS_TYPE = 'CTS' THEN 0 ELSE RT_PHYS_{Buyer}] + [RT_PHYS_{Seller} * (-1)] , 0 })

AO_LRS_VOL

Hourly AO Total LRS Volume (MWh); represents the total load volume including physical exports (Wheel-Out transactions) out of MISO for an AO. Physical exports do not include pseudo tie schedules or Carved-Out Grandfather Agreement Transactions.

= Σ_{AO} [IF (N_GFA_ARC > 0 , THEN N_GFA_ARC , ELSE 0)] + RT_PHYS_EXP

*^$MISO\_LRS\_FCT_{AO}$

AO to MISO LRS Factor (factor); the ratio of an AO's total positive meter volumes (Load) divided by MISO total. The result is an hourly factor per AO that is rounded to eight decimal places.

= AO_LRS_VOL / Σ_{MISO} (AO_LRS_VOL)

D.13.11.2 Charge Type Calculation for RT_RNU

*^RT_RNU _HR

Hourly Real-Time Revenue Neutrality Uplift Amount for an AO ($); the result is rounded to the nearest cent. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement.

= $MISO\_LRS\_FCT_{AO}$ * MISO_RT_RNU

*RT_RNU

Daily Real-Time Revenue Uplift Amount for an AO ($); the formula result is displayed in dollars.

= Σ_H (RT_RNU_HR)

D.14 Real-Time Revenue Sufficiency Guarantee First Pass Distribution Amount (RT_RSG_DIST1)

The Real-Time Revenue Sufficiency Guarantee Make Whole Payment Amount (RT_RSG_MWP) is funded hourly by MISO primarily using the Real-Time RSG First Pass Distribution Amount (RT_RSG_DIST1) charge type.

The RT_RSG_MWP credits are the direct result of having insufficient Resources cleared in the Day-Ahead Energy and Operating Reserve Market to meet the requirements of the Real-Time Energy and Operating Reserve Market. The Day-Ahead process clears generation to meet the Load requirements bid into the Day-Ahead Energy and Operating Reserve Market. The RAC process commits additional Resources to meet Load and system conditions in the Real-Time Energy and Operating Reserve Market.

Deviation volume calculations are only performed for non-dispatchable units in bill determinants that contain the term “NDSP”. EAR Export Schedules are excluded from the deviation calculations for Physical Export Imbalance Volume. Coordinated Transaction Schedules (CTS) are excluded from the deviation calculations for Physical Import Imbalance Volumes and Physical Export Imbalance Volumes.

RT_RSG_DIST1 is comprised of three major bill determinant components:

- CMC_DIST – Constraint Management Charge Distribution Amount
- VLR_DIST – Voltage and Local Reliability Charge Distribution Amount
- DDC_DIST – Day-Ahead Deviation and Headroom Charge Distribution Amount

An asterisk (*) denotes a billing determinant that is displayed on an AO’s Real-Time statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the *Market Settlements BPM.*

D.14.1Calculation Inputs for RT_RSG_DIST1

Intermediate Calculations used as inputs to other Intermediate Calculations are defined in the Intermediate Calculation sections of this Charge Type.

*AC_ECON_MAX	Committed Economic Maximum Volume (MWh); represents the economic maximum limit for a resource at the time of commitment.
*AC_ECON_MIN	Committed Economic Minimum Volume (MWh); represents the economic minimum limit for a resource at the time of commitment.
ATC_CMC_TA_TDR_VOL	Hourly Active Transmission Constraint Management Charge Topology Adjustment / Transmission De-rate Volume (MWh); represents the total Megawatt volume of Topology Adjustments or Transmission De-rates for a given Active Transmission Constraint.
CANCEL_FL	Hourly Real-Time Unit Commitment Cancellation Flag (flag); represents if a given RAC commitment has been cancelled by MISO. 'Y' means yes and 'N' means no.
*CCF	Constraint Contribution Factor (FCT); represents the impact that an incremental increase or decrease in flow of one MW has on a given Active Transmission Constraint. This factor is determined through an analysis of relevant contingencies.
*CMC_ALC_FCT	Constraint Management Factor (FCT): represents the percentage that a given MWP is attributable to a commitment made to manage an Active Trasnmission Constraint.
~~*D1_NI_PBK~~	~~Day 1 Net Inadvertent Payback Volume (MWh); the hourly amount of Day One Inadvertent Payback megawatts a LBA is either paying back or is receiving. Each LBA, working with a MP, selects a single generator within the LBA area to act as the asset being impacted by any megawatts being paid back or received. A positive value represents load while a negative value represents additional generation.~~
*DA_REG_VOL	Hourly Day-Ahead Cleared Regulation Volume (MWh); the amount of Regulating Reserve cleared in the Day-Ahead Energy and Operating Reserve Market by a qualified Resource.

*DA_PHYS	Hourly Day-Ahead Physical Schedule Volume (MWh); represents the Import, Export, or Wheel Through volume for a Day-Ahead Physical Schedule.
*DA_SCHD	Hourly Day-Ahead Asset Injection or Withdrawal Schedule Volume (MWh); this hourly volume is the market cleared load bid or supply offer volume by asset. Load bid volumes are represented as positive values; supply offer volumes are represented as negative values.
*DA_SPIN_VOL	Hourly Day-Ahead Cleared Spinning Reserve Volume (MWh); the amount of Spinning Reserve cleared in the Day-Ahead Energy and Operating Reserve Market by a qualified Resource.
*DA_SUPP_VOL	Hourly Day-Ahead Cleared Supplemental Reserve Volume (MWh); the amount of Supplemental Reserve cleared in the Day-Ahead Energy and Operating Reserve Market by a qualified Resource.
*DA_VSCHD	Hourly Day-Ahead Net Virtual Schedule Volume (MWh); the Day-Ahead Net Virtual Schedule Volume is the net market cleared Bid and Offered Virtual Schedules by AO by Commercial Pricing Node. A positive volume represents a net Load obligation and a negative volume represents a net supply obligation.
*DEV_EXEMPT	Hourly RSG Distribution Liability Exemption Flag (flag); at a Commercial Pricing Node. This binary nature (value of “Y” or “N”) data point results in the elimination of RSG Distribution megawatt volume for this asset in hours where DEV_EXEMPT = “Y.
*DEV_EXEMPT_PHYS	Hourly RSG Distribution Liability Exemption Flag (flag); for an AO, for a specific Physical Schedule. This binary nature (value of “Y” or “N”) data point results in the elimination of RSG Distribution megawatt volume for this Physical Schedule in hours where DEV_EXEMPT_PHYS = “Y”.
*DFE	Hourly Deficient Resource Energy Volume (MWh); for an AO at a Commercial Pricing Node. This value represents the energy output of a Resource below the Deficient Energy threshold. The DFE volume is always presented as a positive value.
*DRR_ADJ_MTR	Demand Response Resource MW Reduction Volume (MWh); These values are derived from submitted Meter Data provided by the Asset Owner of a Demand Response Resource.

*EEEF	Hourly Excessive Energy Exemption Flag (flag); at a Commercial Pricing Node. This binary nature (value of "Y" or "N") data point results in the Excessive Energy Volume to be settled at LMP rather than the Excessive Energy Price when the exemption is issued (EEEF="Y").
*EXE	Hourly Excessive Resource Energy Volume (MWh); for an AO at a Commercial Pricing Node. This value represents the energy output of a Resource beyond the Excessive Energy threshold. The EXE volume is always presented as a positive value.
ICPSL_FCT	Daily Internally Commercially Pseudo-tied Load Factor (FCT); The Daily Load Weighing Factor for an EP Node internally commercially pseudo tied to a CP Node. This factor is calculated in DART.
*LRS_XMPT	Nodal Exemption of Withdrawal from Load Ratio Share (Flag); a "Y" value indicates that withdrawal at the Commercial Pricing Node is not included in an AO's Load Ratio Share for the Operating Day.
*NAI	Hourly Net Actual Interchange (NAI) Volume (MWh); the summed, measured unilateral interchange of an LBA. These values are provided by the LBA Operator to MISO. NAI for an LBA will display on the Real-Time Market Settlement statement for the AO that is the Residual Load Holder.
*NDL_DMD_FCST	Hourly Notification Deadline Demand Forecast (MWh): for an AO at a Commercial Pricing Node. If the Notification Deadline Demand Forecast is not available, the Notification Deadline Demand Forecast will equal the Day-Ahead Schedule. The NDL_DMD_FCST volume is always presented as a positive value.
*NDL_ECON_MAX	Hourly Notification Deadline Economic Maximum Volume (MWh); represents the economic maximum limit for a generation asset at the Notification Deadline.
*NDL_ECON_MIN	Hourly Notification Deadline Economic Minimum Volume (MWh); represents the economic minimum limit for a generation asset at the Notification Deadline.
*NDL_FIN	Hourly Notification Deadline Financial Schedule Volume (MWh); represents Buyer or Seller side Financial Schedule Volume.

*NDL_NDSP_FCST	Hourly Notification Deadline Non-dispatchable Resource Forecast (MWh); represents the projected Real-Time injection volume of a Non-dispatchable (Intermittent) Resource in effect at the Notification Deadline. If the Notification Deadline Non-dispatchable Resource Forecast is not available, the Notification Deadline Non-dispatchable Resource Forecast will equal the Day-Ahead Schedule.
*NDL_PHYS	Hourly Notification Deadline Physical Schedule Volume (MWh); represents the Import, Export, or Wheel Through volume for a Physical Schedule at the Notification Deadline.
*NDL_SS_VOL	Hourly Notification Deadline Self-Schedule Volume (MWh): represents the Self-Schedule volume for a generation asset at the Notification Deadline.
*RSG_XMPT	Hourly RSG Distribution Liability Exemption Flag (flag); at a Commercial Pricing Node. This binary nature (value of “Y” or “N”) data point results in the elimination of RSG Distribution megawatt volume for this asset in hours where RSG_XMPT = “Y”.
*RT_ADJ_MTR	Hourly Real-Time Residual Load Volume (MWh); Residual Load due to unaccounted for energy in a LBA. Please refer to the description and calculation definition of this component located elsewhere in this document.
*RT_ICPSL_ACT_MTR	Hourly Real-Time Internally Commercially Pseudo-tied Load Metered Actual Volume (MWh); Hourly meter volume for an EP Node which is internally commercially pseudo tied into an internal LBA different than the associated CP Node's internal LBA. Metered volume may be actual or estimated provided by the MDMA.
RT_RSG_ASSET_CR_HR	Hourly Real-Time RSG Credit Amount for a Generation Resource asset ($); this is the hourly credit amount that a Generation Resource receives for the Real-Time Energy and Operating Reserve Market.
*RT_BLL_MTR	Hourly Real-Time Metered Billable Volume (MWh); billable asset volume. Please refer to the description and calculation definition of this component located elsewhere in this document.
*$RT\_BLL\_MTR_{GEN}$	Hourly Real-Time Metered Billable Volume for Generation (MWh); billable asset volume for Generation Resources, excluding DRR Type-II

	Resources. Please refer to the previously defined calculation definition of this component.
RT_DRRII_INJ_VOL	Hourly Real-Time DRR II Injection Volume (MWh); Energy injection volume for a DRR Type-II, calculated as minus one times the difference between the dispatch maximum and the billable meter load at the DRR Type-II bus. Please refer to the previously defined calculation definition of this component.
*RT_DSP_TARG_EN	Hourly Real-Time Dispatch Target for Energy (MWh); represents the hourly time-weighted integration of the Dispatch Interval, Dispatch Targets for Energy.
*RT_GFACO	Hourly Real-Time Carved-Out GFA Transaction Volume where the AO is the Buyer or Seller at a Commercial Pricing Node (MWh); a transaction related to a contract that has been specifically classified as a Grandfathered Carved-Out Transaction. All Day-Ahead Carved-Out GFA Transaction must have a corresponding Real-Time Carved-Out GFA Transaction, but a Real-Timed Carve-Out Grandfathered Transaction does not need to have a corresponding Day-Ahead Transaction. The buyer is defined as the AO that receives the transaction volume at the sink Commercial Pricing Node. The transaction volume is always presented as a positive value. If the AO is both the buyer and seller, the transaction will be listed once for each end of the transaction.
*RT_MAX_DSP	Hourly Real-Time Maximum Dispatchable Volume (MWh); the maximum dispatchable offer volume for a generation asset. This value is provided as a positive value.
*RT_MIN_DSP	Hourly Real-Time Minimum Dispatchable Volume (MWh); the minimum dispatchable offer volume for a generation asset. This value is provided as a positive value.
* RT_PHYS	Hourly a Real-Time Physical Schedule Volume (MWh); represents the Import, Export, or Wheel Through volume for a Real-Time Physical Schedule.
* RT_PHYS_TYPE	Real-Time Physical Schedule Type (value); the type code on a Real-Time Physical Schedule.

*RT_RSG_ELIGIBILITY — Real-Time RSG Eligibility (flag); an hourly flag that indicates whether an asset is eligible to receive their submitted production Offer for the Hour. A "Y" indicates the asset is eligible for the Hour and an "N" indicates the asset is not eligible for the Hour. Real-Time RSG eligibility status only displays on statements when production Offer values have been submitted and the generation facility has been selected to run as part of the RAC process. In the absence of any displayed values, the participant assumes the unit eligibility is "N". The RT_RSG_ELIGIBILITY is set to "Y" whenever the asset has been guaranteed to receive their Production Costs.

* VLR_ALC_FCT — Voltage and Local Reliability Allocation Factor; represents the percentage that a given MWP is attributable to a Voltage and Local Reliability Commitment and that will be allocated to Voltage and Local Reliability.

VLR_LBA_DIST_FCT — Voltage and Local Reliability Local Balancing Authority Distribtuion Factor; represents for a given, studied Voltage and Local Reliability Issue, the percentage that a given MWP is attributable to a Voltage and Local Reliability Commitment, adjusted for the VLR_ALC_FCT, and that will be allcoated to a given Local Banalcing Authority.

VLR_FL — Hourly Day-Ahead Voltage and Local Reliability Flag (flag): A value of "1" indicates an hourly MWP amount which is the result of a Resource called on for a Voltage and Local Reliability Commitment. A value of "0" indicates the hourly MWP amount is not the result of a Voltage and Local Reliability Commitment.

UNL_CAP_REQ — Unloaded Capacity Requirement (MWH); The amount of online, available generation Capacity above the generation Capacity needed to meet instantaneous total Load obligations that must be maintained to ensure online Resources are able to meet ramping requirements of all products cleared in the markets. This value is determined by MISO Operations personnel.

D.14.2Constraint Management Charge Distribution (CMC_DIST) Calculation

The CMC_DIST amount funds Real-Time RSG MWP Amount credits paid to units committed in the RAC to manage Active Transmission Constraints (ATCs). AO's assets and schedules with an adverse impact on a constraint are charged based on the amount of deviation and the Constraint Contribution Factor for the ATC.

D.14.2.1 Intermediate Calculations for CMC_DIST

AEI

Hourly Real-Time Actual Energy Injection Volume for RAC resources called on for constraint management purposes (MWh); represents the Real-Time Billable Meter injection volume for resources (other than DRR Type-II Resources), plus the calculated injection volume for DRR IIs, both types committed by the Transmission Provider in the RAC processes.
= MIN ($RT\_BLL\_MTR_{GEN}$ + RT_DRRII_INV_VOL, 0)

AEW

Hourly Actual Energy Withdrawal (MWh); this value represents the billable meter volume for load assets and DRR IIs, which is actual meter volume, or, if unavailable, Metered Alternate Volume, less LBA residual load volume (RT_ADJ_MTR)~~ and Day 1 Net Inadvertent Payback (D1_NI_PBK) volume~~. Please refer to the previously defined calculation definition of this component.

GEN_PERF

Hourly Generation Performance Volume (MWh); for a single Generation Resource. A positive value represents the actual performance of a Generation Resource. The Hourly Real-Time Billable Volume is used less any Residual Load volume when the Generation Resource is acting as the assigned Residual Load asset.
= MIN ($RT\_BLL\_ MTR_{GEN}$ + RT_DRRII_INV_VOL - RT_ADJ_MTR~~ – D1_NI_PBK ~~, 0) * -1

RT_CO_GEN_PCT

Hourly Real-Time Generation Carved-Out Grandfathered Agreement Transaction Ratio (%); The ratio of tagged Carved-Out transaction MW sourcing at the asset to the Maximum of the Day-Ahead Cleared Injection MW or the Real-Time Generation Performance.
= IF (MAX (-1 * ($DA\_ SCHD_{GEN}$ + DA_DRRII_SCHD_VOL GEN_PERF))= 0 , THEN 0, ELSE MIN { [$\Sigma_{Transactions}$ (RT_GFACO_{Seller}) / MAX (-1 * (DA_SCHD_{GEN} + DA_DRRII_SCHD_VOL), GEN_PERF)] , 1 })

RT_CO_LOAD_PCT

Hourly Real-Time Load Carved-Out Grandfathered Agreement Transaction Ratio (%); The ratio of tagged Carved-Out transaction MW sinking at the asset to the Real-Time Withdrawal MW.
= IF (RT_BLL_MTR <= 0 , THEN 0, ELSE MIN { [$\Sigma_{Transactions}$ (RT_GFACO_{Buyer}) / RT_BLL_MTR] , 1 })

The intermediate calculations in the following sections are performed for each Active Transmission Constraint for each Asset Owner.

MR_ADJ_DA_SCHD	Hourly Must Run Adjusted Day-Ahead Schedule (MWh); represents the Day-Ahead Schedule less Day-Ahead Regulation volume, upwardly adjusted to the Notification Deadline Economic Minimum volume value if below it. = MIN { MAX [MAX(NDL_ECON_MIN, NDL_SS_VOL) , (-1 * (DA_SCHD_{GEN} + DA_DRRII_SCHD_VOL)) – DA_REG_VOL] , NDL_ECON_MAX }
DR_ADJ_DA_SCHD	Hourly De-Rate Adjusted Day-Ahead Schedule (MWh); represents the Day-Ahead Schedule plus all Day-Ahead Regulation and Reserve volumes, upwardly adjusted to the Real-Time Economic Minimum in effect at the Notification Deadline. = MIN { MAX [MAX(NDL_ECON_MIN, NDL_SS_VOL) , (-1 * (DA_SCHD_{GEN} + DA_DRRII_SCHD_VOL) + DA_REG_VOL + DA_SPIN_VOL + (IF (-1 * DA_SCHD) > 0 THEN DA_SUPP_VOL ELSE 0)] , NDL_ECON_MAX }

The following calculations are for deviations from Day-Ahead to the Notification Deadline:

CMC_NDL_MR_VOL — Hourly Constraint Management Charge Notification Deadline Must Run Volume (MWh); represents increased resource capacity between the day-ahead clearing and notification deadline.

= IF RT_RSG_ELIGIBILITY = 'Y' OR RSG_XMPT = 'Y' THEN 0 ELSE

MAX { MAX(NDL_ECON_MIN, NDL_SS_VOL) - [(-1 * (DA_SCHD_{GEN} + DA_DRRII_SCHD_VOL)) - DA_REG_VOL] , 0 } * (1 - RT_CO_GEN_PCT) * CCF

CMC_NDL_DR_VOL — Hourly Constraint Management Charge Notification Deadline De-Rate Volume (MWh); represents decreased resource capacity between the day-ahead clearing and the notification deadline.

= IF RT_RSG_ELIGIBILITY = 'Y' OR RSG_XMPT = 'Y' THEN 0 ELSE

MIN { NDL_ECON_MAX – [(-1 * (DA_SCHD_{GEN} + DA_DRRII_SCHD_VOL)) + DA_REG_VOL + DA_SPIN_VOL + (IF (-1 * DA_SCHD) > 0 THEN DA_SUPP_VOL ELSE 0)] , 0 } * (1 - RT_CO_GEN_PCT) * CCF

CMC_NDL_LOAD_VOL — Hourly Constraint Management Charge Notification Deadline Load Imbalance Volume (MWh); represents load imbalance between the day-ahead clearing and the notification deadline . If the Real-Time Demand Forecast is not available, the Real-Time Demand Forecast will equal to the Day-Ahead Schedule.

= IF DEV_EXEMPT = 'Y' THEN 0 ELSE

(DA_SCHD – NDL_DMD_FCST) * (1 - RT_CO_LOAD_PCT) * CCF

CMC_NDL_VIRT_VOL — Hourly Constraint Management Charge Notification Deadline Virtual Transaction Imbalance Volume (MWh); represents the sum of the cleared Virtual Supply Offer and the cleared Virtual Bid Offer volumes for an hour. Virtual Transactions are net by AO by Commercial Pricing Node.

= (DA_VSCHD_{Seller} + DA_VSCHD_{Buyer}) * CCF

CMC_NDL_PHYS_IMP_VOL — Hourly Constraint Management Charge Notification Deadline Physical Import Imbalance Volume (MWh); represents any deviation between the Real-Time Import schedule at the Notification Deadline and the Day-

Ahead import schedule~~.~~. CTS transactions are excluded from this calculation.
= IF DEV_EXEMPT_PHYS = ’Y’ THEN 0
ELSEIF RT_PHYS_TYPE = ’CTS’ THEN 0
ELSE (NDL_PHYS_{Seller} - DA_PHYS_{Seller}) * CCF

CMC_NDL_PHYS_EXP_VOL

Hourly Constraint Management Charge Notification Deadline Physical Export Imbalance Volume (MWh); represents any deviation between the Day-Ahead Export schedule and the Real-Time export schedule at the Notification Deadline. CTS transactions are excluded from this calculation.
= IF DEV_EXEMPT_PHYS = ‘Y’ THEN 0
ELSEIF RT_PHYS_ TYPE = ‘CTS’ THEN 0
ELSE (DA_PHYS_{Buyer} – NDL_PHYS_{Buyer}) * CCF

CMC_NDL_FIN_VOL

Hourly Constraint Management Charge Notification Deadline Financial Schedule Volume (MWh); represents the negative of the Financial Schedule volume if the AO is the Seller at the Source or the Financial Schedule volume if the AO is the Buyer at the Sink. The Constraint Contribution Factor is determined at the Delivery Point. Any Real-Time Financial Schedule for Deviations must be confirmed before the Notification Deadline.
= [(-1 * NDL_FIN_{Seller}) + NDL_FIN_{Buyer}] * CCF_{DP}

CMC_NDL_DRR1_VOL

Hourly Constraint Management Charge Notification Deadline DRR Type-I Volume (MWh); represents any deviation between the Real-Time targeted demand reduction amount at the Notification Deadline and the Day-Ahead schedule.
= IF RSG_XMPT = ‘Y’ THEN 0 ELSE
[NDL_ECON_MIN - (-1 * DA_SCHD)] *
(1 - RT_CO_GEN_PCT) * CCF

CMC_NDL_NDSP_VOL

Hourly Constraint Management Charge Notification Deadline Non-Dispatchable Volume (MWh): represents any deviations between the Non-Dispatchable Forecast at the Notification Deadline and the Day-Ahead Schedule.

