WEM Metering, Settlement & Prudential Calculations

Australian Energy Market Operator

Applicable Trading Days: 13 December 2023
Version 6.0
Version published: 19 December 2023

Disclaimer:

This document or the information in it may be subsequently updated or amended. This document does not constitute legal or business advice, and should not be relied on as a substitute for obtaining detailed advice about the Wholesale Electricity Market Rules or any other applicable laws, procedures or policies. AEMO has made every effort to ensure the quality of the information in this document but cannot guarantee its accuracy or completeness.

Accordingly, to the maximum extent permitted by law, AEMO and its officers, employees and consultants involved in the preparation of this document:

- make no representation or warranty, express or implied, as to the currency, accuracy, reliability or completeness of the information in this document; and
- are not liable (whether by reason of negligence or otherwise) for any statements or representations in this document, or any omissions from it, or for any use or reliance on the information in it.

Version Control

A major version change occurs when the WEM Rules or WEM Procedures require changes to the equations from a particular Trading Day onward.

A minor version change may occur for editorial changes, manifest errors or implementation changes that will apply to the same Trading Day period as dictated by the major version.

Version	Changes	Author(s)	Approver
1.0	Original publication consistent with WEM Rules effective 1 September 2019.	Stuart MacDougall	Mark Katsikandarakis
1.1	New functionality added to distinguish between prudentials and settlements. Update of Interest formulae for settlements. Inclusion of Additional Repaid Amounts to be compliant with WEM Rule 9.24.2(b). Correction of SOMS_F_I(f, i) formulae for the Notional Wholesale Meter. Minor changes in formulae or invocation to improve performance.	Stuart MacDougall	Mark Katsikandarakis
2.0	Consequential changes due to new WEM Rules effective 22 February 2020.	Stuart MacDougall	Mark Katsikandarakis
3.0	Consequential changes due to Coordinator fees in new WEM Rules effective 1 July 2021.	Lisa Laurie	Mark Katsikandarakis
4.0	Consequential changes due to new WEM Rules effective 1 October 2021.	Stuart MacDougall	Mark Katsikandarakis
4.1	Inclusion of Default Levy Adjustment to be compliant with WEM Rule 9.24.9(e).	Lisa Laurie	Mark Katsikandarakis
5.0	Publication consistent with WEM Reform Rules effective 1 October 2023.	Stuart MacDougall Lisa Laurie	Nicholas Nielsen
5.1	Consequential changes due to Market Suspension WEM Amending Rules effective 1 October 2023.	Lisa Laurie	Nicholas Nielsen
5.2	Inclusion of Reserve Capacity Obligation Quantity (RCOQ) estimation for prudentials. Minor changes to Variable Categorisation to include Invoice line item descriptions and moved to new section.	Lisa Laurie	Nicholas Nielsen
6.0	Consequential changes due to WEM Amendment (Reserve Capacity Reform) Rules 2023 Schedule 1 effective 13 December 2023: Capacity Rebate removed, SRCC charges updated and Capacity Provider Payment updated.	Lisa Laurie	Nicholas Nielsen

Contents

1 Introduction

The purpose of this document is to:

- outline WEM Metering, Settlement and Prudential calculations as equations;
- provide additional context or structure equations in such a way that assists in understanding; and
- outline the formulation of a system that could be used to perform both settlement and prudential functions.

This document defines many variables that are used in equations. Each variable will have the following attributes stated to assist in understanding:

Attribute	Explanation	Example
Variable	The name of the variable	$STEMP\_G\_I$
Units	$, {}, MW, MWh, MWs, $/MW, $/MWh, Flag, °C, Hz/500ms	$/MWh
Scope (SC)	Tranche (T), Channel (CH), NMI (N), Contract(C), SESSM Award (SA), Essential System Service (E), Facility-Essential System Service (FE), Network Contingency (NC), Facility-Network Contingency (FNC), Capacity Credit Allocation (A), Separately Certified Component (SCC), Facility (F), Participant (P), Global (G)	G
Granularity (GR)	Dispatch Interval (DI), Trading Interval (I), Trading Day (D), Trading Week (W*), Trading Month (M), Capacity Year (CY), Financial Year (FY), Independent from time (X)	I
Rule	WEM Rule reference	6.9.7
Description	A description of the variable	STEM Clearing Price for Trading Interval i
Ref	Either the equation number where it is defined in this document, or 'I' to denote an input	I

* Trading Week granularity will include a numeric suffix that indicates on which day of the week the Trading Week commences on i.e. 0 = Sunday, 1 = Monday, ... 4 = Thursday etc. This suffix will be included where the granularity is used but not in the variable name e.g. $ESTIMATIONFlag\_G\_W(w)$ and not $ESTIMATIONFlag\_G\_W0(w)$.