= IF RSG_XMPT = ‘Y’ THEN 0 ELSE
[NDL_NDSP_FCST – (-1 * DA_SCHD)] * (1 - RT_CO_GEN_PCT) * CCF

The following calculations are for deviations from the Notification Deadline to Real-Time:

CMC_RT_MR_VOL

Hourly Constraint Management Charge Real-Time Must Run Volume (MWh); represents increased resource capacity between the Notification Deadline and Real-Time.
= IF RT_RSG_ELIGIBILITY = 'Y' OR
RSG_XMPT = 'Y' THEN 0 ELSE
MAX (MAX (RT_MIN_DSP – MR_ADJ_DA_SCHD , 0) * (1 - RT_CO_GEN_PCT)
* CCF , 0)

CMC_RT_DR_VOL

Hourly Constraint Management Charge Real-Time De-Rate Volume (MWh); represents decreased resource capacity between the Notification Deadline and Real-Time.
= IF RT_RSG_ELIGIBILITY = 'Y' OR
RSG_XMPT = 'Y' THEN 0 ELSE
MAX { MIN [RT_MAX_DSP – DR_ADJ_DA_SCHD , 0] * (1 - RT_CO_GEN_PCT) * CCF , 0 }

CMC_RT_EXE_DFE_VOL

Hourly Constraint Management Charge Real-Time Excessive or Deficient Energy Volume (MWh); represents the amount of Excessive Energy or Deficient Energy.
= IF EEEF = 'Y' OR
RSG_XMPT = 'Y' THEN 0 ELSE
MAX { [EXE + (-1 * DFE)]
* (1 - RT_CO_GEN_PCT) * CCF , 0 }

CMC_RT_LOAD_VOL

Hourly Constraint Management Charge Real-Time Load Imbalance Volume (MWh); represents load imbalance between the Notification Deadline and Real-Time. If the Real-Time Demand Forecast is not available, the Real-Time Demand Forecast will equal the Day-Ahead Schedule.
= IF DEV_EXEMPT = 'Y' THEN 0 ELSE
MAX { ([NDL_DMD_FCST – (IF AEW > 0 THEN AEW ELSE AEI)] + DRR_ADJ_MTR) * (1 - RT_CO_LOAD_PCT) * CCF, 0 }

CMC_RT_PHYS_IMP_VOL

Hourly Constraint Management Charge Real-Time Physical Import Imbalance Volume (MWh); represents any deviation between the Real-Time Import Schedule and the Real-Time Import Schedule at the Notification Deadline. CTS transactions are excluded from this calculation.

= IF DEV_EXEMPT_PHYS = 'Y' THEN 0
ELSEIF RT_PHYS_TYPE = 'CTS' THEN 0
ELSE MAX ([RT_PHYS_{Seller} - NDL_PHYS_{Seller}] * CCF , 0)

CMC_RT_PHYS_EXP_VOL

Hourly Constraint Management Charge Real-Time Physical Export Imbalance Volume (MWh); represents any deviation between the Real-Time Physical Export at Notification Deadline and the Real-Time Physical Export. CTS transactions are excluded from this calculation.
= IF DEV_EXEMPT_PHYS = 'Y' THEN 0
ELSEIF RT_PHYS_TYPE = 'CTS' THEN 0
ELSE MAX ([NDL_PHYS_{Buyer} - RT_PHYS_{Buyer}] * CCF , 0)

CMC_RT_DRR1_VOL

Hourly Constraint Management Charge Real-Time DRR Type-I Volume (MWh); represents any deviation between the Real-Time Dispatch Target for Energy and the Economic Minimum at the Notification Deadline.
= IF RSG_XMPT = 'Y' THEN 0 ELSE
MAX ([RT_DSP_TARG_EN – NDL_ECON_MIN] * (1 - RT_CO_GEN_PCT) * CCF , 0)

CMC_RT_NDSP_VOL

Hourly Constraint Management Charge Real-Time Non-Dispatchable Volume (MWh): represents any deviation between the Actual Energy Injection and the Non-Dispatchable Forecast at the Notification Deadline.
= IF RSG_XMPT = 'Y' THEN 0 ELSE
MAX { ([-1 * AEI] – NDL_NDSP_FCST) * (1 - RT_CO_GEN_PCT) * CCF, 0 }

The following calculations are the final intermediate calculations for an Active Transmission Constraint:

*ATC_CMC_RATE

Hourly Active Transmission Constraint Management Charge Rate ($/MWh); represents the credit paid to RAC committed units to manage the Active Transmission Constraint divided by the summed volumes deemed to have contributed to those units being called on.
= ATC_CMC_MWP / MAX (ATC_CMC_DEV_VOL + ATC_CMC_TA_TDR_VOL, ATC_CMC_MAX_DSP_VOL)

ATC_CMC_MWP

Hourly Active Transmission Constraint Management Charge MWP ($); represents the total credit to AO's for units called on by RAC to manage a given ATC.

= $\sum_{ATC}$ (IF CANCEL_FL = 'Y' THEN 0 ELSE (RT_RSG_ASSET_CR_HR * (-1) * CMC_ALC_FCT)

ATC_CMC_DEV_VOL

Hourly Active Transmission Constraint Management Charge Deviation Volume (MWh); represents the sum of all AOs' deviation volumes for the given constraint.

= $\sum_{ATC}$ (CMC_DEV_VOL)

*CMC_DEV_VOL

Hourly Active Transmission Constraint Management Charge Deviation Volume (MWh); represents the net positive sum of all Notification Deadline deviations plus the sum of all Real-Time deviations.

= MAX (CMC_NDL_MR_VOL + CMC_NDL_DR_VOL + CMC_NDL_LOAD_VOL + CMC_NDL_VIRT_VOL + CMC_NDL_PHYS_IMP_VOL + CMC_NDL_PHYS_EXP_VOL + CMC_NDL_FIN_VOL + CMC_NDL_DRR1_VOL + CMC_NDL_NDSP_VOL, 0) + CMC_RT_MR_VOL + CMC_RT_DR_VOL + CMC_RT_EXE_DFE_VOL + CMC_RT_LOAD_VOL + CMC_RT_PHYS_IMP_VOL + CMC_RT_PHYS_EXP_VOL + CMC_RT_DRR1_VOL + CMC_RT_NDSP_VOL

ATC_CMC_MAX_DSP_VOL

Hourly Active Transmission Constraint Management Charge Maximum Dispatch Volume (MWh); represents the sum of the RT_MAX_DSP of all units committed in the RAC process to manage the Active Transmission Constraint.

= $\sum_{RAC\_ATC}$ (RT_MAX_DSP * (MIN (CCF, 0) * -1) * CMC_ALC_FCT)

ATC_CMC_DIST_HR

Hourly Constraint Management Charge Distribution ($); represents the hourly amount charged to the AO for their asset and / or schedule deviation volumes, for each Active Transmission Constraint.

= (CMC_DEV_VOL * ATC_CMC_RATE)

D.14.2.2 Calculation for CMC_DIST Component of the RT_RST_DIST1 Charge Type

*CMC_DIST

Constraint Management Charge Distribution ($); represents the hourly sum of the AO's ATC_CMC_DIST_HR charges for all Active Transmission Constraints for the Operating Day.

= $\sum_{ATC}$ (ATC_CMC_DIST_HR)

D.14.3 Intermediate Calculation for Real-Time Revenue Sufficiency Guarantee Distribution for Voltage and Local Reliability (VLR DIST) Bill Determinant Component of RT_RSG_DIST1

The VLR_DIST amount funds Real-Time RSG MWP Amount credits paid to Resources called on for Voltage and Local Reliability Issues.

D.14.4 Intermediate Calculations for VLR_DIST

AEW	Hourly Actual Energy Withdrawal (MWh); this value represents the billable meter volume, which is actual meter volume, or, if unavailable, Metered Alternate Volume, less LBA residual load volume (RT_ADJ_MTR)~~ and Day 1 Net Inadvertent Payback (D1_NI_PBK) volume~~. Please refer to the previously defined calculation definition of this component.
*RT_ ICPSL_BLL_MTR	Hourly Real-Time Internally Commercially Pseudo-tied Load Billable Metered Volume (MWh); Hourly billable meter volume for an EP Node which is internally commercially pseudo tied into an internal LBA different than the associated CP Node's internal LBA. Actual meter data will be used if available; otherwise an alternate meter volume will be calculated using the ICPSL_FCT and the associated CP Node(s) RT_BLL_MTR data. = IF (RT_ICPSL_ACT_MTR is Null, THEN RT_BLL_MTR * ICPSL_FCT, ELSE RT_ICPSL_ACT_MTR)
* AO_LBA_AEW	Hourly Total Asset Owner Real-Time Actual Energy Withdrawal Volume for an LBA (MW): for a given AO in a given LBA. For an EP Node which is internally commercially pseudo tied into an internal LBA different than the associated CP Node's internal LBA, the ICPSL_BLL_MTR will be subtracted from the CP Node's AO_LBA_AEW and added to the EP Node's AO_LBA_AEW. = $\sum_{AO\ \ LBA}$ [IF LRS_XMPT = "Y", THEN 0, ELSE MAX(AEW – RT_GFACO$_{Buyer}$ + (IF EP Node LBA = AO LBA, THEN ICPSL_BLL_MTR, ELSE - ICPSL_BLL_MTR), 0)]
* LBA_AEW	Hourly Total Real-Time Actual Energy Withdrawal Volume for an LBA (MW): for a given LBA. = $\sum_{LBA}$ (AO_LBA_AEW)

RT_VLR_ASSET_CR	Hourly Real-Time RSG Credit Amount for a Generation Resource committed for Voltage and Local Reliability ($); for a given Resource and Voltage and Local Reliability Issue, the portion of the RSG MWP which must be paid for by the benefiting LBA load. = IF VLR_FL <> 0 THEN RT_RSG_ASSET_CR_HR * VLR_ALC_FCT * (-1) ELSE 0
*RT_VLR_LBA_ASSET_CR	Hourly Real-Time MWP Asset Credit for VLR Payable by a given LBA ($/MWh); the LBA Credit attributable to VLR for which a given LBA's load is liable. = $\sum_{LBA}$ (VLR_LBA_DIST_FCT * RT_VLR_ASSET_CR)

D.14.5 Calculation for Real-Time Revenue Sufficiency Guarantee Distribution for Voltage and Local Reliability (VLR_DIST) Bill Determinant Component of RT_RSG_DIST1

*AO_LBA_AEW_FCT	Hourly Asset Owner Portion of Total LBA AEW (factor); for a given AO and a given LBA. Total Actual Energy Withdrawal volume for one Asset Owner in an LBA divided by the Total Actual Energy Withdrawal volume for the LBA. = AO_LBA_AEW / LBA_AEW
RT_VLR_AO_DIST	Hourly Real-Time RSG Distribution Amount for Voltage and Local Reliability ($); that portion of an LBA's credit for a Voltage and Local Reliability Commitment, for which a given AO in one LBA is liable. = RT_VLR_LBA_ASSET_CR * AO_LBA_AEW_FCT
*VLR_DIST	Hourly Real-Time RSG Distribution Amount for Voltage and Local Reliability ($): for an AO. Total Amount for all VLR commitment Asset Credits payable by a given Asset Owner. = $\sum_{AO}$ (RT_VLR_AO_DIST)

D.14.6 Day-Ahead Deviation and Headroom Charge Distribution (DDC_DIST) Calculation

The Day-Ahead Deviation and Headroom Charge Distribution (DDC_DIST) charges Asset Owner's for asset-related deviations and demand changes for RAC-Committed resources.

D.14.6.1 Intermediate Calculations for DDC_DIST

AEW	Hourly Actual Energy Withdrawal (MWh); this value represents the billable meter volume, which is actual meter volume, or, if unavailable, Metered Alternate Volume, less LBA residual load volume (RT_ADJ_MTR)~~ and Day 1 Net Inadvertent Payback (D1_NI_PBK) volume~~. Please refer to the previously defined calculation definition of this component
GEN_PERF	Hourly Generation Performance Volume (MWh); for a single Generation Resource. A positive value represents the actual performance of a Generation Resource. The Hourly Real-Time Billable Volume is used less any Residual Load volume when the Generation Resource is acting as the assigned Residual Load asset. = MIN (RT_BLL_MTR MTR_{GEN} + RT_DRRII_INJ_VOL - RT_ADJ_MTR~~ – D1_NI_PBK ~~, 0) * -1
*HEADROOM	Hourly Headroom Volume (MWh); represents the difference between the Real-Time Maximum Dispatch volume and the Actual Energy Injection for all RAC committed resources. = $\sum_{RAC}$ MAX(RT_MAX_DSP – [RT_DSP_TARG_EN + (RTN_REG_VOL + DA_REG_VOL) + (RTN_SUPP_VOL + DA_SUPP_VOL) + (RTN_SPIN_VOL + DA_SPIN_VOL)] ,0)
RT_CO_GEN_PCT	Hourly Real-Time Generation Carved-Out Grandfathered Agreement Transaction Ratio (%); The ratio of tagged Carved-Out transaction MW sourcing at the asset to the Maximum of the Day-Ahead Cleared Injection MW or the Real-Time Generation Performance. = IF (MAX (-1 * (DA_SCHD_{GEN} + DA_DRRII_SCHD_VOL), GEN_PERF)= 0 , THEN 0, ELSE MIN { [$\Sigma_{Transactions}$ (RT_GFACO_{Seller}) / MAX (-1 * (DA_SCHD_{Gen} + DA_DRRII_SCHD_VOL), GEN_PERF)] , 1 })
RT_CO_LOAD_PCT	Hourly Real-Time Load Carved-Out Grandfathered Agreement Transaction Ratio (%); The ratio of tagged Carved-Out transaction MW sinking at the asset to the Real-Time Withdrawal MW. = IF (RT_BLL_MTR <= 0 , THEN 0, ELSE MIN { [$\Sigma_{Transactions}$ (RT_GFACO_{Buyer}) / RT_BLL_MTR] , 1 })

HEADROOM_NEED	Headroom Need (MWh): represents the maximum of Unloaded Capacity Requirement and sixty percent of hourly Load change. = MAX {UNL_CAP_REQ, 60% * MAX[Σ_{Next_Hour} MAX(-RT_BLL_MTR$_{GEN}$ + RT_DRRII_INJ_VOL NAI, 0) - $\Sigma_{Current\_Hour}$ MAX(-RT_BLL_MTR$_{GEN}$ + RT_DRRII_INJ_VOL - NAI, 0), 0] }

The following calculations are for deviations occurring from Day-Ahead to the Notification Deadline:

DDC_NDL_CAP_VOL	Hourly Day-Ahead Deviation and Headroom Charge Notification Deadline Capacity Volume (MWh); represents the change in resource capacity between the Day-Ahead clearing and the Notification Deadline. = IF RT_RSG_ELIGIBILITY = 'Y' OR RSG_XMPT = 'Y' THEN 0 ELSE ([{ -1 * (DA_SCHD$_{GEN}$ + DA_DRRII_SCHD_VOL) } + DA_REG_VOL + DA_SPIN_VOL + (IF { -1 * (DA_ SCHD$_{GEN}$ + DA_DRRII_SCHD_VOL) } > 0 THEN DA_SUPP_VOL ELSE 0)] - NDL_ECON_MAX) * (1 - RT_CO_GEN_PCT)
DDC_NDL_LOAD_VOL	Hourly Day-Ahead Deviation and Headroom Charge Notification Deadline Load Imbalance Volume (MWh); represents load imbalance between the Day-Ahead clearing and the notification deadline. If the Real-Time Demand Forecast is not available, the Real-Time Demand Forecast will equal the Day-Ahead Schedule. = IF DEV_EXEMPT = 'Y' THEN 0 ELSE (NDL_DMD_FCST – DA_SCHD) * (1 - RT_CO_LOAD_PCT)
DDC_NDL_PHYS_IMP_VOL	Hourly Day-Ahead Deviation and Headroom Charge Notification Deadline Physical Import Imbalance Volume (MWh); represents any deviations between the Day-Ahead Import schedule and the Real-Time Import schedule at the Notification Deadline. CTS transactions are excluded from this calculation. = IF DEV_EXEMPT_PHYS = 'Y' THEN 0 ELSEIF RT_PHYS_TYPE = 'CTS' THEN 0 ELSE (DA_PHYS$_{Seller}$ – NDL_PHYS$_{Seller}$)
DDC_NDL_PHYS_EXP_VOL	Hourly Day-Ahead Deviation and Headroom Charge Notification Deadline Physical Export Imbalance Volume (MWh); represents any deviations between the Real-Time Export schedule at the Notification Deadline and the Day-Ahead Export schedule. CTS transactions are excluded from this calculation.

= IF DEV_EXEMPT_PHYS = 'Y' THEN 0
ELSEIF RT_PHYS_TYPE = 'CTS' THEN 0
ELSE (NDL_PHYS_{Buyer} - DA_PHYS_{Buyer})

DDC_NDL_VIRT_VOL

Hourly Day-Ahead Deviation and Headroom Charge Notification Deadline Virtual Volume (MWh); represents the negative of the sum of cleared Day-Ahead Virtual Supply Offer volume and the cleared Day-Ahead Virtual Bid volume.
= (DA_VSCHD_{Seller} + DA_VSCHD_{Buyer}) * -1

DDC_NDL_FIN_VOL

Hourly Day-Ahead Deviation and Headroom Charge Notification Deadline Financial Schedule Volume (MWh); represents the negative of the total volume of FBT schedules for Deviation for the Buyer at the Sink plus the total volume of FBT schedules for Deviation for Sellers at the source.
= ({-1} * NDL_FIN_{Buyer}) + NDL_FIN_{Seller}

DDC_NDL_DRR1_VOL

Hourly Day-Ahead Deviation and Headroom Charge Notification Deadline DRR Type-I Volume (MWh); represents any deviation between the Day-Ahead Schedule and Targeted Demand Reduction Level in effect at the Notification Deadline.
= IF RT_RSG_ELIGIBILITY = 'Y' OR RSG_XMPT = 'Y'
THEN 0 ELSE ({-1 * DA_SCHD} – NDL_ECON_MIN) * (1 - RT_CO_GEN_PCT)

DDC_NDL_NDSP_VOL

Hourly Day-Ahead Deviation and Headroom Charge Notification Deadline Non-Dispatchable Volume (MWh): represents any deviation between the Day-Ahead Schedule and the Non-Dispatchable Forecast in effect at the Notification Deadline.
= IF RSG_XMPT = 'Y' THEN 0 ELSE ({ -1 * DA_SCHD } – NDL_NDSP_FCST) * (1 - RT_CO_GEN_PCT)

The following calculations are for deviations from the Notification Deadline to Real-Time:

DDC_RAC_DR_VOL

Hourly Day-Ahead Deviation and Headroom Charge RAC De-Rate Volume (MWh); represents the total by Asset Owner of any positive difference between the Economic Maximum as submitted by the Transmission Provider and the Economic Maximum Dispatch for RAC-committed resources.
= IF RT_RSG_ELIGIBILITY = 'N' OR
RSG_XMPT = 'Y' THEN 0 ELSE

MAX (AC_ECON_MAX – RT_MAX_DSP, 0) *
(1 - RT_CO_GEN_PCT)

DDC_RAC_MR_VOL	Hourly Day-Ahead Deviation and Headroom Charge RAC Must Run Volume (MWh); for Generation Resources, Demand Response Resources – Type II, and External Asynchronous Resources for units committed by any RAC process conducted for the Operating Day. This volume represents the total by Asset Owner of any positive difference between the Economic Minimum Dispatch and the Economic Minimum as committed by the Transmission Provider = IF RT_RSG_ELIGIBILITY = 'N' OR RSG_XMPT = 'Y' THEN 0 ELSE MAX (RT_MIN_DSP - AC_ECON_MIN , 0) * (1 - RT_CO_GEN_PCT)
DDC_RT_DR_VOL	Hourly Day-Ahead Deviation and Headroom Charge Real-Time De-Rate Volume (MWh); represents the total by Asset Owner of any positive difference between the Economic Maximum at the Notification Deadline and the Economic Maximum. = IF RT_RSG_ELIGIBILITY = 'Y' OR RSG_XMPT = 'Y' THEN 0 ELSE MAX (NDL_ECON_MAX – RT_MAX_DSP , 0) * (1 - RT_CO_GEN_PCT)
DDC_RT_MR_VOL	Hourly Day-Ahead Deviation and Headroom Charge Real-Time Must Run Volume (MWh); or Generation Resources, Demand Response Resources – Type II, and External Asynchronous Resources for units not committed by any RAC process conducted for the Operating Day. This volume represents the total by Asset Owner of any positive difference between the Economic Minimum Dispatch and the Economic Minimum Limit at the Notification Deadline. = IF RT_RSG_ELIGIBILITY = 'Y' OR RSG_XMPT = 'Y' THEN 0 ELSE MAX (RT_MIN_DSP - NDL_ECON_MIN , 0) * (1 - RT_CO_GEN_PCT)

DDC_RT_EXE_DFE_VOL

Hourly Day-Ahead Deviation and Headroom Charge Real-Time Excessive or Deficient Energy Volume (MWh); represents the total by Asset Owner of the sum of all Excessive and Deficient Resource Energy volume.
= IF EEEF = ‘Y’ OR
RSG_XMPT = ‘Y’ THEN 0 ELSE
(EXE + DFE) * (1 - RT_CO_GEN_PCT)

DDC_RT_LOAD_VOL

Hourly Day-Ahead Deviation and Headroom Charge Real-Time Load Imbalance Volume (MWh); represents the positive value of any difference between Real-Time Actual Energy Withdrawal volume and Notification Deadline Load Zone Demand Forecast volume.
= IF DEV_EXEMPT = ‘Y’ THEN 0 ELSE
MAX [([(IF AEW > 0 THEN AEW ELSE AEI) + DRR_ADJ_MTR] – NDL_DMD_FCST) * (1 - RT_CO_LOAD_PCT), 0]

DDC_RT_PHYS_IMP_VOL

Hourly Day-Ahead Deviation and Headroom Charge Real-Time Physical Import Imbalance Volume (MWh); represents the total volume differences between all Real-Time Import schedules at the Notification Deadline and the Real-Time Import schedules. CTS transactions are excluded from this calculation.
= IF DEV_EXEMPT_PHYS = ‘Y’ THEN 0
ELSEIF RT_PHYS_TYPE = ’CTS’ THEN 0
ELSE MAX [($\text{NDL\_PHYS}_{\text{Seller}}$ - $\text{RT\_PHYS}_{\text{Seller}}$),0]

DDC_RT_PHYS_EXP_VOL

Hourly Day-Ahead Deviation and Headroom Charge Real-Time Physical Export Imbalance Volume (MWh); represents the total of volume differences between Real-Time Export schedules and the Real-Time Export schedules at the Notification Deadline. CTS transactions are excluded from this calculation.
= IF DEV_EXEMPT_PHYS = ‘Y’ THEN 0
ELSEIF RT_PHYS_TYPE = ’CTS’ THEN 0
ELSE MAX [($\text{RT\_PHYS}_{\text{Buyer}}$ - $\text{NDL\_PHYS}_{\text{Buyer}}$), 0]

DDC_RT_DRR1_VOL

Hourly Day-Ahead Deviation and Headroom Charge Real-Time DRR Type-I Imbalance Volume (MWh); represents any deviation between the Targeted Demand Reduction Level in effect at the Notification Deadline and the Dispatch Target for Energy.
= IF RSG_XMPT = ’Y’ THEN 0 ELSE
MAX [(NDL_ECON_MIN – RT_DSP_TARG_EN) * (1 - RT_CO_GEN_PCT), 0]

DDC_RT_NDSP_VOL — Hourly Day-Ahead Deviation and Headroom Charge Real-Time Non-Dispatchable Volume (MWh): represents the positive of any difference between the Non-Dispatchable Forecast in effect at the Notification Deadline and the Actual Energy Injection.
= IF RSG_XMPT = 'Y' THEN 0 ELSE MAX [(NDL_NDSP_FCST – [-1 * AEI]) * (1 - RT_CO_GEN_PCT), 0]

D.14.6.2 Calculation for the DDC_DIST Component of the RT_RSG_DIST1 Charge Type

*MISO_DDC_RATE — Hourly MISO Day-Ahead Deviation and Headroom Charge Rate ($/MWh); represents the Market-wide rate for Day-Ahead Deviations and Headroom.
=DDC_CREDIT / MAX(MISO_DDC_DEV_VOL + HEADROOM, ECON_COM_CAP_VOL

DDC_CREDIT — Hourly MISO Day-Ahead Deviation and Headroom Credit ($): represents the amount of Real-Time RSG Make-Whole Payments to be distributed via the Day-Ahead Deviations and Headroom Charge Rate.

```
=
IF
  DDC_MWND + HEADROOM_NEED > = ECON_COM_CAP_VOL
    THEN DDC_MWP
ELSE IF
  DDC_MWND + HEADROOM_NEED  > 0
   AND DDC_MWND + HEADROOM_NEED < ECON_COM_CAP_VOL
    THEN (DDC_MWND + HEADROOM_NEED) * (DDC_MWP /
    ECON_COM_CAP_VOL)
ELSE IF
  DDC_MWND + HEADROOM_NEED < = 0
    THEN 0
```

DDC_MWND — Hourly MISO Day-Ahead Deviation and Headroom Net Deviations (MWh): represents the sum of all Notification Deadline deviations plus the sum of all RAC and Real-Time deviations.
= DDC_NDL_CAP_VOL + DDC_NDL_LOAD_VOL + DDC_NDL_PHYS_IMP_VOL + DDC_NDL_PHYS_EXP_VOL + DDC_NDL_VIRT_VOL + DDC_NDL_FIN_VOL + DDC_NDL_DRR1_VOL + DDC_NDL_NDSP_VOL +DDC_RAC_DR_VOL + DDC_RAC_MR_VOL + DDC_RT_DR_VOL + DDC_RT_MR_VOL +

	DDC_RT_EXE_DFE_VOL + DDC_RT_LOAD_VOL + DDC_RT_PHYS_IMP_VOL + DDC_RT_PHYS_EXP_VOL + DDC_RT_DRR1_VOL + DDC_RT_NDSP_VOL
ECON_COM_CAP_VOL	Hourly MISO Economically Committed Capacity Volume (MWh): represents the sum of RT_MAX_DSP for all economically committed Resources. = MISO_RAC_MAX_DSP_VOL - MISO_CMC_MAX_DSP_VOL – MISO_VLR_MAX_DSP_VOL
DDC_MWP	Hourly MISO Day-Ahead Deviation and Headroom Charge MWP ($): represents the Real-Time RSG Make-Whole Payments attributable to Day-Ahead Deviations and Headroom Charges = (MISO_RT_RSG_MWP * (-1)) – MISO_CMC_DIST – MISO_CMC_RES_ DIST - MISO_VLR_DIST – MISO_CMC_TA_TDR_DIST
*MISO_RT_RSG_MWP	Hourly MISO Real-Time RSG MWPs Total Amount ($); represents the sum of all Real-Time RSG Make-Whole Payments, excluding commitment cancellations. $=\sum_{MISO\ RAC}$ (IF CANCEL_FL = 'Y' THEN 0, ELSE RT_RSG_ASSET_CR_HR)
*MISO_CMC_DIST	Hourly MISO Constraint Management Charge Distribution Amount ($); represents the hourly sum of RSG charges for the management of all Active Transmission Constraints for the Hour. $= \sum_{MISO\ ATC}$ (CMC_DIST_HR)
*MISO_CMC_RES_DIST	Hourly MISO Constraint Management Charge Residual Distribution ($): represents the amount of Hourly Active Transmission Constraint Management Charge MWP not collected via the Hourly MISO Constraint Management Charge Distribution Amount or the Hourly MISO Constraint Management Charge Topology Adjustment / Transmission De-rate Charge Distribution Amount. = ($\sum_{MISO}$ ATC_CMC_MWP) – MISO_CMC_DIST – MISO_CMC_TA_TDR_DIST
*MISO_CMC_TA_TDR_DIST	Hourly MISO Constraint Managment Charge Topology Adjustment / Transmission De-rate Charge Distribution Amount ($); represents the market-wide total of charges for Topology Adjustments and / or

	Transmission De-rates for all Active Transmission Constraints in the Hour. = $\sum_{MISO}$ (ATC_CMC_TA_TDR_DIST)
ATC_CMC_TA_TDR_DIST	Hourly Constraint Management Charge Topology Adjustment / Transmission De-rate Distribution Amount ($); represents the total charge for unit commitment by RAC to manage Topology Adjustments and Transmission De-rates for this Active Transmission Constraint. = $\sum_{ATC}$ (ATC_CMC_TA_TDR_VOL * ATC_CMC_RATE)
*MISO_DDC_DEV_VOL	Hourly MISO Day-Ahead Deviation and Headroom Charge Deviation Volume (MWh); represents the sum of all AO's deviations volumes for the Hour. = $\sum_{AO}$ (DDC_DEV_VOL)
*DDC_DEV_VOL	Hourly Day-Ahead Deviation and Headroom Charge Deviation Volume (MWh); represents the net positive sum of all Notification Deadline deviations plus the sum of all RAC and Real-Time deviations. = MAX (DDC_NDL_CAP_VOL + DDC_NDL_LOAD_VOL + DDC_NDL_PHYS_IMP_VOL + DDC_NDL_PHYS_EXP_VOL + DDC_NDL_VIRT_VOL + DDC_NDL_FIN_VOL + DDC_NDL_DRR1_VOL + DDC_NDL_NDSP_VOL, 0) + DDC_RAC_DR_VOL + DDC_RAC_MR_VOL + DDC_RT_DR_VOL + DDC_RT_MR_VOL + DDC_RT_EXE_DFE_VOL + DDC_RT_LOAD_VOL + DDC_RT_PHYS_IMP_VOL + DDC_RT_PHYS_EXP_VOL + DDC_RT_DRR1_VOL + DDC_RT_NDSP_VOL
*MISO_RAC_MAX_DSP_VOL	Hourly MISO RAC Maximum Dispatch Volume (MWh); represents the sum of RT_MAX_DSP for all RAC-Committed Resources. = $\sum_{MISO\ RAC}$ (RT_MAX_DSP)
*MISO_CMC_MAX_DSP_VOL	Hourly MISO Constraint Management Charge Maximum Dispatch Volume (MWh); represents the sum of the RT_MAX_DSP of all units committed in the RAC process to manage Active Transmission Constraints. = $\sum_{MISO\ RAC\_ATC}$ (RT_MAX_DSP * (MIN (CCF, 0) * -1) * CMC_ALC_FCT)

*MISO_VLR_MAX_DSP_VOL — Hourly MISO Voltage and Local Reliability Charge Maximum Dispatch Volume (MWh); represents the sum of the RT_MAX_DSP of all Resources committed to manage Voltage and Local Reliability Issues.
$=\sum_{VLR}$
IF VLR_FL = 1
THEN (RT_MAX_DSP * VLR_ALC_FCT)
ELSE 0

*DDC_DIST — Hourly Day-Ahead Deviation and Headroom Charge Distribution Amount ($); represents the total amount charged to the Asset Owner for their Day-Ahead Deviation and Headroom Charge Volume multiplied by the Day-Ahead Deviation and Headroom Charge Rate for the Operating Date.
= DDC_DEV_VOL * MISO_DDC_RATE

*MISO_VLR_DIST — Hourly MISO Voltage and Local Reliability Charge Distribution Amount ($); represents the market-wide hourly sum of RSG charges for all Voltage and Local Reliability Commitments for the Hour.
$= \sum_{MISO}$ (VLR_DIST)

D.14.7 Charge Type Calculation for RT_RSG_DIST1

*^RT_RSG_DIST1_HR — Hourly Real-Time RSG Distribution Amount ($); for an AO. This is the hourly sum of the Constraint Management and Day Ahead Deviation / Headroom components of Real Time RSG Distribution. The result is rounded to the nearest cent. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement.
= CMC_DIST + DDC_DIST + VLR_DIST

*RT_RSG_DIST1 — Daily Real-Time RSG Distribution Amount ($); for an AO.
$=\sum_{H}$ (RT_RSG_DIST1_HR)

D.15 Real-Time Revenue Sufficiency Guarantee Make Whole Payment Amount (RT_RSG_MWP)

Resources that meet eligibility requirements that are economically committed by MISO in the LAC or RAC process for the Real-Time Energy and Operating Reserve Market are guaranteed recovery of their Start-Up, No-Load, Energy (or Shut-Down, Hourly Curtailment and Energy Offer for Demand Response Resource-Type I), Additional Regulation Mileage, and Operating Reserve availability costs in this charge type. Start-Up, No-Load, and Energy Costs (or Shut-Down, Hourly Curtailment and Energy Costs) are collectively referred to as Total Production Costs.

MISO performs the RAC process to ensure that sufficient Resources are available and on-line to meet Load Forecast and Operating Reserve requirements projected for each hour of the Operating Day. After the Day-Ahead Energy and Operating Reserve Market is cleared, MISO performs the Real-Time related RAC process and may commit additional Resources beyond those cleared in the Day-Ahead Energy and Operating Reserve Market to meet the forecasted needs within MISO. The RAC process employs a Security Constrained Unit Commitment algorithm and is performed as necessary prior to, and throughout, the Operating Day.

On an hourly basis, the Post Operating Processor determines whether a Resource that was committed during the Real-Time related LAC or RAC process has met the eligibility requirements to ensure that Production Costs are guaranteed. The Real-Time settlement compares whether the asset's energy and Operating Reserve value for a committed period exceeds the guaranteed Production Costs for those hours. The asset's combined energy, Regulating Reserve, Spinning Reserve, Supplemental Reserve, and Ramp Capability market value is calculated without regard to FBTs. If the total value is less than the guaranteed Production Cost amount, the difference is credited to the AO as a Real-Time RSG MWP Amount.

The Real-Time related LAC or RAC process may commit a Resource multiple times in a single Operating Day. The contiguous hours that a Resource is committed by the LAC or RAC process are referred to as the commitment period. Each commitment period must be separated by at least one hour where the asset was ineligible to receive a Revenue Sufficiency MWP. Production Costs are guaranteed by commitment period.

Real-Time RSG MWP Amounts will be adjusted in the event a Resource fails the Real-Time RSG Full Payment Criteria. An adjusted Real-Time RSG MWP Amount will account for any additional energy margin for the Resource’s Non-Excessive Energy output above the Eligible Megawatt Hour value. For additional information regarding the RT RSG Full Payment Criteria, please refer to the Post Operating Processor Calculation Guide.

Real-Time RSG MWP Amounts associated with Generation Resources economically committed for purposes other than Voltage and Local Reliability (VLR) may be mitigated by asset by day when Production Costs for the Operating Day exceed the IMM's pre-determined reference tolerances. There is no mitigation applied to Demand Response Resources-Type I or Demand Response Resources-Type II. The IMM mitigating actions are designed to prevent AOs from exercising undue influence when their Generation Resources are known to be in demand for reliability in a local area. The settlement statement displays an "IMM RSG MITIGATION" flag indicating when a particular generation asset Real-Time RSG MWP Amount has been mitigated. The IMM will not always provide mitigated reference Production Costs. For non-VLRC purposes, when no IMM Production Costs have been provided to MISO for the entire Operating Day, the IMM Production Costs will not be displayed on the settlement statement and the IMM mitigation comparison will not be performed.

Real-Time RSG MWP Amounts may also be mitigated for Generation Resources by asset by day for Voltage and Local Reliability Commitment (VLRC) requirements. Mitigation may be warranted when any of the following values exceed the Independent Market Monitor’s (IMM’s) pre-determined reference tolerances:

- Generation Offers
- Economic Minimum
- Minimum Run Time

The IMM will not always provide mitigated VLRC Generation Offer, Economic Minimum, and/or Minimum Run Time values. When no IMM VLRC Generation Offer, Economic

Minimum, and/or Minimum Run Time values have been provided to MISO for the entire Operating Day, the IMM values are not displayed on the Settlement Statement and the IMM mitigation comparison is not performed.

An IMM RSG MITIGATION value of "N" indicates no mitigation had been performed; a value of "Y" indicates that the Real-Time RSG MWP was mitigated for the Operating Day.

The Real-Time RSG MWP Amount, including determinants, is displayed on the Real-Time Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a billing determinant that is displayed on an AO's Real-Time statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.15.1Calculation Inputs for RT_RSG_MWP

*RT_RSG_ELIG_MWH	Real-Time RSG Eligible MWH (MWh); this value represents the eligible energy output of a Resource during the Real-Time commitment period.
*RT_IMM_RSG_MWH	Hourly Real-Time Mitigated RSG MWH (MWh); this value represents the mitigated eligible energy output of a Resource during the Real-Time commitment period.
*RT_RSG_PC	Real-Time RSG Production Cost (Offer) Amount ($); hourly production Offer calculated by DART that includes Start-Up (Shut-Down), No-Load (Hourly Curtailment), Energy Offer, Regulation Mileage Offer, and any applicable Operational Reserve availability cost. DART averages awarded production Offers across the entire hourly commitment period. Commitment periods spanning midnight averages all Start-Up (Shut-Down) cost across the start of the commitment period in the prior Operating Day. DART determines each Resource's eligibility for full or partial Start-Up (Shut-Down) reimbursement based upon any previous status including whether it is a hot, intermediate or cold start condition. The total hourly eligible production Offer value is calculated by DART for each Generator and provided to Market Settlements. Production Offers

are shown as positive values. The Real-Time production Offers only display on statements when values have been provided by the DART. In the absence of any displayed values, the participant assumes they are zero for every hour.

*RT_RSG_MIT_PC — Real-Time Mitigated RSG Production Cost Amount ($); hourly mitigated Start-Up, No-Load, Energy Offer, Regulation Mileage Offer, and any applicable Operational Reserve availability cost amounts for a Generation Resource, provided by the IMM. Mitigated production Offers are shown as positive values. Real-Time IMM production Offers only display on statements when values have been provided by the DART or the IMM System. In the absence of any displayed values, the participant assumes they are zero for every hour.

*RT_REG_AC — Real-Time Regulating Reserve Availability Cost ($); hourly cost to provide the Regulating Reserve service and Regulation Mileage. This amount is based on the Regulation Availability Offer and the Regulating Mileage Offer for the eligible Resource.

*RT_SPIN_AC — Real-Time Spinning Reserve Availability Cost ($); hourly cost to provide the Spinning Reserve service. This amount is based on the Spinning Availability Offer for the eligible Resource.

*RT_SUPP_AC — Real-Time Supplemental Reserve Availability Cost ($); hourly cost to provide the Supplemental Reserve service. This amount is based on the Supplemental Availability Offer for the eligible Resource.

*RT_REG_MIT_AC — Real-Time Regulation Reserve Mitigated Availability Cost ($); hourly cost to provide the Regulating Reserve service for a Generation Resource. This amount is provided by the Independent Market Monitor.

*RT_SPIN_MIT_AC — Real-Time Spinning Reserve Mitigated Availability Cost ($); hourly cost to provide the Spinning Reserve service for a Generation Resource. This amount is provided by the Independent Market Monitor.

*RT_SUPP_MIT_AC — Real-Time Supplemental Reserve Mitigated Availability Cost ($); hourly cost to provide the Supplemental Reserve service for a Generation Resource. This amount is provided by the Independent Market Monitor.

*RT_RSG_ELIGIBILITY — Real-Time RSG Eligibility (flag); an hourly flag that indicates whether an asset is eligible to receive their Production Costs for the Hour. The eligibility is determined by DART as the Real-Time Energy and Operating Reserve Market is cleared. A "Y" indicates the asset is eligible for the Hour and a "N" indicates the asset is not eligible for the Hour. Real-Time RSG eligibility status only displays on statements when production Offer values have been provided by the DART or the IMM System. In the absence of any displayed values, the participant assumes the unit eligibility is "N".

RT_LMP_EN — Hourly Real-Time LMP ($/MWh); at a Commercial Pricing Node. The Real-Time Energy and Operating Reserve Market clearing price for Energy at a given Commercial Pricing Node in the Transmission Provider Region, which is equivalent to the marginal cost of serving demand at the Commercial Pricing Node. The Real-Time Locational Margin Price includes the MCC and the MLC.

*RT_RSG_REG_REV — Hourly Real-Time Net Cleared Regulation Amount ($); the hourly amount of Regulating Reserve cleared in the Real-Time Energy and Operating Reserve Market by a qualified Resource multiplied by the hourly integrated Regulating Reserve Marginal Clearing Price plus any Additional Regulation Mileage multiplied by the Real-Time Regulation Mileage Marginal Clearing Price during the Real-Time commitment.

*RT_RSG_SPIN_REV — Hourly Real-Time Net Cleared Spinning Reserve Amount ($); the hourly amount of Spinning Reserve cleared in the Real-Time Energy and Operating Reserve Market by a qualified Resource multiplied by the hourly integrated Spinning Reserve Marginal Clearing Price during the Real-Time commitment.

*RT_RSG_SUPP_REV — Hourly Real-Time Net Cleared Supplemental Reserve Amount ($); the hourly amount of Supplemental Reserve cleared in the Real-Time Energy and Operating Reserve Market by a qualified Resource multiplied by the hourly integrated Supplemental Reserve Marginal Clearing Price during the Real-Time commitment.

*RT_RSG_RC_REV — Hourly Real-Time Net Cleared Ramp Capability Amount ($); the hourly amount of Up Ramp Capability cleared in the Real-Time Energy and Operating Reserve Market multiplied by the hourly integrated Up Ramp Capability MCP plus the hourly amount of Down Ramp Capability cleared in the Real-Time Energy and Operating Reserve Market multiplied by the hourly integrated Down Ramp Capability MCP.

* NRGA	Net Regulation Generation Adjustment ($) for a Resource; Please refer to the previously defined calculation definition of this component.
*RT_RSG_ADD_EN_MARGIN	Hourly Real-Time RSG Additional Energy Margin Amount ($); the hourly additional energy margin to be incorporated into the Hourly RT_MKT_EN_VAL Amount for Resources that fail the RT RSG MWP Full Payment Criteria.
*RT_DB_ELMP_MWP	Hourly Real-Time Make-Whole Payment Amount ($): for EAR Wheel-Out Schedule.