Granularity has a strict hierarchy: a Capacity Year is comprised of Trading Months which are comprised of Trading Days which are comprised of Trading Intervals which are comprised of Dispatch Intervals. Some variables have no time component, for example, they relate purely to a contract. In this instances the granularity is denoted as X. This hierarchy is represented in Figure 1.

When defining a variable, it will always be defined for its granularity. For example, the variable $IRCR\_P\_M(p, m)$ is defined for a particular Trading Month m. It will only be defined by variables with a granularity of Trading Month or coarser. However, when the variable is used to define other equations it may be expressed using a granularity finer than its granularity, for example $IRCR\_P\_M(p, d)$. When the variable is expressed like this, it is implicit that it refers to the Trading Month m, in which Trading Day d falls.

A similar hierarchy (and convention) is adopted for scopes as illustrated by Figure 2.

Figure 1: Granularity hierarchy

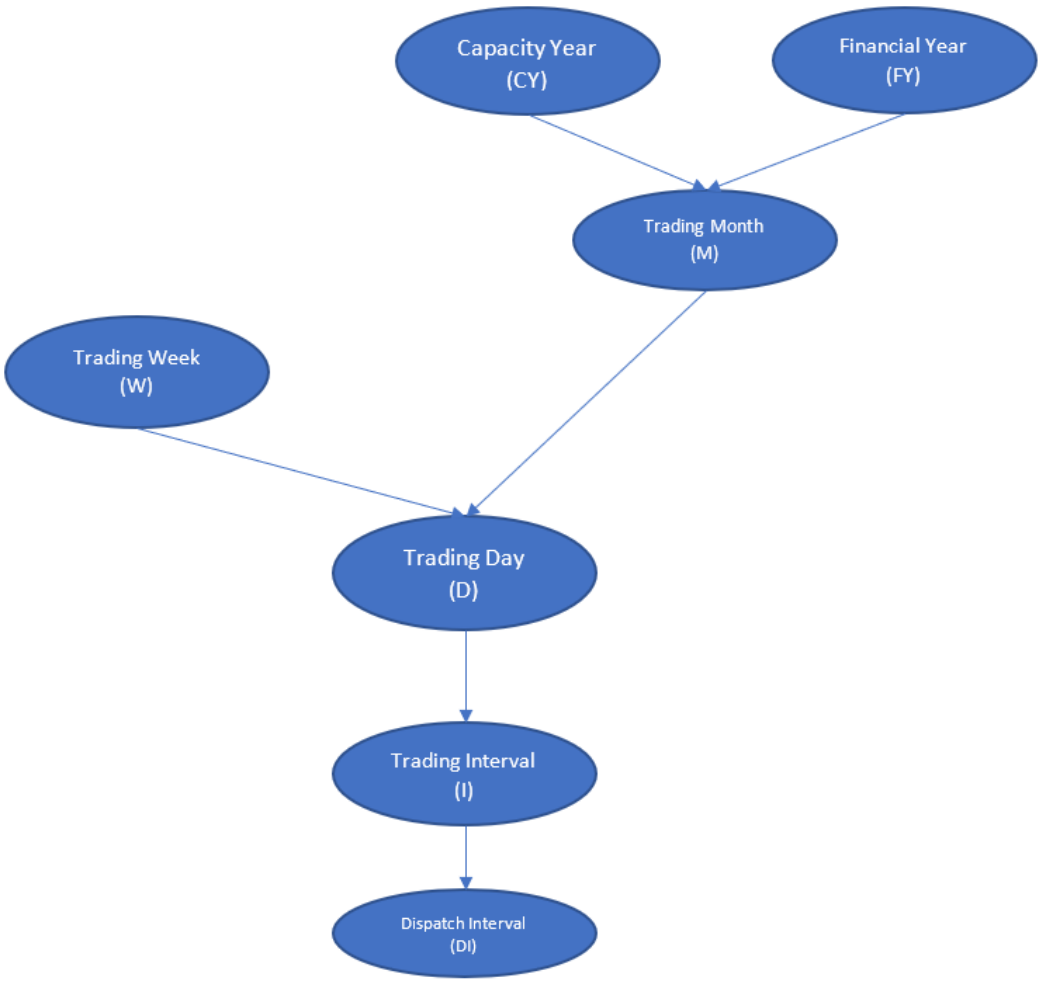
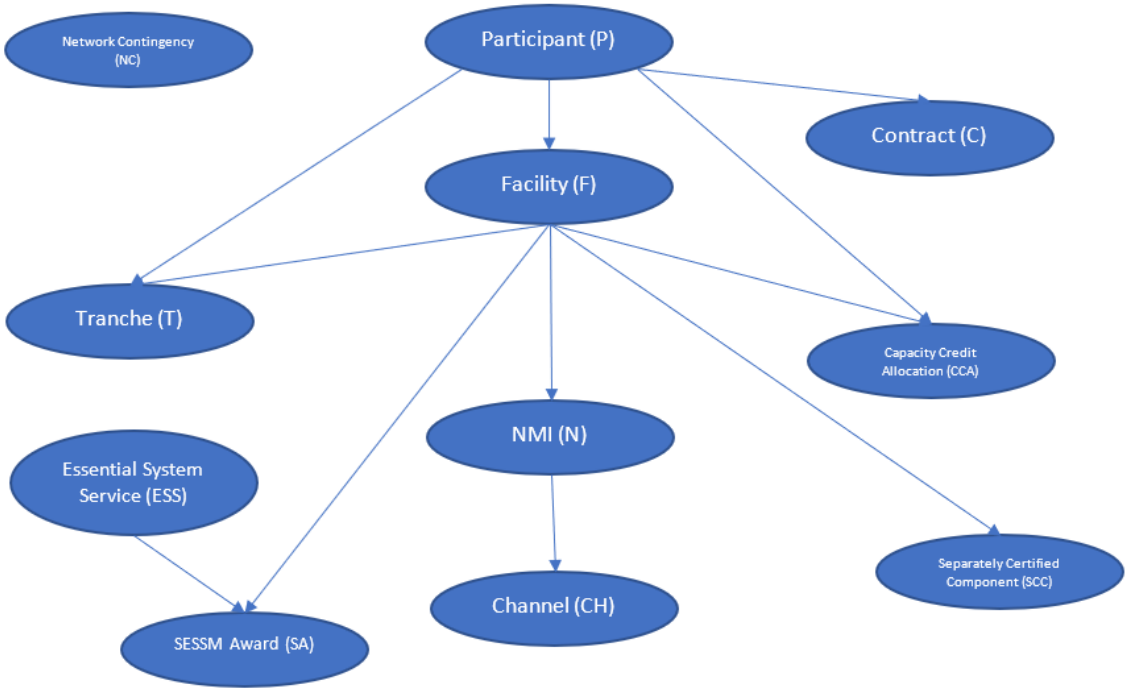


Figure 2: Scope hierarchy



2 Defined Terms, Sets and Associations

Defined terms are used throughout the rules. These defined terms often convey specific information, for example the term Scheduled Facility requires the facility to be registered with AEMO as outlined in the definition. Similarly, some specific calculations only apply, or are interpreted based on these defined terms. In the implementation, these defined terms are often represented as a set of Facilities (or Participants) that meet the definition of the defined term. Furthermore, there are often associations between defined terms within the rules, for example Facilities are associated to participants through registration.
This document defines all sets with the following conventions:

- The definition of each set variable is always Global and for a Trading Day and therefore the variable name omits information about scope and granularity. For example the set of Scheduled Facilities in Trading Day d is represented as $SF(d)$, rather than being named $SF\_G\_D(d)$.
- Subsets are defined by adding a scope argument. For example $SF(p, d)$ represents the subset of $SF(d)$ associated with participant p.