D.15.2 Real-Time Intermediate Calculations for RT_RSG_MWP

RT_IMM_RSG_MWH_TOTAL	Daily Real-Time Mitigated RSG MWH (MWh); this value represents the summation of the Hourly Real-Time Mitigated RSG MWH for a Resource. $= \Sigma_H$ (RT_IMM_RSG_MWH)
RT_MKT_EN_VAL	Hourly Real-Time Market Energy Amount ($); this amount represents the hourly Real-Time value when it is committed by MISO. The calculation is performed for every Hour where the DART has determined the asset has met the eligibility requirement for the Hour. The value is calculated by multiplying the generation asset metered volume by the LMP at the Commercial Pricing Node without regard for FBTs and adding Operating Reserve revenue and Ramp Capability revenue. This amount accounts for any additional energy margin on the Non-Excessive Energy output above the Eligible Megawatt Hour value for use in the Revenue portion of the Real-Time RSG MWP calculation. = IF { RT_RSG_ELIGIBILITY = "Y") , THEN [(RT_RSG_ELIG_MWH * RT_LMP_EN)] + ($NRGA_{CN}$ * -1) + RT_RSG_REG_REV + RT_RSG_SPIN_REV + RT_RSG_SUPP_REV + RT_RSG_ADD_EN_MARGIN + RT_RSG_RC_REV] , ELSE 0 }
RT_PC_AMT	Hourly Real-Time RSG Production Cost Amount for an eligible Resource asset ($); The RSG Production Cost credit amount. = IF { [RT_RSG_ELIGIBILITY = "Y"] , THEN RT_RSG_PC , ELSE 0)

RT_PC_AMT_MIT — Hourly Real-Time Mitigated RSG Production Cost Amount for a Generation Resource asset ($);
= IF { RT_IMM_RSG_MWH > 0
THEN RT_RSG_MIT_PC ,
ELSE IF (RT_IMM_RSG_MWH_TOTAL = 0 AND
RT_RSG_ELIGIBILITY = "Y") ,
THEN RT_RSG_MIT_PC , ELSE 0 }

RT_RSG_EN_VAL_CP — Commitment Period Real-Time Market Energy Amount ($); this amount represents the total commitment period Real-Time value. A commitment period is defined as the contiguous hours where the asset has been determined by the DART to be eligible for Real-Time RSGs. Commitment periods are limited to the Operating Day. This equation is performed for each commitment period for an asset for an Operating Day.
= Σ_H (RT_MKT_EN_VAL)

RT_RSG_ELIG_MWH_CP — Commitment Period Real-Time RSG Eligible MWH (Integer); this number represents the total Real-Time eligible MWH's during a commitment period. A commitment period is defined as the contiguous hours where the asset has been determined by the DART to be eligible for Real-Time RSGs. Commitment periods are limited to the Operating Day. This equation is performed for each commitment period for an asset for an Operating Day.
= Σ_H (RT_RSG_ELIG_MWH)

RT_PC_AMT_CP — Commitment Period Real-Time RSG Production Cost Amount ($); this amount represents the total commitment period Real-Time production Offer. A commitment period is defined as the contiguous hours where the asset has been determined by the DART to be eligible for Real-Time RSGs. Commitment periods are limited to the Operating Day. This equation is performed for each commitment period for an asset for an Operating Day.
= Σ_H (RT_PC_AMT)

RT_PC_AMT_MIT_CP — Commitment Period Real-Time Mitigated RSG Production Cost Amount ($); this amount represents the total commitment period Real-Time mitigated production Offer for a Generation Resource. A commitment period is defined as the contiguous hours where the asset has been determined by the DART to be eligible for Real-Time RSGs. Commitment periods are limited to the Operating Day. This equation is

performed for each commitment period for an asset for an Operating Day.
= Σ_H (RT_PC_AMT_MIT)

RT_RSG_CP_HR

Commitment Period Real-Time RSG Credit Hour Count (Integer); the number of hours in a commitment period. A commitment period is defined as the contiguous hours where the asset has been determined by the DART to be eligible for Real-Time RSGs. Commitment periods are limited to the Operating Day.

= Σ_H [IF (RT_IMM_RSG_MWH > 0) ,
THEN 1 ,
ELSE IF (RT_IMM_RSG_MWH_TOTAL = 0 AND
RT_RSG_ELIGIBILITY = "Y") ,
THEN 1 ,
ELSE 0]

RT_MWP_AMT_CP

Commitment Period Real-Time RSG MWP Amount ($); represents for a commitment period, the total amount of production costs not covered by the asset's energy value. This equation is performed for all commitment periods for an asset for an Operating Day.

= MAX [0 , (RT_PC_AMT_CP - RT_RSG_EN_VAL_CP)]

*^RT_ASOF_MWP

Hourly Real-Time As Offered MWP for a Resource asset ($); the total calculated MWP by Hour for a Resource asset based on the participant's offered data. Each Hour is rounded to the nearest cent with any rounding error being carried forward to the next commitment period in the Operating Day. Rounding error does not carry from one Operating Day to another. This equation is performed for each commitment period Hour of an Operating Day with each commitment period using its own corresponding MWP divided by the number of eligible hours of the commitment period.

= IF [RT_RSG_ELIGIBILITY = "Y" ,
THEN (RT_MWP_AMT_CP / RT_RSG_CP_HR) ,
ELSE 0]

RT_MWP_MIT_AMT_CP	Commitment Period Real-Time Mitigated RSG MWP Amount ($); represents for a commitment period, the total amount of production Offers not covered by the Generation Resource asset's energy value. This equation is performed for all commitment periods for an asset for an Operating Day. = MAX [0 , (RT_PC_AMT_MIT_CP - RT_RSG_EN_VAL_CP)]
*^RT_IMM_MWP	Hourly Real-Time IMM MWP for a generation asset ($); the total calculated MWP by Hour for a Generation Resource asset if the asset is mitigated by the IMM. Each Hour is rounded to the nearest cent with any rounding error being carried forward to the next commitment period in the Operating Day. Rounding error does not carry from one Operating Day to another. This equation is performed for each commitment period Hour of an Operating Day with each commitment period using its own corresponding MWP divided by the number of eligible hours of the commitment period. = IF [RT_IMM_RSG_MWH > 0 , THEN (RT_MWP_MIT_AMT_CP / RT_RSG_CP_HR) , ELSE IF (RT_IMM_RSG_MWH_TOTAL = 0 AND RT_RSG_ELIGIBILITY = "Y") , THEN (RT_MWP_MIT_AMT_CP / RT_RSG_CP_HR) , ELSE 0]
*IMM(RT)_RSG_MITIGATION	Daily Real-Time IMM RSG Mitigation flag (Y or N); a daily flag indicating whether a Generation Resource asset's Real-Time revenue sufficiency MWP had been mitigated by the IMM. An IMM RSG MITIGATION value of "N" indicates no mitigation had been performed; a value of "Y" indicates that the Real-Time RSG MWP was mitigated for the Operating Day for the generation asset. = IF (RT_PC_AMT_MIT_CP > 0 , THEN "Y" , ELSE "N")
RT_RSG_ASSET_CR_HR	Hourly Real-Time RSG Credit Amount for a Generation Resource asset ($); this is the hourly credit amount that a Generation Resource receives for the Real-Time Energy and Operating Reserve Market. When the daily total credit amount exceeds the IMM's predetermined thresholds, then the hourly credit is reduced to the hourly IMM calculated credit amount. = IF IMM_RSG_MITIGATION = “N” , THEN RT_ASOF_MWP * -1 + RT_DB_ELMP_MWP * -1, ELSE RT_IMM_MWP * -1 + RT_DB_ELMP_MWP * -1

D.15.3 Charge Type Calculation for RT_RSG_MWP

*^RT_RSG_MWP_HR

Hourly Real-Time RSG MWP Amount ($); this is the hourly AO total credit amount for all their assets. The formula result is per hour. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement.

= Σ_{Assets} (RT_RSG_ASSET_CR_HR) for Generation Resources + Σ_{Assets} [(RT_ASOF_MWP) *(-1)] for Demand Response Resources-Type I and Type II

*RT_RSG_MWP

Daily Real-Time RSG MWP Amount ($); this is the hourly asset credit amount summed for all hours of the day for an AO.

= Σ_{H} (RT_RSG_MWP_HR)

D.16 Real Time Price Volatility Make-Whole Payment Amount (RT_PV_MWP)

The Real-Time Price Volatility Make-Whole Payment Charge Type is comprised of the Day-Ahead Margin Assurance Payment (DAMAP) amount and the Real-Time Offer Revenue Sufficiency Guarantee Payment amount (RT_ORSGP). The Day-Ahead Margin Assurance Payment amount is intended to compensate an eligible Resource for market conditions that would erode the margin earned in the Day-Ahead such as RT dispatch less than their DA schedule and/or adverse energy or Operating Reserves pricing. Resources that are committed in the Day-Ahead or Real-Time Energy and Operating Reserve Markets and are not otherwise eligible for the RT RSG Make-Whole Payment can be eligible for the Real-Time Offer Revenue Sufficiency Guarantee Payment under certain circumstances. Additional information about DA_MAP and RT_ORSGP can be found in the Post Operating Processor Calculation Guide.

An asterisk (*) denotes a billing determinant that is displayed on an AO's Real-Time Statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.16.1 Calculation Inputs for RT_PV_MWP

*DA_MAP_FL	Day-Ahead Margin Assurance Payment Flag (unity); for a Resource. This billing determinant indicates whether the Resource is eligible for Day Ahead Margin Assurance Preservation Payment. "Y" indicates the Resource is eligible for payment and "N" indicates the Resource is not eligible.
*DAMAP_EN_CON	Day-Ahead Margin Assurance Payment Energy Contribution ($); for a Resource. Represents the portion of the DAMAP as a result of energy dispatch from MISO. Please refer to the Post Operating Processor Calculation Guide for the calculation definition of this component.
*DAMAP_REG_CON	Day-Ahead Margin Assurance Payment Regulating Reserve Contribution ($); for a Resource represents the portion of the DAMAP as a result of Regulating Reserve clearing by MISO and any amount of Additional

	Regulation Mileage. Please refer to the Post Operating Processor Calculation Guide for the calculation definition of this component.
*DAMAP_SPIN_CON	Day-Ahead Margin Assurance Payment Spinning Reserve Contribution ($); for a Resource. Represents the portion of the DAMAP as a result of Spinning Reserve clearing by MISO. Please refer to the Post Operating Processor Calculation Guide for the calculation definition of this component.
*DAMAP_SUPP_CON	Day-Ahead Margin Assurance Payment Supplemental Reserve Contribution ($); for a Resource; Represents the portion of the DAMAP as a result of Supplemental Reserve clearing by MISO. Please refer to the Post Operating Processor Calculation Guide for the calculation definition of this component.
*DAMAP_DRC_CON	Day-Ahead Margin Assurance Payment Down Ramp Capability Contribution ($); for a Resource; Represents the portion of the DAMAP as a result of Down Ramp Capability clearing by MISO. Please refer to the Post Operating Processor Calculation Guide for the calculation definition of this component.
*DAMAP_URC_CON	Day-Ahead Margin Assurance Payment Up Ramp Capability Contribution ($); for a Resource; Represents the portion of the DAMAP as a result of Up Ramp Capability clearing by MISO. Please refer to the Post Operating Processor Calculation Guide for the calculation definition of this component.
*MRD_FL	Manual Re-Dispatch Flag (Unity); for a Resource. An hourly flag that indicates whether a resource has been manually re-dispatched. "Y" indicates the Resource has been manually re-dispatched and "N" indicates the Resource has not been manually re-dispatched.
*RT_ORSGP_FL	Real-Time Offer Revenue Sufficiency Guarantee Flag (Unity); for a Resource; represents whether the Resource received the RTORSGP credit. "Y" indicates the Resource is eligible for payment and "N" indicates the Resource is not eligible.
*RT_ELIG_MWH	Real-Time Eligible Megawatt-Hour (MWh); for a Resource. This represents the difference between the Econ Min Limit for a Must-Run Resource or the DA Schedule for an eligible Resource committed in the Day-Ahead, and the RT_ASM_NXE output of the Resource in the RT.

Please refer to the previously defined calculation definition of this component.

*RT_LMP_EN — Hourly Real-Time LMP ($/MWh); at a Commercial Pricing Node. The Real-Time Energy and Operating Reserve Market clearing price for Energy at a given Commercial Pricing Node associated with the eligible Resource. Please refer to the previously defined calculation definition of this component.

*RT_ORSGP_IE — Real-Time ORSGP Incremental Energy Cost ($); for a Resource. This amount represents the Incremental Energy cost for an eligible Resource. Please refer to the Post Operating Processor Calculation Guide for the calculation definition of this component.

*RTORSGP_REG_AC — Real-Time Additional Regulation Reserve Cost ($); for a Resource. Hourly cost to provide the Regulating Reserve service and Additional Regulation Mileage. This amount is based on the Regulation Reserve Availability Offer for the eligible Resource and the Real-Time Regulation Mileage Offer. Please refer to the Post Operating Processor Calculation Guide for the calculation definition of this component for an eligible Resource.

*RTORSGP_SPIN_AC — Real-Time Additional Spinning Reserve Cost ($); for a Resource. Hourly cost to provide the Spinning Reserve service. This amount is based on the Spinning Reserve Availability Offer for the eligible Resource. Please refer to the Post Operating Processor Calculation Guide for the calculation definition of this component for an eligible Resource.

*RTORSGP_SUPP_AC — Real-Time Additional Supplemental Reserve Cost ($); for a Resource. Hourly cost to provide the Supplemental Reserve service. This amount is based on the Supplemental Reserve Availability Offer for the eligible Resource. Please refer to the Post Operating Processor Calculation Guide for the calculation definition of this component for an eligible Resource.

*RT_REG_REV — Real-Time Hourly Regulation Reserve Revenue ($); for a Resource. The hourly amount of Regulating Reserve cleared in the Real-Time Energy and Operating Reserve Market net of Day-Ahead clearing by a qualified Resource multiplied by the hourly integrated Regulating Reserve Marginal Clearing Price plus any Additional Regulation Mileage multiplied by the Real-Time Regulation Mileage Marginal Clearing Price.

Please refer to the Post Operating Processor Calculation Guide for the calculation definition of this component for an eligible Resource.

*RT_SPIN_REV	Real-Time Hourly Spinning Reserve Revenue ($); for a Resource. The hourly amount of Spinning Reserve cleared in the Real-Time Energy and Operating Reserve Market net of Day-Ahead clearing by a qualified Resource multiplied by the hourly integrated Spinning Reserve Marginal Clearing Price. Please refer to the Post Operating Processor Calculation Guide for the calculation definition of this component for an eligible Resource.
*RT_SUPP_REV	Real-Time Hourly Supplemental Reserve Revenue ($); for a Resource. The hourly amount of Supplemental Reserve cleared in the Real-Time Energy and Operating Reserve Market net of Day-Ahead clearing by a qualified Resource multiplied by the hourly integrated Supplemental Reserve Marginal Clearing Price. Please refer to the Post Operating Processor Calculation Guide for the calculation definition of this component for an eligible Resource.
*RT_DRC_REV	Real-Time Hourly Down Ramp Capability Revenue ($); for a Resource. The hourly amount of Down Ramp Capability cleared in the Real-Time Energy and Operating Reserve Market net of Day-Ahead clearing by a participating Resource multiplied by the hourly integrated Down Ramp Capability Market Clearing Price.
*RT_URC_REV	Real-Time Hourly Up Ramp Capability Revenue ($); for a Resource. The hourly amount of Up Ramp Capability cleared in the Real-Time Energy and Operating Reserve Market net of Day-Ahead clearing by a participating Resource multiplied by the hourly integrated Up Ramp Capability Market Clearing Price.
*NRGA	Net Regulation Generation Adjustment ($); for a Resource. Please refer to the previously defined calculation definition of this component.

D.16.2 Intermediate Calculations for RT_PV_MWP

RTORSGP_EN_REV_HR — Real-Time Hourly Energy Revenue ($); for a Resource.
= RT_ELIG_MWH * RT_LMP_EN

RTORSGP_ASM_REV_HR — Real-Time Hourly Operating Reserve Revenue ($); for a Resource.
= RT_REG_REV + RT_SPIN_REV + RT_SUPP_REV

RTORSGP_RC_REV_HR — Real-Time Hourly Ramp Capability Revenue ($); for a Resource.
= RT_DRC_REV + RT_URC_REV

D.16.3 Charge Type Calculation for RT_PV_MWP

*DA_MAP — Hourly Day-Ahead Margin Assurance Payment ($); for a Resource; this represents the total DAMAP amount in an hour.
= [{ MIN (DAMAP_EN_CON + DAMAP_REG_CON + DAMAP_SPIN_CON + DAMAP_SUPP_CON + DAMAP_DRC_CON + DAMAP_URC_CON) , 0 } * { IF (DA_MAP_FL ="Y", THEN 1, ELSE 0) }]

*RTORSGP — Real-Time Hourly Offer Revenue Sufficiency Guarantee Payment ($); for a Resource.
= [{ MIN ((RTORSGP_EN_REV_HR + RTORSGP_ASM_REV_HR + RTORSGP_RC_REV_HR) - (RTORSGP_IE + RTORSGP_REG_AC + RTORSGP_SPIN_AC + RTORSGP_SUPP_AC + NRGA)), 0 } * { IF (RT_ORSGP_FL = "Y", THEN 1, ELSE 0) }]

*^RT_PV_MWP_HR — Hourly Real-Time Price-Volatility Make Whole Payment Amount ($); for an Asset Owner. This represents the hourly PV_MWP amount for an AO. The formula result is rounded to the nearest cent. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement.
= Σ_{Asset} (DA_MAP) + Σ_{Asset} (RTORSGP)

*RT_PV_MWP — Daily Real-Time Price-Volatility Make Whole Payment Amount ($); for an Asset Owner. This represents the daily PV_MWP total amount for an AO in an Operating Day.
= Σ_{H} (RT_PV_MWP_HR)

D.17 Real-Time Virtual Energy Amount (RT_VIRT_EN)

The Real-Time Virtual Energy Amount represents an AO's total Real-Time net cost (or credit) associated with the AO's Day-Ahead net virtual schedules being backed out, or unwound, in the Real-Time Energy and Operating Reserve Market. The Real-Time virtual schedule volume is equal to the Day-Ahead volume multiplied by minus one. The Real-Time Virtual Energy Amount is calculated hourly for all schedules and summed into a daily total per AO.

For each AO, the Settlement Statement shows the total net cleared bid and offered volume by Commercial Pricing Node by hour.

The Real-Time Virtual Energy Amount, including determinants, is displayed on the Real-Time Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a billing determinant that is displayed on an AO's Real-Time Statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.17.1Calculation Inputs for RT_VIRT_EN

*RT_LMP_EN	Hourly Real-Time LMP ($/MWh); at a Commercial Pricing Node. The Real-Time Energy and Operating Reserve Market clearing price for Energy at a given Commercial Pricing Node in the Transmission Provider Region, which is equivalent to the marginal cost of serving demand at the Commercial Pricing Node. The Real-Time Locational Margin Price includes the MCC and the MLC.
*DA_VSCHD	Hourly Day-Ahead Net Virtual Schedule Volume at a Commercial Pricing Node (MWh); for an AO. The Day-Ahead Net Virtual Schedule Volume is the net Day-Ahead Energy and Operating Reserve Market cleared Bid and Offered Virtual Schedule volume by AO by Commercial Pricing Node by hour. A positive volume represents a net Load obligation and a negative volume represents a net supply obligation.

D.17.2 Intermediate Calculations for RT_VIRT_EN

There are no intermediate calculations.

D.17.3 Charge Type Calculation for RT_VIRT_EN

*^RT_VIRT_EN_HR	Hourly Real-Time Virtual Energy Amount ($); for an AO. The hourly total due MISO from an AO for backing out all the AO's net Day-Ahead Virtual schedules. The formula result is per Hour and rounded to the nearest cent. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement. $= \Sigma_{Transactions} (DA_VSCHD * RT_LMP_EN * (-1))$
*RT_VIRT_EN	Real-Time Virtual Energy Amount ($); for an AO. The daily total due MISO from an AO for backing out all the AO's net Day-Ahead Virtual schedules. $= \Sigma_{H} (RT_VIRT_EN_HR)$

D.18 Real Time Regulation Amount (RT_ASM_REG)

The Real-Time Regulation Amount represents an AO's compensations for Regulating Reserve in the Real-Time Energy and Operating Reserve Market, net of Regulating Reserve amounts in the Day-Ahead Energy and Operating Reserve Market. This amount also includes any Real-Time Mileage Total Make-Whole Payment, Additional Regulation Mileage payment, and Undeployed Regulation Mileage Amount.

The Real-Time Regulation Amount, Real-Time Mileage Total Make-Whole Payment, Additional Regulation Mileage payment, and Undeployed Regulation Mileage Amount, including billing determinants, is displayed on the Real-Time Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a determinant that is displayed on an AO's Real-Time statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.18.1 Calculation Inputs for RT_ASM_REG

*DA_MIL_POT_MWP	Day Ahead Mileage Potential Make-Whole Payment ($): at a Commercial Pricing Node. The potential Make-Whole Payment to a Resource with undeployed Regulating Mileage
*DA_UNUSED_MARGIN	Day Ahead Unused Net Positive Margin ($): at a Commercial Pricing Node. The amount of unused margin based on the costs and revenues associated with Energy, Regulating Reserve, Spinning Reserve, Supplemental Reserve, and applicable Startup Cost and No Load Cost in the Day-Ahead Energy and Operating Reserve Market.
*RT_MIL_POT_MWP	Real-Time Mileage Potential Make-Whole Payment ($): at a Commercial Pricing Node. The potential Make-Whole Payment to a Resource with undeployed Regulating Mileage
*RT_UNUSED_MARGIN	Real-Time Unused Net Positive Margin ($): at a Commercial Pricing Node. The amount of unused margin based on the costs and revenues associated with the net Energy, Regulating Reserve, Spinning Reserve,

Supplemental Reserve, and applicable Startup Cost and No Load Cost in the Real-Time Energy and Operating Reserve Market.

* REG_MIL_UNDP_AMT — Regulation Mileage Undeployed Amount ($): at a Commercial Pricing Node. The charge to the Regulating Resource for its Regulation Mileage below the Hourly Real-Time Cleared Regulating Reserve based on the Real-Time Regulation Mileage MCP.