2.1 Participant Sets

2.1.1 Axiomatic Participant Sets in AEMO systems

Calculations defined in the rules depend on different sets of participants. The participant sets outlined below are considered to be axiomatic, or the base sets, upon which all other sets will be created. These base sets are defined in terms of how AEMO's systems have been created. Sets which are calculated later are often sets of participants which are defined in the rules, and in these instances the rule reference is provided.

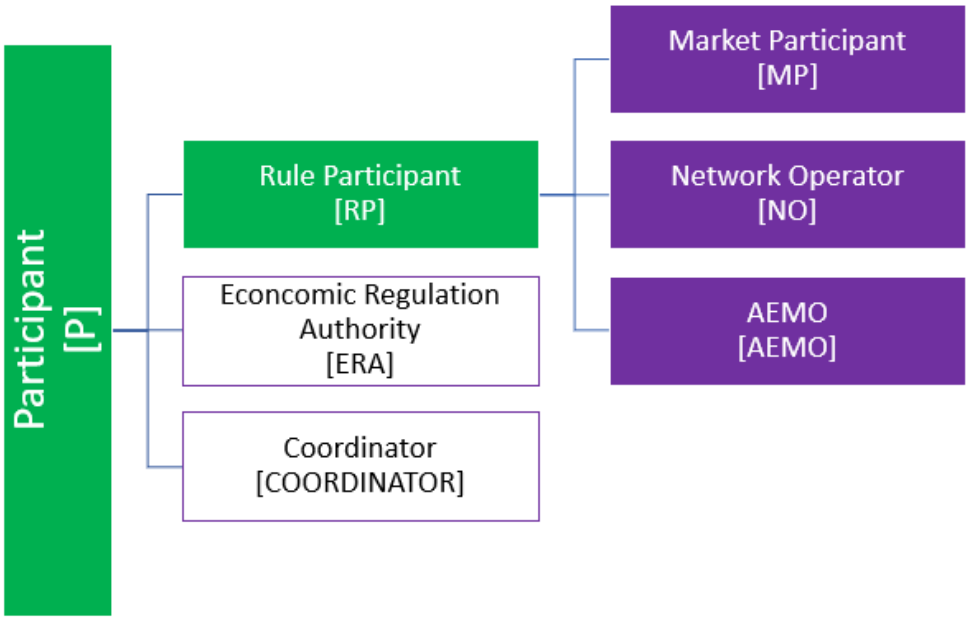
Variable	Units	SC	GR	Rule	Description	Ref
WEMS_MP(d)	{}	G	D		Set of participants with MP participant class in WEMS in Trading Day d	I
WEMS_NO(d)	{}	G	D		Set of participants with NO participant class in WEMS in Trading Day d	I
WEMS_PREG(d)	{}	G	D		Set of participants registered in WEMS in Trading Day d	I

2.1.2 Sets of Rule Participant classes

The following are classes of Rule Participants [MR 2.28.1]:

- Network Operator (NO)
- Market Participant (MP)
- AEMO (AEMO)

The diagram below shows the relationship between Rule Participant classes (purple) and other sets of participants (green).



These sets are defined as follows:

$$P\_M(m) = \bigcup_{d \in D(m)} P(d) \tag{1}$$

$$P\_CY(cy) = \bigcup_{d \in D\_CY(cy)} P(d) \tag{2}$$

$$P(d) = COORDINATOR(d) \cup ERA(d) \cup RP(d) \tag{3}$$

$$COORDINATOR(d) = \{COE\} \tag{4}$$

$$ERA(d) = \{ERA\} \tag{5}$$

$$WPNTWK(d) = \{WPNTWK\} \tag{6}$$

$$RP(d) = MP(d) \cup NO(d) \cup AEMO(d) \tag{7}$$

$$MP(d) = WEMS\_PREG(d) \cap WEMS\_MP(d) \tag{8}$$

$$AEMO(d) = \{IMOWA\} \tag{9}$$

$$NO(d) = WEMS\_PREG(d) \cap WEMS\_NO(d) \tag{10}$$

Variable	Units	SC	GR	Rule	Description	Ref
P_M(m)	{}	G	M		Set of participants (Rule Participants, ERA and the Coordinator) in Trading Month m	(1)
P_CY(cy)	{}	G	CY		Set of participants (Rule Participants, ERA and the Coordinator) in Capacity Year cy	(2)
P(d)	{}	G	D		Set of participants (Rule Participants, ERA and the Coordinator) in Trading Day d	(3)
COORDINATOR(d)	{}	G	D	11	Set containing the Coordinator	(4)
ERA(d)	{}	G	D	11	Set containing the ERA	(5)
WPNTWK(d)	{}	G	D	11	Set containing Western Power	(6)
RP(d)	{}	G	D	11	Set of Rule Participants in Trading Day d	(7)
MP(d)	{}	G	D	11	Set of Market Participants in Trading Day d	(8)
AEMO(d)	{}	G	D	11	Set containing the AEMO	(9)
NO(d)	{}	G	D	11	Set containing Network Operators in Trading Day d	(10)
WEMS_MP(d)	{}	G	D		Set of participants with MP participant class in WEMS in Trading Day d	I
WEMS_NO(d)	{}	G	D		Set of participants with NO participant class in WEMS in Trading Day d	I
WEMS_PREG(d)	{}	G	D		Set of participants registered in WEMS in Trading Day d	I
D(w)	{}	G	W0		Set of Trading Days in Trading Week w	I
D_CY(cy)	{}	G	CY		Set of Trading Days in Capacity Year cy	I

2.2 Facility Sets

2.2.1 Axiomatic Facility Sets in AEMO systems

Calculations defined in the rules depend on different sets of Facilities. The Facility sets outlined below are considered to be axiomatic, or the base sets, upon which all other sets will be created. These base sets are defined in terms of how AEMO's systems have been created. Sets which are calculated later are often sets of Facilities which are defined in the rules, and in these instances the rule reference is provided.

Variable	Units	SC	GR	Rule	Description	Ref
WEMS_DSP(d)	{}	G	D		Set of Facilities with a DSP WEMS Type in Trading Day d	I
WEMS_SF(d)	{}	G	D		Set of Facilities with a SF WEMS Type in Trading Day d	I
WEMS_SSF(d)	{}	G	D		Set of Facilities with a SSF WEMS Type in Trading Day d	I
WEMS_NSF(d)	{}	G	D		Set of Facilities with a NSF WEMS Type in Trading Day d	I
WEMS_IL(d)	{}	G	D		Set of Facilities with a IL WEMS Type in Trading Day d	I
WEMS_N(d)	{}	G	D		Set of Facilities with a N WEMS Type in Trading Day d	I
WEMS_NDL(d)	{}	G	D		Set of Facilities with a NDL WEMS Type in Trading Day d	I
NDL_MTR(d)	{}	G	D		Set of Non-Dispatchable Loads with interval meters that are not in WEMS in Trading Day d	I
WEMS_FREG(d)	{}	G	D		Set of Facilities with a registered status in WEMS in Trading Day d	I
WEMS_IM(d)	{}	G	D		Set of Facilities with an intermittent load status in WEMS in Trading Day d	I
WEMS_EG(d)	{}	G	D		Set of Facilities in WEMS that serve an Intermittent Load in Trading Day d	I
NOINTMETER(d)	{}	G	D		Set of Facilities in WEMS for which no interval meter exists in Trading Day d	I
CCF(d)	{}	G	D		Set of Facilities with Capacity Credits on Trading Day d	I
NMI(d)	{}	G	D		Set of all connection points in Trading Day d	I
RCM_SF(d)	{}	G	D		Set of Facilities with an indicative SF RCM Type in Trading Day d	I
RCM_SSF(d)	{}	G	D		Set of Facilities with an indicative SSF RCM Type in Trading Day d	I
RCM_NSF(d)	{}	G	D		Set of Facilities with an indicative NSF RCM Type in Trading Day d	I
RCM_DSP(d)	{}	G	D		Set of Facilities with an indicative DSP RCM Type in Trading Day d	I

2.2.2 Sets of Facility Technology Types and Facility Classes

The following are Facility Technology Types [MR 2.29.1]:

- distribution system (DX)
- transmission system (TX)
- Intermittent Generating System (IG)
- Non-Intermittent Generating System (NIG)
- Electric Storage Resource (ESR)
- Load (LOAD)

The following are Facility Classes [MR 2.29.1A]:

- Network (NTWK)
- Scheduled Facility (SF)
- Semi-Scheduled Facility (SSF)
- Non-Scheduled Facility (NSF)
- Interruptible Load (IRL)
- Demand Side Programme (DSP)

These sets are defined as follows.

$$DSP(d) = WEMS\_FREG(d) \cap WEMS\_DSP(d) \tag{11}$$

$$indDSP(d) = \overline{WEMS\_FREG(d)} \cap RCM\_DSP(d) \tag{12}$$

$$SF(d) = WEMS\_FREG(d) \cap WEMS\_SF(d) \tag{13}$$

$$indSF(d) = \overline{WEMS\_FREG(d)} \cap RCM\_SF(d) \tag{14}$$

$$SSF(d) = WEMS\_FREG(d) \cap WEMS\_SSF(d) \tag{15}$$

$$indSSF(d) = \overline{WEMS\_FREG(d)} \cap RCM\_SSF(d) \tag{16}$$

$$NSF(d) = WEMS\_FREG(d) \cap WEMS\_NSF(d) \tag{17}$$

$$indNSF(d) = \overline{WEMS\_FREG(d)} \cap RCM\_NSF(d) \tag{18}$$

$$IRL(d) = WEMS\_FREG(d) \cap WEMS\_IL(d) \tag{19}$$

$$NDL\_WEMS(d) = WEMS\_FREG(d) \cap WEMS\_NDL(d) \tag{20}$$

$$NOTIONAL(d) = \{NOTIONAL\} \tag{21}$$

$$NTWK(d) = WEMS\_FREG(d) \cap WEMS\_N(d) \tag{22}$$

Variable	Units	SC	GR	Rule	Description	Ref
DSP(d)	{}	G	D	11	Set of Demand Side Programmes in Trading Day d	(11)
indDSP(d)	{}	G	D	11	Set of unregistered Facilities with an indicative Facility Class of Demand Side Programme in Trading Day d	(12)
SF(d)	{}	G	D	11	Set of Scheduled Facilities in Trading Day d	(13)
indSF(d)	{}	G	D	11	Set of unregistered Facilities with an indicative Facility Class of Scheduled Facility in Trading Day d	(14)
SSF(d)	{}	G	D	11	Set of Semi-Scheduled Facilities in Trading Day d	(15)
indSSF(d)	{}	G	D	11	Set of unregistered Facilities with an indicative Facility Class of Semi-Scheduled Facility in Trading Day d	(16)
NSF(d)	{}	G	D	11	Set of Non-Scheduled Facilities in Trading Day d	(17)

Variable	Units	SC	GR	Rule	Description	Ref
indNSF(d)	{}	G	D	11	Set of unregistered Facilities with an indicative Facility Class of Non-Scheduled Facility in Trading Day d	(18)
IRL(d)	{}	G	D	11	Set of Interruptible Loads in Trading Day d	(19)
NDL_WEMS(d)	{}	G	D		Set of Non-Dispatchable Loads in WEMS registration in Trading Day d	(20)
NOTIONAL(d)	{}	G	D	11	Set containing the Notional Wholesale Meter	(21)
NTWK(d)	{}	G	D	11	Set of Networks in Trading Day d	(22)
WEMS_FREG(d)	{}	G	D		Set of Facilities with a registered status in WEMS in Trading Day d	I
WEMS_DSP(d)	{}	G	D		Set of Facilities with a DSP WEMS Type in Trading Day d	I
RCM_DSP(d)	{}	G	D		Set of Facilities with an indicative DSP RCM Type in Trading Day d	I
WEMS_SF(d)	{}	G	D		Set of Facilities with a SF WEMS Type in Trading Day d	I
RCM_SF(d)	{}	G	D		Set of Facilities with an indicative SF RCM Type in Trading Day d	I
WEMS_SSF(d)	{}	G	D		Set of Facilities with a SSF WEMS Type in Trading Day d	I
RCM_SSF(d)	{}	G	D		Set of Facilities with an indicative SSF RCM Type in Trading Day d	I
WEMS_NSF(d)	{}	G	D		Set of Facilities with a NSF WEMS Type in Trading Day d	I
RCM_NSF(d)	{}	G	D		Set of Facilities with an indicative NSF RCM Type in Trading Day d	I
WEMS_IL(d)	{}	G	D		Set of Facilities with a IL WEMS Type in Trading Day d	I
WEMS_N(d)	{}	G	D		Set of Facilities with a N WEMS Type in Trading Day d	I
WEMS_NDL(d)	{}	G	D		Set of Facilities with a NDL WEMS Type in Trading Day d	I
NDL_MTR(d)	{}	G	D		Set of Non-Dispatchable Loads with interval meters that are not in WEMS in Trading Day d	I