*ADD_REG_MIL_VOL — Additional Regulation Mileage Volume (MWh); at a Commercial Pricing Node. The amount of Target Regulation Mileage above the Hourly Real-Time Cleared Regulating Reserve.

*RTN_REG_VOL — Real Time Net Regulation Volume (MWh); at a Commercial Pricing Node. The amount of Regulating Reserve in the Real-Time Energy and Operating Reserve Market for a qualified Resource net of Regulating Reserve amounts in the Day-Ahead Energy and Operating Reserve.

*RT_REG_MIL_MCP — Real Time Regulation Mileage Market Clearing Price ($/MW); at a Commercial Pricing Node. Please refer to the previously defined calculation definition of this component.

*RT_REG_MCP — Real Time Regulating Reserve Market Clearing Price ($/MWh); at a Commercial Pricing Node. Please refer to the previously defined calculation definition of this component.

*RT_PROD_SUBST_FL — Real Time Dispatch Interval Product Substitution Flag: Product substitution is a mechanism that allows the substitution of a given higher quality Ancillary Service (AS) product for a lower quality AS product in order to meet the Operating Reserve requirements in a least cost manner for a given Interval. '1' indicates product substitution has occurred. '0' indicates no product substitution has occurred.

D.18.2 Intermediate Calculations for RT_ASM_REG

*RT_MIL_TOT_MWP — Real Time Mileage Total Make-Whole Payment ($): The amount necessary to keep a Resource whole to its offered costs for any Undeployed Regulation Mileage.

$=\sum_{CN}$ (MAX(DA_MIL_POT_MWP$_{CN}$ - DA_UNUSED_MARGIN$_{CN}$,0) + MAX(RT_MIL_POT_MWP$_{CN}$ - RT_UNUSED_MARGIN$_{CN}$,0))

D.18.3 Charge Type Calculation for RT_ASM_REG

*^RT_ASM_REG_HR

Hourly Real-Time Regulation Reserve Amount ($); at a Commercial Pricing Node. Calculation is performed for Commercial Pricing Nodes clearing Regulating Reserve in the Real-Time Energy and Operating Reserve Market. . It also includes the Real-Time Mileage Total Make-Whole Payment, Additional Regulation Mileage payment, and the Undeployed Regulation Mileage Amount. The hourly amount is the product of net cleared megawatts and Real-Time Regulating Reserve Market Clearing Price plus any Real-Time Mileage Total Make-Whole Payment, Additional Regulation Mileage payment, and the Undeployed Regulation Mileage Amount.

$= \sum_{CN} (-1 * RTN\_REG\_VOL_{CN} * RT\_REG\_MCP_{CN}) +$
$\sum_{CN} (-1 * ADD\_REG\_MIL\_VOL_{CN} * RT\_REG\_MIL\_MCP_{CN})$
$+ \sum_{CN} (REG\_MIL\_UNDP\_AMT_{CN})$
$+ \sum_{CN} (-1 * RT\_MIL\_TOT\_MWP)$

*RT_ASM_REG

Real-Time Regulating Reserve Amount ($); the total daily amount due to the Asset Owner that owns the qualified Generation Resources supplying the Regulating Reserve.

$= \sum_{H} (RT\_ASM\_REG\_HR)$

D.19 Real Time Spinning Reserve Amount (RT_ASM_SPIN)

The Real-Time Spinning Reserve Amount represents an AO's compensation for Spinning Reserve in the Real-Time Energy and Operating Reserve Market, net of Spinning Reserve amounts in the Day-Ahead Energy and Operating Reserve Market.

The Real-Time Spinning Reserve Amount, including billing determinants, is displayed on the Real-Time Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a determinant that is displayed on an AO's Real-Time statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.19.1 Calculation Inputs for RT_ASM_SPIN

*RTN_SPIN_VOL	Real Time Net Spinning Reserve Volume (MWh); at a Commercial Pricing Node. The amount of Spinning Reserve and Regulating Reserve substituted for Spinning Reserve in the Real-Time Energy and Operating Reserve Market net of the Spinning Reserve and Regulating Reserve substituted for Spinning Reserve in the Day-Ahead Energy and Operating Reserve Market.
*RT_SPIN_MCP	Real Time Spinning Reserve Market Clearing Price ($/MWh); at a Commercial Pricing Node. Please refer to the previously defined calculation definition of this component.

D.19.2 Intermediate Calculations for RT_ASM_SPIN

There are no intermediate calculations.

D.19.3 Charge Type Calculation for RT_ASM_SPIN

*^RT_ASM_SPIN_HR	Hourly Real-Time Spinning Reserve Amount ($); at a Commercial Pricing Node. Calculation is performed for Commercial Pricing Nodes clearing Spinning Reserve the Real-Time Energy and Operating Reserve Market. The hourly amount is the product of net cleared megawatts and Real-Time Spinning Reserve Market Clearing Price. $= \sum_{CN} (-1 * RTN_SPIN_VOL * RT_SPIN_MCP)$

*RT_ASM_SPIN	Real-Time Spinning Reserve Amount ($); the total daily amount due to the AO that owns the qualified Resource or Resources clearing Spinning Reserve. $= \sum_{H} (\text{RT_ASM_SPIN_HR})$

D.20 Real Time Supplemental Reserve Amount (RT_ASM_SUPP)

The Real-Time Supplemental Reserve Amount represents an AO's compensation for clearing Supplemental Reserve in the Real-Time Energy and Operating Reserve Market, net of amounts cleared in the Day-Ahead Energy and Operating Reserve Market.

The Real-Time Supplemental Reserve Amount, including billing determinants, is displayed on the Real-Time Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a determinant that is displayed on an AO's Real-Time statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM*.*

D.20.1Calculation Inputs for RT_ASM_SUPP

*RTN_SUPP_VOL	Real Time Net Cleared Supplemental Reserve Volume (MWh); at a Commercial Pricing Node. The amount of Supplemental Reserve cleared in the Real-Time Energy and Operating Reserve Market net of amounts cleared in the Day-Ahead Energy and Operating Reserve Market.
*RT_SUPP_MCP	Real Time Supplemental Reserve Market Clearing Price ($/MWh); at a Commercial Pricing Node. Please refer to the previously defined calculation definition of this component.

D.20.2Intermediate Calculations for RT_ASM_SUPP

There are no intermediate calculations.

D.20.3 Charge Type Calculation for RT_ASM_SUPP

*^RT_ASM_SUPP_HR	Hourly Real-Time Supplemental Reserve Amount ($); at a Commercial Pricing Node. Calculation is performed for Commercial Pricing Nodes clearing Supplemental Reserve in the Real-Time Energy and Operating Reserve Market. The hourly amount is the product of cleared net Supplemental Reserve megawatts and Real-Time Supplemental Reserve Market Clearing Price. $= \sum_{CN}$ (-1 * RTN_SUPP_VOL * RT_SUPP_MCP)
*RT_ASM_SUPP	Real-Time Supplemental Reserve Amount ($); the total daily amount due to the AO that owns the Resource or Resources clearing the Supplemental Reserve. $= \sum_{H}$ (RT_ASM_SUPP_HR)

D.21 Regulation Cost Distribution Amount (RT_ASM_REG_DIST)

The Real-Time Regulation Reserve Cost Distribution Amount represents the allocation by AO Load of the total cost of procurement of Regulating Reserve in the Day-Ahead and Real-Time Energy and Operating Reserve Market, the amount collected from the Undeployed Regulation Mileage Amount, and the amount paid for Mileage Make-Whole Payments. The amount is also offset by credits from the distribution of funds collected from the Real-Time Excessive/Deficient Energy Deployment Charge Amount (RT_ASM_EXE_DFE_DEP) associated with Operating Reserves.

The Real-Time Regulation Reserve Cost Distribution Amount, including billing determinants, is displayed on the Real-Time Energy and Operating Reserve Market and Reserves Settlement Statement.

An asterisk (*) denotes a determinant that is displayed on an AO's Real-Time statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.21.1 Calculation Inputs for RT_ASM_REG_DIST

*DA_MIL_POT_MWP	Day Ahead Mileage Potential Make-Whole Payment ($): please refer to the previously defined calculation definition of this component.
*DA_UNUSED_MARGIN	Day Ahead Unused Net Positive Margin ($): please refer to the previously defined calculation definition of this component.
*RT_MIL_POT_MWP	Real-Time Mileage Potential Make-Whole Payment ($): please refer to the previously defined calculation definition of this component.
*RT_UNUSED_MARGIN	Real-Time Unused Net Positive Margin ($): please refer to the previously defined calculation definition of this component.
*RT_BLL_MTR	Hourly Asset Withdrawal Volume at an asset CPNode (MWh); this represents the total hourly Load volume at an asset Commercial Pricing Node where the asset is owned by the AO. An asset CPNode is any

node associated with a GENRES, LOAD, EAR, DRR1 or DRR2 asset entity.

*PCT_CPN_IN_ZN — Percent of CPNode in Reserve Zone (Unity); the percent share of the Load at a Commercial Pricing Node applicable to a particular Reserve Zone. The value is displayed as a number and should be divided by 100 for calculation purposes.

*PRE_888_REG — Regulation Pre-Order 888 Flag (Unity); this flag represents whether a Carved Out Grand Fathered Agreement covers the Regulation Reserve service required. The flag is displayed as an attribute of the GFACO transaction and it has a value of “Y” or “N”. However, for calculation display purposes the value of the flag shall be considered to be one (1) for a value of “Y” and zero (0) for a value of “N”.

*RT_GFACO_{Buyer} — Hourly Real-Time Carved-Out GFA Transaction Volume where the AO is the buyer and owns an Asset at the Commercial Pricing Node (MWh); please refer to the previously defined calculation definition of this component.

*RT_GFACO_{Seller} — Hourly Real-Time Carved-Out GFA Transaction Volume where the AO is the seller and owns an Asset at the Commercial Pricing Node (MWh); please refer to the previously defined calculation definition of this component.

*DA_REG_VOL — Hourly Day-Ahead Cleared Regulation Volume at a Commercial Pricing Node (MWh); please refer to the previously defined calculation definition of this component.

*RTN_REG_VOL — Hourly Real Time Net Cleared Regulation Volume at a Commercial Pricing Node (MWh); please refer to the previously defined calculation definition of this component.

*DA_REG_MCP — Hourly Day-Ahead Regulation Market Clearing Price ($/MWh); the Day Ahead clearing price at a Commercial Pricing Node in MISO footprint for Regulation Reserve.

*RT_REG_MCP — Hourly Real-Time Regulation Market Clearing Price ($/MWh); the Real-Time quantity-weighted hourly clearing price for regulation reserve at a Commercial Pricing Node in MISO footprint.

*ASM_REG_DIST_EXEMPT ASM Regulation Exemption Flag; this flag indicates the CPNode is exempt from all ASM regulation charges. This status is entered at the time of registration.

REG_MIL_UNDP_AMT Hourly Real Time Undeployed Regulation Mileage Charge Uplift Amount ($); please refer to the previously defined calculation definition of this component.

*MISO_ASM_REG_DIST_VOL Hourly Regulation Cost Distribution-Liable Energy Withdrawal Volume (MWh); for MISO footprint, excluding Export Schedules.

*MISO_RT_ASM_REG_GFA_SELLER_DIST_VOL Hourly Regulation Reserve GFA Distribution Volume (MWh); for MISO footprint.

D.21.2 Intermediate Calculations for RT_ASM_REG_DIST

$RT\_ASM\_REG\_GFA\_SELLER\_DIST\_VOL_{CN}$ Hourly Regulation Reserve GFA Distribution Volume (MWh); for a CPNode. Hourly ASM Regulation Reserve cost distribution-liable GFACO energy withdrawal volume at the Sink CPNode.

= IF ASM_REG_DIST_EXEMPT = 'N'
THEN { $\sum_{Transactions}$ (RT_GFACO_{SELLER} * PRE_888_REG) }
ELSE 0

$*RT\_ASM\_REG\_GFA\_SELLER\_DIST\_VOL_{AO\text{-}ZN}$ Hourly Regulation Reserve GFA Distribution Volume (MWh); for an AO in a Reserve Zone. Hourly ASM Regulation Reserve cost distribution-liable GFACO energy withdrawal volume for an AO in a Reserve Zone.

$=\sum_{CN}$ ($RT\_ASM\_REG\_GFA\_SELLER\_DIST\_VOL_{CN}$ * PCT_CPN_IN_ZN)

*RT_MIL_TOT_MWP Real Time Mileage Total Make-Whole Payment ($): please refer to the previously defined calculation definition of this component.

$ASM\_REG\_DIST\_VOL_{CN}$ Hourly Regulation Reserve Distribution Volume (MWh); for a CPNode. Hourly ASM Regulation Reserve cost distribution-liable energy withdrawal volume at the Sink CPNode minus eligible GFACO buyer withdrawal volume.

= IF ASM_REG_DIST_EXEMPT = 'N'
THEN [MAX ($RT\_BLL\_MTR_{CN}$, 0) - { $\sum_{Transactions}$ (RT_GFACO_{BUYER} * PRE_888_REG) }]
ELSE 0

*$ASM\_REG\_DIST\_VOL_{AO-ZN}$	Hourly Regulation Reserve Distribution Volume (MWh); for an AO in a Reserve Zone. Hourly ASM Regulation Reserve cost distribution-liable non-GFACO energy withdrawal volume for an AO in a Reserve Zone. $=\sum_{CN} (ASM\_REG\_DIST\_VOL_{CN} * PCT\_CPN\_IN\_ZN)$
*$ASM\_REG\_GFA\_DIST\_RATE_{ZN}$	Hourly Regulation Reserve GFA Distribution Rate ($/MWh); for a Reserve Zone. Hourly ASM Regulation Reserve procurement cost distribution rate in a Reserve Zone for GFACO energy withdrawal volume. $=\sum_{CN} [\{ (DA\_REG\_VOL_{CN} * DA\_REG\_MCP_{CN} * PCT\_CPN\_IN\_ZN) + (RTN\_REG\_VOL_{CN} * RT\_REG\_MCP_{CN} * PCT\_CPN\_IN\_ZN) - (REG\_MIL\_UNDP\_AMT * PCT\_CPN\_IN\_ZN) + (RT\_MIL\_TOT\_MWP * PCT\_CPN\_IN\_ZN) \} / \{ (RT\_ASM\_REG\_GFA\_SELLER\_DIST\_VOL_{CN} * PCT\_CPN\_IN\_ZN) + (ASM\_REG\_DIST\_VOL_{CN} * PCT\_CPN\_IN\_ZN) \}]$
*$ASM\_REG\_DIST\_RATE_{ZN}$	Hourly Regulation Reserve Distribution Rate ($/MWh); for a Reserve Zone. Hourly ASM Regulation Reserve procurement cost distribution rate in a particular Reserve Zone for non-GFACO energy withdrawal volume. $= \sum_{CN} [\{ (DA\_REG\_VOL_{CN} * DA\_REG\_MCP_{CN} * PCT\_CPN\_IN\_ZN) + (RTN\_REG\_VOL_{CN} * RT\_REG\_MCP_{CN} * PCT\_CPN\_IN\_ZN) - (REG\_MIL\_UNDP\_AMT * PCT\_CPN\_IN\_ZN) + (RT\_MIL\_TOT\_MWP * PCT\_CPN\_IN\_ZN) - (RT\_ASM\_REG\_GFA\_SELLER\_DIST\_VOL_{CN} * PCT\_CPN\_IN\_ZN * ASM\_REG\_GFA\_DIST\_RATE_{ZN}) \} / (ASM\_REG\_DIST\_VOL_{CN} * PCT\_CPN\_IN\_ZN)]$
*MISO_EDEDC_REG_UPLIFT	Hourly Real-Time Excessive/Deficient Energy Deployment Charge Uplift Amount for Regulating Reserves ($); this represents the total funds collected through the part of Regulating Reserves in the RT_ASM_EXE_DFE_DEP Charge Type from all AOs. $= \Sigma_{AO} (RT\_ASM\_EXE\_DFE\_DEP\_REG\_HR) * -1$
MISO_EDEDC_UPLIFT_RATE	Hourly EDEDC Uplift Rate ($/MWh); for all MISO. This rate is used to allocate credits from the funds collected through the part of Regulating Reserves in RT_ASM_EXE_DFE_DEP Charge Type from all AOs. The funds are distributed pro-rata, based on Market Load Ratio Share, excluding Export Schedules.

= MISO_EDEDC_REG_UPLIFT / (MISO_ASM_REG_DIST_VOL + MISO_RT_ASM_REG_GFA_SELLER_DIST_VOL)

D.21.3 Charge Type Calculation for RT_ASM_REG_DIST

*^ RT_ASM_REG_DIST_HR$_{AO}$ Hourly Regulation Reserve Cost Distribution Amount ($); for an AO for all Reserve Zone. The result is rounded to the nearest cent. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement.

= Σ_{AO-ZN} [(ASM_REG_DIST_VOL$_{AO-ZN}$ * ASM_REG_DIST_RATE$_{ZN}$) + (RT_ASM_REG_GFA_SELLER_DIST_VOL$_{AO-ZN}$ * ASM_REG_GFA_DIST_RATE$_{ZN}$) + ((ASM_REG_DIST_VOL$_{AO-ZN}$ + RT_ASM_REG_GFA_SELLER_DIST_VOL$_{AO-ZN}$) * MISO_EDEDC_UPLIFT_RATE)]

* RT_ASM_REG_DIST Daily Regulation Reserve Cost Distribution Amount ($); for an AO. This is the AO's daily total share of the cost of the Regulation Operating Reserve in MISO.

= Σ_H (RT_ASM_REG_DIST_HR)

D.22 Spinning Reserve Cost Distribution Amount (RT_ASM_SPIN_DIST)

The Real-Time Spinning Reserve Cost Distribution Amount represents the allocation by AO Load of the total cost of procurement of Spinning Reserve in the Day-Ahead and Real-Time Energy and Operating Reserve Market.

The Real-Time Spinning Reserve Cost Distribution Amount, including billing determinants, is displayed on the Real-Time Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a determinant that is displayed on an AO's Real-Time statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.22.1 Calculation Inputs for RT_ASM_SPIN_DIST

*RT_BLL_MTR	Hourly Asset Withdrawal Volume at an asset CPNode (MWh); this represents the total hourly load volume at an asset Commercial Pricing Node where the asset is owned by the AO. An asset CPNode is any node associated with a GENRES, LOAD, EAR, DRR1 or DRR2 asset entity.
*PCT_CPN_IN_ZN	Percent of CPNode in Reserve Zone (Unity); the percent share of the Load at a Commercial Pricing Node applicable to a particular Reserve Zone. The value is displayed as a number and should be divided by 100 for calculation purposes.
*PRE_888_SPIN	Spinning Pre-Order 888 Flag (Unity); this flag represents whether a Carved Out Grandfathered Agreement covers the Spinning Reserve service required. The flag is displayed as an attribute of the GFACO transaction and it has a value of "Y" or "N". However, for calculation display purposes the value of the flag shall be considered to be one (1) for a value of "Y" and zero (0) for a value of "N".

*RT_GFACO_{Buyer}	Hourly Real-Time Carved-Out GFA Transaction Volume where the AO is the buyer and owns an Asset at the Commercial Pricing Node (MWh); please refer to the previously defined calculation definition of this component.
*RT_GFACO_{Seller}	Hourly Real-Time Carved-Out GFA Transaction Volume where the AO is the seller and owns an Asset at the Commercial Pricing Node (MWh); please refer to the previously defined calculation definition of this component.
*RT_PHYS_{Buyer}	Hourly Real-Time PBT Volume where the AO is the Buyer (MWh); a Buyer is defined as an AO that receives energy from MISO, at a MISO defined interface Commercial Pricing, for export out of MISO.
* RT_PHYS_TYPE	Real-Time Physical Schedule Type (value); the type code on a Real-Time Physical Schedule.
*DA_SPIN_VOL	Hourly Day-Ahead Cleared Spinning Volume at a Commercial Pricing Node (MWh); please refer to the previously defined calculation definition of this component.
*RTN_SPIN_VOL	Hourly Real Time Net Spinning Volume and Net Regulating Reserve for Spinning Reserve Substitution Volume at a Commercial Pricing Node (MWh); please refer to the previously defined calculation definition of this component.
*DA_SPIN_MCP	Hourly Day-Ahead Spinning Market Clearing Price ($/MWh); the Day Ahead clearing price at a Commercial Pricing Node in MISO footprint for Spinning Reserve.
*RT_SPIN_MCP	Hourly Real-Time Spinning Market Clearing Price ($/MWh); the Real-Time quantity-weighted hourly clearing price for spinning reserve at a Commercial Pricing Node in MISO footprint.
*ASM_SPIN_DIST_EXEMPT	ASM Spinning Exemption Flag; this flag indicates the CPNode is exempt from all ASM spinning reserve charges. This status is entered at the time of registration.

D.22.2 Intermediate Calculations for RT_ASM_SPIN_DIST

RT_ASM_SPIN_GFA_SELLER_DIST_VOL$_{CN}$ Hourly Spinning Reserve GFA Distribution Volume (MWh); for a CPNode. Hourly ASM Spinning Reserve cost distribution-liable GFACO energy withdrawal volume at the Sink CPNode.

= IF ASM_SPIN_DIST_EXEMPT = 'N'
THEN { $\sum_{Transactions}$ (RT_GFACO$_{SELLER}$ * PRE_888_SPIN) }
ELSE 0

*RT_ASM_SPIN_GFA_SELLER_DIST_VOL$_{AO-ZN}$ Hourly Spinning Reserve GFA Distribution Volume (MWh); for an AO in a Reserve Zone. Hourly ASM Spinning Reserve cost distribution-liable GFACO energy withdrawal volume for an AO in a Reserve Zone.

=$\sum_{CN}$ (RT_ASM_SPIN_GFA_SELLER_DIST_VOL$_{CN}$ * PCT_CPN_IN_ZN)

ASM_SPIN_DIST_VOL$_{CN}$ Hourly Spinning Reserve Distribution Volume (MWh); for a CPNode. Hourly ASM Spinning Reserve cost distribution-liable energy withdrawal volume at the Sink CPNode which includes Export Schedules, except those from EAR Export Schedules and CTS transactions, and excludes eligible GFACO buyer withdrawal volume.

= IF ASM_SPIN_DIST_EXEMPT = 'N'
THEN [MAX (RT_BLL_MTR$_{CN}$, 0) - { $\sum_{Transactions}$ (RT_GFACO$_{BUYER}$ * PRE_888_SPIN) } +
{ $\sum_{Transactions}$ (IF RT_PHYS_TYPE = 'CTS' THEN 0 ELSE RT_PHYS$_{BUYER}$) }]
ELSE 0

*ASM_SPIN_DIST_VOL$_{AO-ZN}$ Hourly Spinning Reserve Distribution Volume (MWh); for an AO in a Reserve Zone. Hourly ASM Spinning Reserve cost distribution-liable non-GFACO energy withdrawal volume for an AO in a Reserve Zone.

=$\sum_{CN}$ (ASM_SPIN_DIST_VOL$_{CN}$ * PCT_CPN_IN_ZN)

*ASM_SPIN_GFA_DIST_RATE$_{ZN}$ Hourly Spinning Reserve GFA Distribution Rate ($/MWh); for a Reserve Zone. Hourly ASM Spinning Reserve procurement cost distribution rate in a Reserve Zone for GFACO energy withdrawal volume.

=$\sum_{CN}$ [{ (DA_SPIN_VOL$_{CN}$ * DA_SPIN_MCP$_{CN}$ * PCT_CPN_IN_ZN) +
(RTN_SPIN_VOL$_{CN}$ * RT_SPIN_MCP$_{CN}$ * PCT_CPN_IN_ZN) } /
{ (RT_ASM_SPIN_GFA_SELLER_DIST_VOL$_{CN}$ * PCT_CPN_IN_ZN) +
(ASM_SPIN_DIST_VOL$_{CN}$ * PCT_CPN_IN_ZN) }]

$*ASM\_SPIN\_DIST\_RATE_{ZN}$ — Hourly Spinning Reserve Distribution Rate ($/MWh); for a Reserve Zone. Hourly ASM Spinning Reserve procurement cost distribution rate in a particular Reserve Zone for non-GFACO energy withdrawal volume.

$= \sum_{CN}$ [{ ($DA\_SPIN\_VOL_{CN}$ * $DA\_SPIN\_MCP_{CN}$ * PCT_CPN_IN_ZN) +
($RTN\_SPIN\_VOL_{CN}$ * $RT\_SPIN\_MCP_{CN}$ * PCT_CPN_IN_ZN) -
($RT\_ASM\_SPIN\_GFA\_SELLER\_DIST\_VOL_{CN}$ * PCT_CPN_IN_ZN * $ASM\_SPIN\_GFA\_DIST\_RATE_{ZN}$) } /
($ASM\_SPIN\_DIST\_VOL_{CN}$ * PCT_CPN_IN_ZN)]

D.22.3 Charge Type Calculation for RT_ASM_SPIN_DIST

$*\hat{}RT\_ASM\_SPIN\_DIST\_HR_{AO}$ — Hourly Spinning Reserve Cost Distribution Amount ($); for an AO for all Reserve Zone. The result is rounded to the nearest cent. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement.

$= \Sigma_{AO\text{-}ZN}$ [($ASM\_SPIN\_DIST\_VOL_{AO\text{-}ZN}$ * $ASM\_SPIN\_DIST\_RATE_{ZN}$) +
($RT\_ASM\_SPIN\_GFA\_SELLER\_DIST\_VOL_{AO\text{-}ZN}$ * $ASM\_SPIN\_GFA\_DIST\_RATE_{ZN}$)]

*RT_ASM_SPIN_DIST — Daily Spinning Reserve Cost Distribution Amount ($); for an AO. This is the AO's daily total share of the cost of the Spinning Operating Reserve in MISO.

$= \Sigma_H$ (RT_ASM_SPIN_DIST_HR)

D.23 Supplemental Reserve Cost Distribution Amount (RT_ASM_SUPP_DIST)

The Real-Time Supplemental Reserve Cost Distribution Amount represents the allocation by AO Load of the total cost of procurement of Supplemental Reserve in the Day-Ahead and Real-Time Energy and Operating Reserve Market.

The Real-Time Supplemental Reserve Cost Distribution Amount, including billing determinants, is displayed on the Real-Time Energy and Operating Reserve Market and Reserves Settlement Statement.

An asterisk (*) denotes a determinant that is displayed on an AO's Real-Time statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.23.1Calculation Inputs for RT_ASM_SUPP_DIST

*RT_BLL_MTR	Hourly Asset Withdrawal Volume at an asset CPNode (MWh); this represents the total hourly load volume at an asset Commercial Pricing Node where the asset is owned by the AO. An asset CPNode is any node associated with a GENRES, LOAD, EAR, DRR1 or DRR2 asset entity.
*PCT_CPN_IN_ZN	Percent of CPNode in Reserve Zone (Unity); the percent share of the Load at a Commercial Pricing Node applicable to a particular Reserve Zone. The value is displayed as a number and should be divided by 100 for calculation purposes.
*PRE_888_SUPP	Supplemental Pre-Order 888 Flag (Unity); this flag represents whether a Carved Out Grandfathered Agreement covers the Supplemental Reserve service required. The flag is displayed as an attribute of the GFACO transaction and it has a value of "Y" or "N". However, for calculation display purposes the value of the flag shall be considered to be one (1) for a value of "Y" and zero (0) for a value of "N".

*RT_GFACO_{Buyer}	Hourly Real-Time Carved-Out GFA Transaction Volume where the AO is the buyer and owns an Asset at the Commercial Pricing Node (MWh); please refer to the previously defined calculation definition of this component.
*RT_GFACO_{Seller}	Hourly Real-Time Carved-Out GFA Transaction Volume where the AO is the seller and owns an Asset at the Commercial Pricing Node (MWh); please refer to the previously defined calculation definition of this component.
*RT_PHYS_{Buyer}	Hourly Real-Time PBT Volume where the AO is the Buyer (MWh); a Buyer is defined as an AO that receives energy from MISO, at a MISO defined interface Commercial Pricing, for export out of MISO.
* RT_PHYS_TYPE	Real-Time Physical Schedule Type (value); the type code on a Real-Time Physical Schedule.
*DA_SUPP_VOL	Hourly Day-Ahead Cleared Supplemental Volume at a Commercial Pricing Node (MWh); please refer to the previously defined calculation definition of this component.
*RTN_SUPP_VOL	Hourly Real Time Net Cleared Supplemental Volume at a Commercial Pricing Node (MWh); please refer to the previously defined calculation definition of this component.
*DA_SUPP_MCP	Hourly Day-Ahead Supplemental Market Clearing Price ($/MWh); the Day Ahead clearing price at a Commercial Pricing Node in MISO footprint for Supplemental Reserve.
*RT_SUPP_MCP	Hourly Real-Time Supplemental Market Clearing Price ($/MWh); the Real-Time quantity-weighted hourly clearing price for supplemental reserve at a Commercial Pricing Node in MISO footprint.
*ASM_SUPP_DIST_EXEMPT	ASM Supplemental Exemption Flag; this flag indicates the CPNode is exempt from all ASM supplemental reserve charges. This status is entered at the time of registration.

D.23.2 Intermediate Calculations for RT_ASM_SUPP_DIST

$RT\_ASM\_SUPP\_GFA\_SELLER\_DIST\_VOL_{CN}$ Hourly Supplemental Reserve GFA Distribution Volume (MWh); for a CPNode. Hourly ASM Supplemental Reserve cost distribution-liable GFACO energy withdrawal volume at the Sink CPNode.

= IF ASM_SUPP_DIST_EXEMPT = 'N'

THEN { $\sum_{Transactions}$ (RT_GFACO_{SELLER} * PRE_888_SUPP) }

ELSE 0

*$RT\_ASM\_SUPP\_GFA\_SELLER\_DIST\_VOL_{AO-ZN}$ Hourly Supplemental Reserve GFA Distribution Volume (MWh); for an AO in a Reserve Zone. Hourly ASM Supplemental Reserve cost distribution-liable GFACO energy withdrawal volume for an AO in a Reserve Zone.

$=\sum_{CN}$ ($RT\_ASM\_SUPP\_GFA\_SELLER\_DIST\_VOL_{CN}$ * PCT_CPN_IN_ZN)

$ASM\_SUPP\_DIST\_VOL_{CN}$ Hourly Supplemental Reserve Distribution Volume (MWh); for a CPNode. Hourly ASM Supplemental Reserve cost distribution-liable energy withdrawal volume at the Sink CPNode which includes Export Schedules, except those from EAR Export Schedules and CTS transactions, and excludes eligible GFACO buyer withdrawal volume.

= IF ASM_SUPP_DIST_EXEMPT = 'N'

THEN [MAX ($RT\_BLL\_MTR_{CN}$, 0) - { $\sum_{Transactions}$ (RT_GFACO_{BUYER} * PRE_888_SUPP) } +

{ $\sum_{Transactions}$ (IF RT_PHYS_TYPE = 'CTS' THEN 0 ELSE RT_PHYS_{BUYER}) }]

ELSE 0

*$ASM\_SUPP\_DIST\_VOL_{AO-ZN}$ Hourly Supplemental Reserve Distribution Volume (MWh); for an AO in a Reserve Zone. Hourly ASM Supplemental Reserve cost distribution-liable non-GFACO energy withdrawal volume for an AO in a Reserve Zone.

$=\sum_{CN}$ ($ASM\_SUPP\_DIST\_VOL_{CN}$ * PCT_CPN_IN_ZN)

*$ASM\_SUPP\_GFA\_DIST\_RATE_{ZN}$ Hourly Supplemental Reserve GFA Distribution Rate ($/MWh); for a Reserve Zone. Hourly ASM Supplemental Reserve procurement cost distribution rate in a Reserve Zone for GFACO energy withdrawal volume.

$=\sum_{CN}$ [{ ($DA\_SUPP\_VOL_{CN}$ * $DA\_SUPP\_MCP_{CN}$ * PCT_CPN_IN_ZN) +

(RTN_SUPP_VOL$_{CN}$ * RT_SUPP_MCP$_{CN}$ * PCT_CPN_IN_ZN) } /
{ (RT_ASM_SUPP_GFA_SELLER_DIST_VOL$_{CN}$ * PCT_CPN_IN_ZN) +
(ASM_SUPP_DIST_VOL$_{CN}$ * PCT_CPN_IN_ZN) }]

*ASM_SUPP_DIST_RATE$_{ZN}$ — Hourly Supplemental Reserve Distribution Rate ($/MWh); for a Reserve Zone. Hourly ASM Supplemental Reserve procurement cost distribution rate in a particular Reserve Zone for non-GFACO energy withdrawal volume.

= ∑$_{CN}$ [{ (DA_SUPP_VOL$_{CN}$ * DA_SUPP_MCP$_{CN}$ * PCT_CPN_IN_ZN) +
(RTN_SUPP_VOL$_{CN}$ * RT_SUPP_MCP$_{CN}$ * PCT_CPN_IN_ZN) - (RT_ASM_SUPP_GFA_SELLER_DIST_VOL$_{CN}$ * PCT_CPN_IN_ZN * ASM_SUPP_GFA_DIST_RATE$_{ZN}$) } /
(ASM_SUPP_DIST_VOL$_{CN}$ * PCT_CPN_IN_ZN)]

D.23.3Charge Type Calculation for RT_ASM_SUPP_DIST

*^RT_ASM_SUPP_DIST_HR$_{AO}$ — Hourly Supplemental Reserve Cost Distribution Amount ($); for an AO in all Reserve Zone. The result is rounded to the nearest cent. The hourly values are displayed beneath the Charge Type total in the Line Item section of the statement.

= Σ$_{AO-ZN}$ [(ASM_SUPP_DIST_VOL$_{AO-ZN}$ * ASM_SUPP_DIST_RATE$_{ZN}$) +
(RT_ASM_SUPP_GFA_SELLER_DIST_VOL$_{AO-ZN}$ * ASM_SUPP_GFA_DIST_RATE$_{ZN}$)]

*RT_ASM_SUPP_DIST — Daily Supplemental Reserve Cost Distribution Amount ($); for an AO. This is the AO's daily total share of the cost of the Supplemental Operating Reserve in MISO.

= Σ$_{H}$ (RT_ASM_SUPP_DIST_HR)

D.24 Real Time Excessive Deficient Energy Deployment Charge Amount (RT_ASM_EXE_DFE_DEP)

The Real-Time Excessive/Deficient Energy Deployment Charge Amount represents the charge to an AO owning Generation where the AO's unit fails to follow Setpoint instructions or fails Regulation Mileage Performance Test for 4 consecutive intervals within 1 hour without an Exemption. This charge consists of taking back any cleared Day Ahead Regulation Operating Reserve payment and any cleared Net Real Time Regulation payment and also assesses a prorated share of the Day Ahead and Real Time Regulation Market cost. The Regulation Cost Distribution Amount is also assessed under these conditions.

The Real-Time Excessive/Deficient Energy Deployment Charge Amount, including billing determinants, is displayed on the Real-Time Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a determinant that is displayed on an AO's Real-Time statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.24.1 Calculation Inputs for RT_ASM_EXE_DFE_DEP

MIL_CHARGE_AMT — Failure Mileage Performance Test Charge ($); at a Regulating Resource CPNode. This represents the charge amount for a Resource that failed the Regulation Mileage Performance Test in any Dispatch Interval in an hour.

*$RT\_BLL\_MTR_{CN\text{-}injection}$ — Hourly Asset Injection Volume (MWh); at a resource CPNode. This represents the total hourly injection volume at a Resource Commercial Pricing Node where the asset is owned by the AO. A Resource CPNode is any node associated with a GENRES, DRR Type-I or DRR Type-II asset entity.
= MIN ($RT\_BLL\_MTR_{GEN,}$ + RT_DRRII_INJ_VOL, 0)

*DA_REG_VOL Hourly Day-Ahead Cleared Regulation Volume (MWh); the amount of Regulating Reserve cleared in the Day-Ahead Energy and Operating Reserve Market by a qualified Resource.

*DA_REG_MCP Hourly Day-Ahead Regulation Market Clearing Price ($/MWh); the Day-Ahead Market Clearing Price for Regulating Reserve at a Resource Commercial Pricing Node.

*RTN_REG_VOL Hourly Net Real-Time Cleared Regulation Volume (MWh): the amount of Regulating Reserve cleared in the Real-Time Energy and Operating Reserve Market by a qualified Resource net of amounts cleared in the Day-Ahead Energy and Operating Reserve Market. Please refer to the previously defined calculation definition of this component.

*ADD_REG_MIL_VOL Additional Regulation Mileage Volume (MWh); at a Commercial Pricing Node. The amount of Target Regulation Mileage above the Hourly Integrated Real-Time Cleared Regulating Reserve.

*$RT\_BLL\_MTR_{GEN}$ Hourly Real-Time Metered Billable Volume for Generation (MWh); billable asset volume for Generation Resources, excluding DRR Type-II Resources. Please refer to the previously defined calculation definition of this component.

RT_DRRII_INJ_VOL Hourly Real-Time DRR II Injection Volume (MWh); Energy injection volume for a DRR Type-II, calculated as minus one times the difference between the dispatch maximum and the billable meter load at the DRR II bus. Please refer to the previously defined calculation definition of this component.

*RT_REG_MIL_MCP Real Time Regulation Mileage Market Clearing Price ($/MW); at a Commercial Pricing Node. Please refer to the previously defined calculation definition of this component.

*RT_REG_MCP Hourly Real-Time Regulation Market Clearing Price ($/MWh); the Market Clearing Price for Regulation Reserve at a Resource Commercial Pricing Node.

*EEEF Hourly Excessive Energy Exemption Flag; at a Commercial Pricing Node (unity); at a Commercial Pricing Node. This binary nature (value of “Y” or “N”) data point would cause the Excessive Energy Volume to be added to the Non-Excessive Energy Volume to be settled at LMP rather than the Excessive Energy Price when the exemption is issued (EEEF="1"). In hours where EEEF="Y", the mathematical value of EEEF is 1 (for numerical calculation purposes).

*FFDF — Hourly Failure to Follow Dispatch Flag (unity); at a Commercial Pricing Node. A Resource would be issued this flag when deemed not to abide by Setpoint Instructions as measured by SCADA data or, in case SCADA values are suspect, State Estimator values. In hours where FFDF="Y", the mathematical value of FFDF is 1 (for numerical calculation purposes)

*FMPTF — Hourly Failure Mileage Performance Test Flag (unity); at a Commercial Pricing Node. This binary nature (value of "Y" or "N") data point would cause the AO owning the Resource to be charged back the Additional Regulating Mileage Payment from Charge Type of RT_ASM_REG if the flag value is set to "Y".

*MISO_ASM_REG_DIST_VOL — Hourly Regulation Cost Distribution-Liable Energy Withdrawal Volume (MWh); for MISO footprint, excluding Export Schedules.

*MISO_RT_ASM_REG_GFA_SELLER_DIST_VOL — Hourly Regulation Reserve GFA Distribution Volume (MWh); for MISO footprint.

D.24.2Intermediate Calculations for RT_ASM_EXE_DFE_DEP

*MISO_ASM_EXE_DFE_DEP_RT — Real Time Excessive/Deficient Charge Rate ($/MWh); for MISO footprint.

$$= [\ \Sigma_{CN}\ \{\ (\ DA\_REG\_VOL_{CN}\ *\ DA\_REG\_MCP_{CN}\ )\ +\ (\ RTN\_REG\_VOL_{CN}\ *\ RT\_REG\_MCP_{CN}\ )\ \}\ ]\ /\ (\ MISO\_ASM\_REG\_DIST\_VOL + MISO\_RT\_ASM\_REG\_GFA\_SELLER\_DIST\_VOL\ )$$

*RT_ASM_EXE_DFE_DEP_REG_HR — Hourly Excessive/Deficient Energy Deployment Charge for Regulating Reserve Capacity ($); for all Commercial Pricing Nodes for an AO. This calculation is performed at Commercial Pricing Nodes where the AO owns the Resource which failed to follow Setpoint or failed to provide Regulating Mileage.

$$= \Sigma_{CN}\ [\ \{\ MAX\ (\ (\ DA\_REG\_VOL_{CN}\ *\ DA\_REG\_MCP_{CN}\ ) + (RTN\_REG\_VOL_{CN}\ *\ RT\_REG\_MCP_{CN}\ ),\ 0\ )\ +\ (\ (\ RT\_BLL\_MTR_{CN\text{-}injection}\ *\ MAX\ (\ MISO\_ASM\_EXE\_DFE\_DEP\_RT, 0\ )\ )\ *\ -1\ )\ \}$$

* { IF FMPTF = 1, THEN 1, ELSEIF (EEEF = "Y", THEN 0, ELSE FFDF) }]

*RT_ASM_EXE_DFE_DEP_MIL_HR Hourly Excessive/Deficient Energy Deployment Charge for Regulating Mileage ($); for all Commercial Pricing Nodes for an AO. This calculation is performed at Commercial Pricing Nodes where the AO owns the Resource which incurred either the Hourly or Dispatch Interval Failure Mileage Performance Test.

$= \Sigma_{CN}$ [(ADD_REG_MIL_VOL$_{CN}$ * RT_REG_MIL_MCP$_{CN}$) * (FMPTF)] + Σ_{CN} [MIL_CHARGE_AMT$_{CN}$ * (IF FMPTF 1, THEN 0, ELSE 1)]

D.24.3 Charge Type Calculation for RT_ASM_EXE_DFE_DEP

*^RT_ASM_EXE_DFE_DEP_HR Hourly Excessive/Deficient Energy Deployment Charge ($); for all Commercial Pricing Nodes for an AO. This calculation is performed at Commercial Pricing Nodes where the AO owns the Resource which incurred the Setpoint following failure.

= RT_ASM_EXE_DFE_DEP_REG_HR + RT_ASM_EXE_DFE_DEP_MIL_HR

*RT_ASM_EXE_DFE_DEP Daily Real Time Excessive Deficient Energy Deployment Charge Amount ($); for an AO.

$= \Sigma_{H}$ (RT_ASM_EXE_DFE_DEP)

D.25 Non-Excessive Energy Amount (RT_ASM_NXE)

The Real-Time Non-Excessive Energy Amount represents an AO's credit or charge for net energy injections at Resources owned by the AO. The Charge Type applies only to the volume that is less than or equal to the Resource's Excessive Energy Threshold. Those injections are paid at the prevailing LMP for the Commercial Pricing Node associated with the Asset.