2.2.3 Other Facility Sets

Additional sets of Facilities are required by the rules and are defined below.

$$REG\_F(d) = DSP(d) \cup SF(d) \cup SSF(d) \cup NSF(d) \cup IRL(d) \cup NTWK(d) \tag{23}$$

$$NDL(d) = NDL\_WEMS(d) \cup NDL\_MTR(d) \cup NOTIONAL(d) \tag{24}$$

$$Typical\_REGF(d) = (SF(d) \cup SSF(d) \cup NSF(d)) \cap \overline{EG(i)} \tag{25}$$

$$IML(d) = (IRL(d) \cup NDL\_WEMS(d)) \cap WEMS\_IM(d) \tag{26}$$

$$EG(d) = WEMS\_FREG(d) \cap WEMS\_EG(d) \tag{27}$$

Variable	Units	SC	GR	Rule	Description	Ref
REG_F(d)	{}	G	D	11	Set of Registered Facilities in Trading Day d	(23)
NDL(d)	{}	G	D	11	Set of Non-Dispatchable Loads in Trading Day d	(24)

Variable	Units	SC	GR	Rule	Description	Ref
Typical_REGF(d)	{}	G	D		Set containing SFs, SSFs and NSFs, excluding any associated with an Intermittent Load for Trading Day d	(25)
IML(d)	{}	G	D	2.30B.1	Set of Loads which have an Intermittent Load component in Trading Day d	(26)
EG(d)	{}	G	D	2.30B.2(a)	Set of Registered Facilities that serve an Intermittent Load in Trading Day d	(27)
DSP(d)	{}	G	D	11	Set of Demand Side Programmes in Trading Day d	(11)
IRL(d)	{}	G	D	11	Set of Interruptible Loads in Trading Day d	(19)
NDL_MTR(d)	{}	G	D		Set of Non-Dispatchable Loads with interval meters that are not in WEMS in Trading Day d	I
NDL_WEMS(d)	{}	G	D		Set of Non-Dispatchable Loads in WEMS registration in Trading Day d	(20)
NOTIONAL(d)	{}	G	D	11	Set containing the Notional Wholesale Meter	(21)
NSF(d)	{}	G	D	11	Set of Non-Scheduled Facilities in Trading Day d	(17)
NTWK(d)	{}	G	D	11	Set of Networks in Trading Day d	(22)
SF(d)	{}	G	D	11	Set of Scheduled Facilities in Trading Day d	(13)
SSF(d)	{}	G	D	11	Set of Semi-Scheduled Facilities in Trading Day d	(15)
WEMS_EG(d)	{}	G	D		Set of Facilities in WEMS that serve an Intermittent Load in Trading Day d	I
WEMS_FREG(d)	{}	G	D		Set of Facilities with a registered status in WEMS in Trading Day d	I
WEMS_IM(d)	{}	G	D		Set of Facilities with an intermittent load status in WEMS in Trading Day d	I

2.3 Other Sets

Variable	Units	SC	GR	Rule	Description	Ref
CCF(d)	{}	G	D		Set of Facilities with Capacity Credits on Trading Day d	I
COP(d)	{}	G	D		Set of Facilities that are in Commercial Operation in Trading Day d	I
ESR(d)	{}	G	D		Set of Electric Storage Resources in Trading Day d	I
LegacyIML(d)	{}	G	D	1.48.2	Set of Intermittent Loads that were treated by AEMO as an Intermittent Load on the day before New WEM Commencement Day, and continue to retain this status on Trading Day d	I
NIMG(d)	{}	G	D		Set of Non-Intermittent Generating Systems in Trading Day d	I
PureLoad(d)	{}	G	D	App 2B 2.2(c)i	Set of Scheduled Facilities, Semi-Scheduled Facilities or Non-Scheduled Facilities that comprise only Loads in Trading Day d	I