The Real-Time Non-Excessive Energy Amount, including billing determinants, is displayed on the Real-Time Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a determinant that is displayed on an AO's Real-Time statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.25.1Calculation Inputs for RT_ASM_NXE

*$RT\_BLL\_MTR_{GEN}$	Hourly Real-Time Metered Billable Volume for Generation (MWh); billable asset volume for Generation Resources, excluding DRR Type-II Resources. Please refer to the previously defined calculation definition of this component.
RT_DRRII_INJ_VOL	Hourly Real-Time DRR II Injection Volume (MWh); Energy injection volume for a DRR Type-II, calculated as minus one times the difference between the dispatch maximum and the billable meter load at the DRR Type-II bus. Please refer to the previously defined calculation definition of this component.
*RT_ADJ_MTR	Hourly Real-Time Residual Load Volume (MWh); Residual Load due to unaccounted for energy in a LBA. Please refer to the previously defined calculation definition of this component.
*EXE	Hourly Excessive Resource Energy Volume (MWh); for an AO at a Commercial Pricing Node. This value represents the energy output of a

	Resource beyond its Excessive Energy Threshold as calculated by MISO.
*DA_SCHD_{Gen}	Hourly Day-Ahead Asset Schedule Volume for a Resource asset (MWh); the Day-Ahead Asset Schedule Volume is the market cleared Resource Offer Day-Ahead Asset schedule by asset for generation resources, excluding DRR Type-II Resources.
DA_DRRII_SCHD_VOL	Hourly Day-Ahead DRR II Schedule Volume (MWh); the calculated volume representing injection for a DRR Type-II in the Day-Ahead Market. This injection volume for the DRR Type-II is calculated as minus one times the difference between the Day-Ahead dispatch maximum and the Day-Ahead Schedule withdrawal bid volume for the DRR Type-II. Please refer to the previously defined calculation definition of this component.
RT_FIN_NET	Hourly Real-Time Net FBT Load Obligation (MWh); for an AO at a Generation Commercial Pricing Node; This volume represents any excess of FBT energy sold (and sourcing) less energy purchased (and sinking) at a Generation Asset, Please refer to the previously defined calculation definition of this component.
RT_GFACO_NET	Hourly Real-Time Net Carved-Out Grandfathered Transactions (MWh); for an AO at a Generation Commercial Pricing Node. Please refer to the previously defined calculation definition of this component.
*RT_LMP_EN	Hourly Real-Time LMP ($/MWh); at a Commercial Pricing Node. The Real-Time Energy and Operating Reserve Market clearing price for Energy at a given Commercial Pricing Node. Please refer to the previously defined calculation definition of this component.
*EEEF	Hourly Excessive Energy Exemption Flag; at a Commercial Pricing Node. This binary nature (value of "Y" or "N") data point would cause the Excessive Energy Volume to be added to the Non-Excessive Energy Volume to be settled at LMP rather than the Excessive Energy Price when the exemption is issued (EEEF="Y"). Please refer to the previously defined calculation definition of this component.

D.25.2 Intermediate Calculations for RT_ASM_NXE

NXE

Hourly Non-Excessive Resource Energy Volume (MWh); at a Commercial Pricing Node. This value represents the energy output of a Resource circumscribed to its Excessive Energy Threshold.

$= (RT\_BLL\_MTR_{GEN} + RT\_DRRII\_INJ\_VOL - RT\_ADJ\_MTR + EXE)$

D.25.3 Charge Type Calculation for RT_ASM_NXE

*^RT_ASM_NXE_HR

Hourly Real-Time Non-Excessive Energy Amount ($); for an AO. This calculation is performed at Commercial Pricing Nodes where the AO owns the Resource to which the energy output corresponds.

$= \Sigma_{CN} [\{ (NXE - DA\_SCHD_{GEN} - DA\_DRRII\_SCHD\_VOL + RT\_FIN\_NET + RT\_GFACO\_NET) - EXE * EEEF \} * RT\_LMP\_EN]$

*RT_ASM_NXE

Daily Real-Time Non-Excessive Energy Amount ($); for an AO.

$= \Sigma_{H} (RT\_ASM\_NXE\_HR)$

D.26 Excessive Energy Amount (RT_ASM_EXE)

The Real-Time Excessive Energy Amount represents an AO's credit or charge for net energy injections of a Resource owned by the AO that are above the Resource's Excessive Energy Threshold. The injections are paid the lesser of the prevailing LMP or Excessive Energy Price for the Commercial Pricing Node associated with the Asset.

The Real-Time Excessive Energy Amount, including billing determinants, is displayed on the Real-Time Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a determinant that is displayed on an AO's Real-Time statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.26.1 Calculation Inputs for RT_ASM_EXE

*EXE	Hourly Excessive Resource Energy Volume (MWh); for an AO at a Commercial Pricing Node. This value represents the energy output of a Resource beyond the Excessive Energy Threshold of the Resource as calculated by MISO.
*EEEF	Hourly Excessive Energy Exemption Flag; at a Commercial Pricing Node. This binary nature (value of "Y" or "N") data point would cause the Excessive Energy Volume to be added to the Non-Excessive Energy Volume to be settled at LMP rather than the Excessive Energy Price when the exemption is issued (EEEF="Y"). Please refer to the previously defined calculation definition of this component.
*EXP	Hourly Excessive Energy Price ($/MWh); at a Commercial Pricing Node. The EXP is equal to the lesser of the ex-post LMP and the energy offer price at the targeted energy base point.

D.26.2 Intermediate Calculations for RT_ASM_EXE

There are no intermediate calculations.

D.26.3 Charge Type Calculation for RT_ASM_EXE

*^ RT_ASM_EXE_HR — Hourly Real-Time Excessive Energy Amount ($); for an AO. This calculation is performed at Commercial Pricing Nodes where the AO owns the Resource to which the excessive energy output corresponds.

$= \Sigma_{CN}$ [EXE * EXP * (1 - EEEF) * (-1)]

*RT_ASM_EXE — Daily Real-Time Excessive Energy Amount ($); for an AO.

= Σ_{H} (RT_ASM_EXE_HR)

D.27 Net Regulation Adjustment Amount (RT_ASM_NRGA)

The Real-Time Net Regulation Adjustment Amount represents charges or credits to a Resource providing deployed Regulation Service such that the Resource is indifferent to deploying Energy above or below is Dispatch Target for Energy to provide the Regulation Service. Both regulation-up and regulation-down deployments are considered under this Charge Type. This Charge type is calculated on an interval basis as described in the Post Operating Processor Calculation Guide.

The Real-Time Net Regulation Adjustment Amount, including billing determinants, is displayed on the Real-Time Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a determinant that is displayed on an AO's Real-Time statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.27.1 Calculation Inputs for RT_ASM_NRGA

* NRGA	Hourly Net Regulation Generation Adjustment ($); at a Commercial Pricing Node. This amount accounts for the LMP-settled Regulation generation output away from the Resource's Offer curve at which it was dispatched.

D.27.2 Intermediate Calculations for RT_ASM_NRGA

There are no intermediate calculations.

D.27.3 Charge Type Calculation for RT_ASM_NRGA

*^ RT_ASM_NRGA_HR	Hourly Net Regulation Generation Adjustment Amount ($); for an AO. This calculation is performed at Commercial Pricing Nodes where the AO owns the Resource that provided the Regulation Service. $= \Sigma_{CN}$ (NRGA)
*RT_ASM_NRGA	Daily Net Regulation Generation Adjustment ($); for an AO. $= \Sigma_{H}$ (RT_ASM_NRGA_HR)

D.28 Contingency Reserve Deployment Failure Charge Amount (RT_ASM_CRDFC)

The Real-Time Contingency Deployment Failure Charge Amount represents the charge incurred by Resources that fail to deploy Contingency Reserves at or above the Contingency Reserve Deployment Instruction.

The Real-Time Contingency Deployment Failure Charge Amount, including billing determinants, is displayed on the Real-Time Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a determinant that is displayed on an AO's Real-Time statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.28.1 Calculation Inputs for RT_ASM_CRDFC

*CRD_SHORT	Hourly Contingency Reserve Deployment Shortfall (MWh); at a Commercial Pricing Node. This volume represents the Contingency Reserve Deployment Instruction minus the actual amount of Contingency Reserve deployed at the end of the Contingency Reserve Deployment Period.
*RT_LMP_EN	Hourly Real-Time LMP ($/MWh); at a Commercial Pricing Node. The Real-Time Energy and Operating Reserve Market clearing price for Energy at a given Commercial Pricing Node in the Transmission Provider Region, which is equivalent to the marginal cost of serving demand at the Commercial Pricing Node. The Real-Time Locational Margin Price includes the MCC and the MLC.

D.28.2 Intermediate Calculations for RT_ASM_CRDFC

There are no intermediate calculations

D.28.3 Charge Type Calculation for RT_ASM_CRDFC

*^RT_ASM_CRDFC_HR	Hourly Contingency Reserve Deployment Failure Charge ($); for an AO. This calculation is performed at Commercial Pricing Nodes where the AO owns the Resource that incurred in the Contingency Reserve Deployment Shortfall. $= \Sigma_{CN}$ (MAX (CRD_SHORT * RT_LMP_EN , 0))
*RT_ASM_CRDFC	Daily Contingency Reserve Deployment Failure Charge ($); for an AO. $= \Sigma_{H}$ (RT_ASM_CRDFC_HR)

D.29 Demand Response Allocation Uplift Amount (RT_DRR_UPL)

The Real-Time Demand Response Allocation Uplift Amount represents the charges incurred by Asset Owners to compensate Demand Response Resources deployed and deemed beneficial based on the NBPT, in the Real-Time Energy and Operating Reserve Market. The charges are first apportioned to each Reserve Zone and then allocated to the Load in the affected Reserve Zones, not to exceed the amount of Real-Time Energy purchases for that Reserve Zone for a given hour. The excess is then recovered from all Asset Owners based on Load Ratio Share.

An asterisk (*) denotes a determinant that is displayed on an AO's Real-Time statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.29.1Calculation Inputs for RT_DRR_UPL

*DA_PHYS$_{Buyer}$	Hourly Day-Ahead PBT Volume where the AO is the Transaction Buyer (MWh); a Buyer is defined as an AO that receives energy from MISO, at a MISO defined Interface Commercial Pricing, for export out of MISO. The transaction volume is always presented as a positive value.
*DA_PHYS$_{Seller}$	Hourly Day-Ahead PBT Volume where the AO is the Transaction Seller (MWh); a Seller is defined as an AO that supplies energy to MISO, at a MISO defined Interface Commercial Pricing Node, for import into MISO. The transaction volume is always presented as a positive value.
*DA_SCHD	Hourly Day-Ahead Asset Schedule Volume (MWh); the Day-Ahead Asset Schedule Volume is the market cleared offered generation, bid Load or offered DRR schedule by asset. A positive schedule represents a Load obligation and a negative schedule represents a supply obligation. There can be only a single schedule per asset.
*DRR_ADJ_MTR	Demand Response Resource MW Reduction Volume (MWh); These values are derived from submitted Meter Data provided by the Asset Owner of a Demand Response Resource.

*NBPT	Hourly Modeled Net Benefit Price Threshold ($); a market wide price threshold modeled to represent the Hourly LMP price in which Demand Response Resources become beneficial to the Market.
NXE	Hourly Non-Excessive Resource Energy Volume (MWh); at a Commercial Pricing Node. This value represents the energy output of a Resource circumscribed to its Excessive Energy Threshold. Please refer to the previously defined calculation definition of this component.
NXE_{DRR}	Hourly Non-Excessive Resource Energy Volume for a Demand Response Resource (MWh); at a Commercial Pricing Node. This value represents the energy output of a Resource circumscribed to its Excessive Energy Threshold. Please refer to the previously defined calculation definition of this component.
*PCT_CPN_IN_ZN	Percent of CPNode in Reserve Zone (Unity); the percent share of the Load at a Commercial Pricing Node applicable to a particular Reserve Zone. The value is displayed as a number and should be divided by 100 for calculation purposes.
*RT_BLL_MTR	Real-Time Metered Billable Volume at a Commercial Pricing Node (MWh); billable asset volume. When generation, Load, or DRR meter data has been submitted by an MDMA, then the actual submitted volume is used for settlements; otherwise alternate volume calculated by the State Estimator is used. Please refer to the previously defined calculation definition of this component.
$*RT\_BLL\_MTR_{DRRI}$	Real-Time Metered Billable Volume at a DRR I Commercial Pricing Node (MWh); billable asset volume. The injection volumes determined for a DRR I unit for a given operating day based on Calculated Baseline data in the Demand Response Tool.
RT_DRRII_INJ_VOL	Hourly Real-Time DRR II Injection Volume (MWh); Energy injection volume for a DRR Type-II, calculated as minus one times the difference between the dispatch maximum and the billable meter load at the DRR Type-II bus. Please refer to the previously defined calculation definition of this component.
RT_FIN_NET	Hourly Real-Time Net FBT Load Obligation (MWh); for an AO at a Generation Commercial Pricing Node; This volume represents any excess of FBT energy sold (and sourcing) less energy purchased (and

sinking) at a Generation Asset, Please refer to the previously defined calculation definition of this component.

RT_GFACO_NET — Hourly Real-Time Net Carved-Out Grandfathered Transactions (MWh); for an AO at a Generation Commercial Pricing Node. Please refer to the previously defined calculation definition of this component.

*RT_LMP_EN — Hourly Real-Time LMP ($/MWh); at a Commercial Pricing Node. The Real-Time Energy and Operating Reserve Market clearing price for Energy at a given Commercial Pricing Node in the Transmission Provider Region, which is equivalent to the marginal cost of serving demand at the Commercial Pricing Node. The Real-Time Locational Margin Price includes the MCC and the MLC.

*RT_PHYS_{Buyer} — Hourly Real-Time PBT Volume (MWh); at a Commercial Pricing Node where the AO is the Buyer (i.e., the AO is buying energy from MISO)

*RT_PHYS_{Seller} — Hourly Real-Time PBT Volume (MWh); at a Commercial Pricing Node where the AO is the Seller (i.e., the AO is selling energy to MISO)

D.29.2 Intermediate Calculations for RT_DRR_UPL

DRR_COMP — Demand Response Compensation Amount ($); for each Demand Response Commercial Pricing Nodes. The formula result is displayed in dollars ($).

=IF RT_LMP_EN ≥ NBPT THEN
(NXE_{DRR} * RT_LMP_EN) * -1 ELSE 0

DRR_COMP_VOL — Demand Response Compensation Volume (MW); for each Demand Response Commercial Pricing Nodes in which the RT_LMP is equal or greater than the Net Benefit Price Threshold.

=IF RT_LMP_EN ≥ NBPT THEN
DRR_ADJ_MTR * (NXE_{DRR} / ($RT\_BLL\_MTR_{DRRI}$ + RT_DRRII_INJ_VOL))) ELSE 0

DRR_COMP_{ZN} — Demand Response Resource Compensation by Reserve Zone ($): For each Reserve Zone, the Hourly Demand Response Resource Compensation.

= $\sum_{CN}$ (DRR_COMP * PCT_CPN_IN_ZN)

$DRR\_COMP\_VOL_{ZN}$ — Demand Response Reserve Zone Compensation Volume (MWh); for a Reserve Zone with Demand Response Resource. The result represents

	the load adjustment determined by the LMP and the Net Benefit Price Threshold. $= \sum_{CN}$ (DRR_COMP_VOL * PCT_CPN_IN_ZN)

*DRR_UPL_COMP$_{ZN}$	Hourly Demand Response Allocation Uplift Charge ($); for a Reserve Zone.
	= **IF**
	DRR_COMP_VOL$_{zn}$ ≤ ZN_RT_EN_PUR_VOL$_{ZN}$
	THEN
	= DRR_COMP$_{ZN}$
	ELSE
	= DRR_COMP$_{ZN}$ *
	(ZN_RT_EN_PUR_VOL$_{ZN}$ / DRR_COMP_VOL$_{zn}$)
	END IF

RT_EN_PUR_VOL$_{CN}$	Hourly Real-Time Energy Purchases Volume for each CPNode (MWh); excluding EAR Export Schedules. $= \sum_{CN}$ [MAX (RT_BLL_MTR - DA_SCHD + RT_FIN_NET + RT_GFACO_NET + $\sum_{ZN}$ (DRR_ADJ_MTR) , 0) + MAX (RT_PHYS$_{BUYER}$ – DA_PHYS$_{BUYER}$, 0) + MAX (DA_PHYS$_{SELLER}$ – RT_PHYS$_{SELLER}$, 0)]
*RT_EN_PUR_VOL$_{AO\text{-}ZN}$	Hourly Real-Time Energy Purchases for each Asset Owner in a Reserve Zone (MWh); $= \sum_{AO\text{-}ZN}$ (RT_EN_PUR_VOL$_{CN}$ * PCT_CPN_IN_ZN)
*ZN_RT_EN_PUR_VOL$_{ZN}$	Hourly Real-Time Energy Purchases for each Reserve Zone (MWh); $= \sum_{ZN}$ (RT_EN_PUR_VOL$_{CN}$ * PCT_CPN_IN_ZN)

D.29.3 Charge Type Calculation for RT_DRR_UPL

*^ RT_DRR_UPL_HR	Hourly Demand Response Allocation Uplift Charge ($); for an Asset Owner in a Reserve Zone: $= \sum_{ao}$ [DRR_UPL_COMP$_{ZN}$ * (RT_EN_PUR_VOL$_{AO\text{-}ZN}$ / ZN_RT_EN_PUR_VOL$_{ZN}$)]
*RT_DRR_UPL	Daily Demand Response Allocation Uplift Charge ($); for an AO. $= \Sigma_{H}$ (RT_DRR_UPL_HR)

D.30 Resource Adequacy Auction Amount (RT_RAA)

The Real-Time Resource Adequacy Auction Amount represents the charges and credits related to the procurement of capacity and planning resources for reliability purposes.

The Real-Time Resource Adequacy Auction Amount, including billing determinants, is displayed on the Real-Time Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a determinant that is displayed on an AO's Real-Time statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.30.1 Calculation Inputs for RT_RAA

*RT_BLL_MTR	Hourly Asset Withdrawal Volume at an asset CPNode (MWh); please refer to the previously defined calculation definition of this component.
*RA_ACP	Daily Resource Adequacy Auction Clearing Price ($/MW); for a Zone. The capacity price at a Local Resource Zone resulting from the Planning Resource Auction.
*RA_ZRC	Daily Resource Adequacy Zonal Resource Credit (MW); for an AO. A UCAP-based MW that serves as the basis for resources providing capacity in the auction.
RA_CLR_PRMR	Daily Resource Adequacy Cleared Planning Reserve Margin Requirement (MW); for an AO. The annual forecasted Demand coincident with MISO's annual peak, i.e., the Coincident Peak Demand forecast, including transmission losses, times one plus the Planning Reserve Margin of the Local Resource Zone where the Load is located.
RA_ADJ_PRMR	Daily Resource Adequacy Adjusted Planning Reserve Margin Requirement (MW); for an AO. The Cleared Planning Reserve Margin Requirement adjusted for those AOs using the Default Method for Retail Load Shifting.

*RA_EDC_PRMR	Daily Resource Adequacy EDC Planning Reserve Margin Requirement (MW); for an EDC. The total Planning Reserve Margin Requirement for all Asset Owners in a given EDC.
*RA_FRAP_PRMR	Daily Fixed Resource Adequacy Plan for Planning Reserve Margin Requirement (MW); for an AO. This amount represents identified resources that an LSE has ownership or contractual rights that will be relied upon to meet the LSE's Planning Reserve Margin Requirement in each Local Resource Zone.
*RA_FRAP_ZRC	Daily Fixed Resource Adequacy Plan for Zonal Resource Credit (MW); for an AO. This amount represents identified resources that an LSE has ownership or contractual rights that will be relied upon to meet the LSE's share of the Local Clearing Requirement in each Local Resource Zone.
~~*RA_EDC_PEAK~~	~~Daily Resource Adequacy EDC Peak Demand (MW); for an EDC. The Hourly peak EDC Demand coincident with MISO's Hourly peak Demand for a given Operating Day.~~
~~*MISO_PEAK_HR~~	~~Daily MISO Peak Hour (HE); This value represents the hour in which the Transmission Provider (i.e. MISO) peaks for the given day.~~
RA_ZRC_RED_MW	Daily Resource Adequacy Zonal Resource Credit Reduction (MW): for a Zone. This amount represents the total ZRC within a given zone resulting from reductions in ZRCs due to Diversified Contracts and Disqualifications.
*RA_HEDGE	Daily Resource Adequacy Hedge (MW); for an AO for a distinct Source/Sink Zone. This value represents those MWs from existing capacity agreements which hold LSEs harmless from price separation as a result of adding locational requirements to the Resource Adequacy provisions.
RA_ZN_NET_BNFT	Daily Zonal Net Benefit ($); for a Zone. This value represents the reduction in the amount paid by Load in a LRZ to reflect the actual cost of the resources obtained to meet the capacity requirement of such Load.

D.30.2 Intermediate Calculations for RT_RAA

~~PRMR~~$\cancel{_{AO-EDC}}$ ~~Daily Planning Reserve Margin Requirement Pre Netting (MW); for an AO within a given EDC. This amount represents the PRMR resulting from Retail Load Shift using the Backup Default Method prior to any Planning Resource netting.~~
~~= RA_EDC_PRMR * (RT_BLL_MTR~~$\cancel{_{MISO\_PEAK\_HR}}$ ~~/ RA_EDC_PEAK~~$\cancel{_{MISO\_PEAK\_HR}}$ ~~)~~

*RA_PRMR — Daily Resource Adequacy Planning Reserve Margin Requirement (MW); for an AO within a given Zone.
= **IF** "Default Method" **THEN**
RA_ADJ_PRMR
~~**ELSEIF** "Backup Default Method" **THEN**~~
~~PRMR~~$\cancel{_{AO-EDC}}$
ELSE
RA_CLR_PRMR

RAA_BUYER — Daily Resource Adequacy Auction Buyer amount ($); for an AO.
= $\Sigma_{AO\text{-}ZONE}$ (RA_PRMR – RA_FRAP_PRMR) * RA_ACP

RAA_SELLER — Daily Resource Adequacy Auction Seller amount ($); for an AO.
= $\Sigma_{AO\text{-}ZONE}$ (RA_ZRC – RA_FRAP_ZRC) * RA_ACP * (-1)

RA_ZRC_RED_BNFT — Daily Zonal Resource Credit Reduction Benefit ($); for a Zone.
= RA_ZRC_RED_MW * RA_ACP

*RA_BNFT_RATE — Daily Zonal Benefit Rate ($/MW); for a Zone.
= (RA_ZRC_RED_BNFT) / ($\Sigma_{AO\text{-}ZONE}$ RA_PRMR)

RA_TOT_RED_BNFT — Daily Zonal Reduction Benefit ($); for an AO within a given Zone.
= RA_PRMR * RA_BNFT_RATE * (-1)

*RA_NET_BNFT_RATE — Daily Zonal Net Benefit Rate ($/MW); for a Zone.
= (RA_ZN_NET_BNFT) / ($\Sigma_{AO\text{-}ZONE}$ RA_PRMR - $\Sigma_{AO\text{-}ZONE}$ RA_HEDGE)

*RA_TOT_NET_BNFT — Daily Zonal Total Benefit ($); for an AO within a given Zone.
= (RA_PRMR – RA_HEDGE_MW) * RA_NET_BNFT_RATE * (-1)

RA_TOT_HEDGE_BNFT — Daily Hedge Benefit ($); for an AO.
= (RA_ACP$_{SINK}$ – RA_ACP$_{SOURCE}$) * RA_HEDGE_MW * (-1)

RA_TOT_BNFT — Daily Zonal Reduction Benefit ($); for an AO within a given Zone.
= RA_TOT_RED_BNFT + RA_TOT_NET_BNFT + RA_TOT_HEDGE_BNFT

D.30.2.1 Charge Type Calculation for RT_RAA

*RT_RAA — Daily Resource Adequacy Auction Amount ($); for an AO.
= Σ_{AO} (RAA_BUYER + RAA_SELLER + RA_TOT_BNFT)

D.31 Real-Time MVP Distribution (RT_ MVP_DIST)

The Real Time MVP Distribution amount represents an AO's monthly credit from MISO held MVP ARRs. The MVP ARRs are treated as options and will always result in credits to those AO's who paid for the MVP Projects. The funds will be distributed using a load ratio share based on Monthly Net Actual Withdrawals (MNAEWs). MNAEW is comprised of both non-grandfathered energy withdrawals and exports for a given calendar month. This is the same ratio share by which AO's are charged for MVP Projects. The MVP ARR revenue and MNAEW will be calculated by region (planning area) and the resulting credits summed to a single value. This calculation is performed upon settlement or resettlement of the last Operating Day of each calendar month.

An asterisk (*) denotes a billing determinant that is displayed on an AO's FTR statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.31.1Calculation Inputs for RT_MVP_DIST

$MNAEW_{REG}$ — MVP Monthly Net Actual Energy Withdrawals for a region (MW): Non-grandfathered nodal energy withdraw and non-PJM export transaction volume for a MISO region for the calendar month.

$MISO\_FEAS\_DISC\_FCT_{PK\_TYP}$ — MISO Discount Factor for Feasible ARRs (factor). Discount factor used when ARR Auction Revenues are less than total monies to be paid to Feasible ARRs. Please refer to the definition for this determinant found elsewhere in this document.

D.31.2 Intermediate Calculations for RT_MVP_DIST

$FEAS\_TARG_{PK\_TYP / REG}$ Target Amount of Feasible MVP ARRs for a given peak type and region ($);
$= \Sigma_{REG} ((1 / ARR\_DUR_{PK\_TYP}) * (ARR\_FEAS\_MW_{PK\_TYP} * ARR\_PRC_{PK\_TYP}))$

$MVP\_ARR\_FEAS\_ACT_{PK\_TYP / REG}$ Actual Amount of MVP Feasible ARRs for a given peak type and region ($).
$= FEAS\_TARG_{PK\_TYP / REG} * MISO\_FEAS\_DISC\_FCT_{PK\_TYP}$

*AO_MNAEW_{REG} MNAEW for an Asset Owner and a Region (MW); MVP Monthly Net Actual Energy Withdrawal volume for an Asset Owner and a region in the calendar month.

$= \Sigma_{AO\ REG} \{ MNAEW \}$

*$MISO\_MNAEW_{REG}$ MNAEW for all Asset Owners and a Region (MW); MVP Monthly Net Actual Energy Withdrawal volume for all Asset Owners and a region in the calendar month.

$= \Sigma_{MISO\ REG} \{ MNAEW \}$

$AO\_MNAEW\_LRS_{REG}$ MVP ARR Distribution Ratio for Asset Owner and Region (ratio); Ratio share used to distribute the FTR_ARR_ARR_TXN charge type amount held by MISO and representing all in-service MVP Projects. A given Asset Owner's MNAEW for the month is divided by the MISO-wide MNAEW for the month.
$= AO\_MNAEW_{REG} / MISO\_MNAEW_{REG}$

*$MISO\_RT\_MVP\_DIST_{REG}$ Total MVP ARR Transaction Amount for Projects for a MISO Region ($); This is the total of ARR transaction amounts representing MVP Projects which will be distributed to a given region's MVP rate payers.
$= \Sigma \{ MVP\_ARR\_FEAS\_ACT_{PK\ TYP / REG} \}$

D.31.3Charge Type Calculation for RT_MVP_DIST

*^RT_MVP_DIST

MVP_ARR_Distribution for an Asset Owner ($); An Asset Owner's share of the ARR transaction monies distributed to MVP rate payers.

$= \Sigma \text{ (MISO\_RT\_MVP\_DIST}_{REG} \text{ * AO\_MNAEW\_LRS}_{REG}\text{)}$

D.32 Real-Time Ramp Capability Amount (RT_RC_AMT)

The Real-Time Ramp Capability Amount represents an AO's compensation for Ramp Capability in the Real-Time Energy and Operating Reserve Market, net of Ramp Capability amounts in the Day-Ahead Energy and Operating Reserve Market.

The Real-Time Ramp Capability Amount, including billing determinants, is displayed on the Real-Time Energy and Operating Reserve Market Settlement Statement.

An asterisk (*) denotes a determinant that is displayed on an AO's Real-Time statement.

A caret (^) symbol represents the result is rounded based on MISO Market Settlements rounding methodology in the Market Settlements BPM.

D.32.1 Calculation Inputs for RT_RC_AMT

*RTN_DRC_VOL	Real-Time Net Down Ramp Capability Volume (MWh); at a Commercial Pricing Node. The amount of Down Ramp Capability volume in the Real-Time Energy and Operating Reserve Market net of the Down Ramp Capability volume in the Day-Ahead Energy and Operating Reserve Market for a participating Resource.
*RT_DRC_MCP	Real-Time Down Ramp Capability Market Clearing Price ($/MWh); at a Commercial Pricing Node. Please refer to the previously defined calculation definition of this component.
*RTN_URC_VOL	Real-Time Net Up Ramp Capability Volume (MWh); at a Commercial Pricing Node. The amount of Up Ramp Capability volume in the Real-Time Energy and Operating Reserve Market net of the Up Ramp Capability volume in the Day-Ahead Energy and Operating Reserve Market for a participating Resource.
*RT_URC_MCP	Real-Time Up Ramp Capability Market Clearing Price ($/MWh); at a Commercial Pricing Node. Please refer to the previously defined calculation definition of this component.

D.32.2 Intermediate Calculations for RT_RC_AMT

RT_DRC	Hourly Real-Time Down Ramp Capability Amount ($); This amount represents the Hourly net Down Ramp Capability Volume multiplied by the Down Ramp Capability Market Clearing Price. = (RTN_DRC_VOL * RT_DRC_MCP)
RT_URC	Hourly Real-Time Up Ramp Capability Amount ($); This amount represents the Hourly net Up Ramp Capability Volume multiplied by the Up Ramp Capability Market Clearing Price. = (RTN_URC_VOL * RT_URC_MCP)

D.32.3 Charge Type Calculations for RT_RC_AMT

^RT_RC_AMT_HR	Hourly Real-Time Ramp Capability Amount ($); at a Commercial Pricing Node. Calculation is performed for Commercial Pricing Nodes clearing Ramp Capability in the Real-Time Energy and Operating Reserve Market. The hourly amount is the sum of the Up Ramp Capability and Down Ramp Capability amounts. = $\sum_{CN}$ ((RT_DRC + RT_URC) * -1)
*RT_RC_AMT	Real-Time Ramp Capability Amount ($); the total daily amount due to the Asset Owner that owns the qualified Resource or Resources clearing Ramp Capability. = $\sum_{H}$ (RT_RC_AMT_HR)

E. References

- BPM 005 Market Settlements
- Energy and Operating Reserve Market Tariff

F. Disclaimer

~~This document is prepared for informational purposes only, to support the application of the provisions of the Tariff and the services provided thereunder. MISO may revise or terminate this document at any time at its discretion without notice. While every effort will be made by MISO to update this document and inform its users of changes as soon as practicable, it is the responsibility of the user to ensure use of the most recent version of this document in conjunction with the Tariff and other applicable documents, including, but not limited to, the applicable NERC Standards. Nothing in this document shall be interpreted to contradict, amend, or supersede the Tariff. MISO is not responsible for any reliance on this document by others, or for any errors or omissions or misleading information contained herein. In the event of a conflict between this document, including any definitions, and either the Tariff, NERC Standards, or NERC Glossary, the Tariff, NERC Standards, or NERC Glossary shall prevail. In the event of a conflict between the Tariff and the NERC Standards, or NERC Glossary, the Tariff shall prevail until or unless the Federal Energy Regulatory Commission ("FERC") orders otherwise. Any perceived conflicts or questions should be directed to the Legal Department.~~This document is prepared for informational purposes only, to support the application of the provisions of the Tariff and the services provided thereunder. MISO may revise or terminate this document at any time at its discretion without notice. While every effort will be made by MISO to update this document and inform its users of changes as soon as practicable, it is the responsibility of the user to ensure use of the most recent version of this document in conjunction with the Tariff and other applicable documents, including, but not limited to, the applicable NERC Standards. Nothing in this document shall be interpreted to contradict, amend, or supersede the Tariff. MISO is not responsible for any reliance on this document by others, or for any errors or omissions or misleading information contained herein. In the event of a conflict between this document, including any definitions, and either the Tariff, NERC Standards, or NERC Glossary, the Tariff, NERC Standards, or NERC Glossary shall prevail. In the event of a conflict between the Tariff and the NERC Standards, or NERC Glossary, the Tariff shall prevail until or unless the Federal Energy Regulatory Commission ("FERC") orders otherwise. Any perceived conflicts or questions should be directed to the Legal Department.

G. Revision History

Doc Number	Description	Revised by:	Effective Date
MS-OP-029-r33	Annual review completed.	C. Delk	~~April~~ APR-16,~~-~~

	Updated B.4 DA_ADMIN to remove ADMIN_TXN_CNT and ADMIN_TXN_RATE. Updated B.11.2 DA_RSG_DIST to remove D1_NI_PBK from calculation of AEW. Updated C.1 FTR_ HR_ALC to remove CFTR_FL and GEN_OUTAGE. Updated definition of AO_FTR_ADJ_PRF. Updated C.3 FTR_MN_ALC to add MISO_RT_GFACO_RBT_CG to calculation of MISO_CO_CG_EXCESS. Added MISO_FTR_MO_TXN to funding portion of FTR_MN_ALC_FCT. Updated D.1 RT_ASSET_EN to remove D1_NI_PBK~~.~~. Updated definition of RT_BLL_MTR. Updated D.14 to remove D1_NI_PBK. Updated definition of AEW and GEN_PERF in D.14.2.1 Updated definition of AEW in D.14.4. Updated definition of AEW and GEN_PERF in D.14.6.1. Updated D.30 RT_RAA to remove RA_EDC_PEAK, MISO_PEAK_HR, and PRMRao-edc~~.~~. Updated definition of RA_PRMR. ~~Annual review completed.~~		2018
MS-OP-029-r32	Updated sections D.13 RT_RNU, D.14 RT_RSG_DIST1, D.22 RT_ASM_SPIN_DIST and D.23 RT_ASM_SUPP_DIST to exempt Coordinated Transaction Schedules (CTS) per FREC Order in Docket No. ER16-533-000. Effective Date is October 3, 2017. Modifications to the definition and calculation for MISO_EDEDC_REG_UPLIFT in Section D.21 RT_ASM_REG_DIST.	C. Delk B. Lipinski	OCT-03-2017
MS-OP-029-r31	Updated Section B.11 (DA_RSG_DIST) and D.14 (RT_RSG_DIST1) to account for internally commercially pseudo-tied EP Nodes per FERC Order in Docket No. ER12-678-008. Effective Date is per order, SEP-1-2012 Annual review completed.	M. Dawson E. Fjellman	MAR-15-2017

MS-OP-029-r30	Modifications required to exempt EAR Export Schedules in Sections D.13 (RT_RNU), D.14 (RT_RSG_DIST1), D.22 (RT_ASM_SPIN_DIST), D.23 (RT_ASM_SUPP_DIST) and D.29 (RT_DRR_UPL) per FERC Order in Docket No. ER16-2580. Modifications to remove GFA Carve Outs from being charged for Schedule 24. Code effective date is October 1, 2016. Updates to sections B.5 (DA_SCHD_24_ALC) and D.8 (RT_SCHD_24_ALC).	M. Dawson	NOV-12-2016
MS-OP-029-r29	Modifications required per FERC Order in Docket No. ER15-685-002.	M. Dawson	JUN-22-2016
MS-OP-029-r28	Modifications required per Ramp Capability FERC Order in Docket No. ER14-2156-000: - Added new Section B. 17 (DA_RC_AMT) - Added new Section D. 32 (RT_RC_AMT) - Revisions to B.12 (DA_RSG_MWP), D. 13 (RT_RNU), D.15 (RT_RSG_MWP), and D.16 (RT_PV_MWP)~~.~~.	A. Alewine	MAY-01-2016
MS-OP-029-r27	Annual Review completed. Modifications to section D.14 (RT_RSG_DIST1) per 10/30/2015 Section 205 Filing, Docket No. ER16-213-001	M. Dawson	JAN-15-2016
MS-OP-029-r26	Modifications to Section B.12 (DA_RSG_MWP) and Section D.15 (RT_RSG_MWP) Updated Real Time JOA formula to include Day Ahead activity in section D.13	A. Alewine D. Croy	OCT-01-2015
MS-OP-029-r25	Modifications to Section B.12 (DA_RSG_MWP) and Section D.15 (RT_RSG_MWP) per 04/28/2015 Section 205 Filing, Docket No. ER15-1571-000. Modifications to Section D.12 (RT_NASSET_EN) per FERC Order 764	A. Alewine	JUN-30-2015
MS-OP-029-r24	Modified Interchange Schedules for EAR unit Bidirectional offer enhancement Added ELMP Settlement Changes Replaced “PSS” with “WebTrans” Revisions for Order 719 (Host Load Zone Removal) Annual review completed.	P. Wang P. Wang L. Hall E. Fjellman	MAR-01-2015
MS-OP-029-r23	Updated FTR_ARR_INF_UPL to separate uplift for First and Second Planning Areas Updated RT_RSG_ASSET_CR_HR in RT_RSG_MWP section.	L. Hall J. Howard	JUN-02-2014

	Updated RT_RAA calculation for 2014-15 planning year.		
MS-OP-029-r22	Changes added to Section D.14 to reflect FERC filing “2013-08-07 Docket No. ER13-2124-000”. Change to the FTR monthly charge type for the multi period monthly auction seasonal transaction Added LBA ratio share allocation method to RT_MISC charge type.	M. Dawson S. Mansouri S. Mansouri	MAR-17-2014
MS-OP-029-r21	Removed the language net DA clearing from RT_RSG_REG_REV, RT_RSG_SPIN_REV, and RT_RSG_SUPP_REV in section D.15 (RT_RSG_MWP). Correct DART_ADMIN_RATE to ENERGY_MKT_RATE and update Section B.4 (DA_ADMIN) and Section D.7 (RT_ADMIN)	J. Howard R. Terry	DEC-16-2013
MS-OP-029-r20	Modification to Section D.15 (RT_RSG_MWP), per 10/16/2013 Section 205 Filing, Docket No. ER-14-106-000. Added LBA_AEW and AO_LBA_AEW to statements	A. Alewine	OCT-17-2013
MS-OP-029-r19	Updated Section B.11.3 (DA_VLR_RSG_DIST) and Section D.14.3 (VLR_DIST) to exclude charges to Grandfathered Carve-out Load.	M. Dawson	SEP-04-2013
MS-OP-029-r18	Added Resource Adequacy Auction Amount Annual Review Completed	J. Howard B. Selear	JUN-01-2013
MS-OP-029-r17	Updated formula and definition for CMC_NDL_VIRT_VOL to comply with pending FERC order. Corrected the following determinants in the determinant name table (exhibit A.4.1): • RT_ASM_EXE_DFE_DEP_MIL_HR • RT_ASM_EXE_DFE_DEP_REG_HR	B. Selear	APR-27-2013
MS-OP-029-r16	Comply with FERC order No. 755 and MISO FERC filing “2012-04-30 Docket No. ER12-1664-000” to modify the following Charge Types for Regulation Mileage payment and related changes: RT_ASM_REG: Add components for Real-Time Additional Regulation Mileage payment, Mileage make-Whole Payment, and Regulation Mileage Shortfall charge; RT_RNU: The credit of Additional Regulation	P. Wang	DEC-17-2012

	Mileage in RT_ASM_REG, and Failure Mileage Performance Test Charge are allocated though this charge type; RT_ASM_REG_DIST: The funds collected due to Regulation Mileage Shortfall in Charge Type RT_ASM_REG and Mileage Make-Whole Payment are distributed though this charge type; RT_ASM_EXE_DFE_DEP: The failure Regulation Mileage performance charge is distributed through this charge type; Corrected some typos Added asterisk to DRR_ADJ_MTR indicating it will appear on statements Updated Exhibit A.4-1 to reflect VLR determinants appearing on statements Corrected RT_DRR_ADJ_ASSET_VOL to reflect that EXE_{DRR} is a negative value	B. Selear B. Selear R. Terry	
MS-OP-029-r15	Added Real-Time Demand Response Allocation Uplift Charge Type Removed section D.29, Marginal Forgone Retail Rate Charge Added Section D.29, Demand Response Allocation Uplift Amount New Determinants, Demand Response Reduction Volume (DRR_ADJ_MTR) and Net Benefit Price Threshold for Demand Response (NBPT) Amended sections D1.2, D1.3, D2.2.2, D7.2, D13.1, D13.8, 13.9, D14.2.1, and D14.6.1, for Demand Response Compensation Amended sections D14.2, 14.4, and 14.6 for consistency.	R. Terry	JUN-01-2012
MS-OP-029-r14	Added Mitigated Day-Ahead and Real-Time RSG Make-Whole Payment information and calculation data for Generation Resource Voltage and Local Reliability commitments per 12/22/2011 Section 205 Filing ER-12-679-000~~.~~ . These calculation changes will be effective 9/1/2012 per the FERC order received on 3/30/12 accepting and suspending these revisions for five months. Added Product Substitution flags for both Day-Ahead and Real-Time Markets Corrected MISO_RT_RSG_MWP formula (sign conventions) in sections D.13.5.2 and D.14.6.2	R. Leonard	APR-01-2012

MS-OP-029-r13	Corrected MISO_RT_RSG_DIST2 inputs from RT_ASOF_MWP to RT_RSG_ASSET_CR_HR in sections D.13.5.1 and D.13.5.2 Removed asterisk from RT_RSG_ASSET_CR_HR in section D.14.1 Corrected MISO_RT_RSG_MWP formula in section D.14.3.2	B. Selear	JUN-01-2011
MS-OP-029-r12	Corrected HEADROOM calculation in section D.14.3.1 Added MRD_FL to section D.16.1	B. Selear	JUN-01-2011
MS-OP-029-r11	MISO branding updates Corrected "Transaction Type" to "Schedule Type" for DA_PHYS_{HVDC} and RT_PHYS_{HVDC} determinants	B. Selear	JUN-01-2011
MS-OP-029-r10	Updated Headroom definition per FERC Order and CMC_NDL_VIRT_VOL definition.	M. Dawson	JUN-01-2011
MS-OP-029-r9	Changed CMC_NDL_VIRT_VOL calculation to be compliant with FERC Order. Removed 2% cut-off value for CCF per FERC Order. Added CCF to statements. Correction to CMC_NDL_DR_VOL.	C. Delk	APR-15-2011
MS-OP-029-r8	Updated for RSG Redesign. Added MAX to RT_ASM_CRDFC_HR	L. Hall	APR-01-2011
MS-OP-029-r7	Corrected the AO_STG2_MW determinant for the FTR_ARR_STG2_DIST calculation (section C.12.2) to include a missing MAX function	D. Croy	AUG-30-2010
MS-OP-029-r6	Removal of EEEF and inclusion of RSG_XMPT within RT_RSG_DIST1 due to the FERC Order on RSG Exemptions	M. Dawson	AUG-30-2010
MS-OP-029-r5	Corrected FTR_MN_ALC calculation input in Section C.3.1 from RT_LMP_CG to DA_LMP_CGCorrected Rate calculation in section D.24.2 Updated Section D.29.3 to remove reference of Contingency Reserves	B. Selear J. Howard K. Crespo	SEP-01-2010
MS-OP-029-r4	Removed Issue Date column from Revision History per Controlled Documents Updated DA_NASSET_EN and RT_NASSET_EN formulas to include the settlement of HVDC transactions Clarified language for: DA_REG_MCP DA_SPIN_MCP DA_SUPP_MCP RT_REG_MCP RT_SPIN_MCP RT_SUPP_MCP Added Section D.29 for Marginal Foregone Retail	K. Crespo D. Croy C. Delk	JAN-29-2010

	Rate Charge (RT_MFRRC)		
MS-OP-029-r3	Updated RT_ASM_EXE_DFE_DEP_HR formula based on tariff language change.	M. Dawson	OCT-01-2009
MS-OP-029-r2	Updated effective dates for *RSG_AWE flag in Section D.14.1	M. Dawson	JUN-01-2009
MS-OP-029-r1	Update to correct formulas for FTR_ARR_INF_UPL and FTR_ARR_ARR_TXN when Retail Load Shift Adjustment is applied. Update to clarify DA_ASSET_EN, RT_ASSET_EN, and RT_ASM_NXE Update to remove special provision for settling Counterflow FTRs	R. Terry	JUN-01-2009
MS-OP-029	Establish separate Controlled Document instead of BPM Attachment A; Update formulas for ASM	C. Delk	JAN-06-2009