Variable	Units	SC	GR	Rule	Description	Ref
ARL(d)	{}	G	D		Set of SESSM Awards for Regulation Lower on Trading Day d	I
ACR(d)	{}	G	D		Set of SESSM Awards for Contingency Reserve Raise on Trading Day d	I

Variable	Units	SC	GR	Rule	Description	Ref
ACL(d)	{}	G	D		Set of SESSM Awards for Contingency Reserve Lower on Trading Day d	I
ARCS(d)	{}	G	D		Set of SESSM Awards for RoCoF Control Service on Trading Day d	I
ARR(d)	{}	G	D		Set of SESSM Awards for Regulation Raise on Trading Day d	I
SRS(d)	{}	G	D		Set of System Restart Service Contracts in Trading Day d	I
NCESS(d)	{}	G	D		Set of NCESS Contracts in Trading Day d	I
SESSMDI(sa)	{}	SA	X	App 2C 2.3(c)i	Set of all Dispatch Intervals in the SESSM Service Timing for SESSM Award sa	I

Variable	Units	SC	GR	Rule	Description	Ref
B(d)	{}	G	D		Set of all generation metering channels associated with NMIs in Trading Day d	I
E(d)	{}	G	D		Set of all consumption metering channels associated with NMIs in Trading Day d	I
NS(d)	{}	G	D	2.30B.10(a)ii	Set of all connection points (NMIs) measuring an Intermittent Load which are separately metered (and settled) in Trading Day d	I
DSPNMI(d)	{}	G	D		Set of connection points which comprise a Demand Side Programme on Trading Day d	I

Variable	Units	SC	GR	Rule	Description	Ref
CCAM(f, d)	{}	F	D		Set of Capacity Credit Allocations made by Facility f in Trading Day d	I
CCAR(p, d)	{}	P	D		Set of Capacity Credit Allocations received by participant p (from Facility f) in Trading Day d	I

Variable	Units	SC	GR	Rule	Description	Ref
PGST(d)	{}	G	D		Set of all variables which are payments to which GST applies in Trading Day d	I
CGST(d)	{}	G	D		Set of all variables which are charges to which GST applies in Trading Day d	I

Variable	Units	SC	GR	Rule	Description	Ref
AF_DI(di)	{}	G	DI	App 2A 2.3	Set of applicable facilities in Dispatch Interval di	(156)
AFadditional_DI(di)	{}	G	DI	App 2A 2.4	Set of additional applicable facilities in Dispatch Interval di	(157)
App2AF_DI(di)	{}	G	DI	App 2A 2.1	Set of facilities (identified in Appendix 2A 2.1) to be included in the runway share calculation in Dispatch Interval di	(160)
App2AFa(d)	{}	G	D	App 2A 2.1(a)	Set of facilities (identified in Appendix 2A 2.1(a)) to be included in the runway share calculation in Trading Day d	(161)
App2AFbc(d)	{}	G	D	App 2A 2.1(b), App 2A 2.1(c)	Set of facilities (identified in Appendix 2A 2.1(b) and 2.1(c)) to be included in the runway share calculation in Trading Day d	(162)

Variable	Units	SC	GR	Rule	Description	Ref
App2AFb_DI(di)	{}	G	DI	App 2A 2.1(b)	Set of facilities (identified in Appendix 2A 2.1(b)) to be included in the runway share calculation in Dispatch Interval di	(163)
App2AFc_DI(di)	{}	G	DI	App 2A 2.1(c)	Set of facilities (identified in Appendix 2A 2.1(c)) to be included in the runway share calculation in Dispatch Interval di	I
App2AIML_DI(di)	{}	G	DI	App 2A 2.1A	Set of facilities (identified in Appendix 2A 2.1A) to be included in the runway share calculation in Dispatch Interval di	(159)

Variable	Units	SC	GR	Rule	Description	Ref
NC_DI(di)	{}	G	DI	App 2A 4.1	Set of Network Contingencies that were taken into account when setting the Contingency Reserve Raise requirement in Dispatch Interval di	I
CF_NC_DI(nc, di)	{}	NC	DI	App 2A 4.5(a)	Set of causer facilities that are applicable facilities or additional applicable facilities associated with Network Contingency nc in Dispatch Interval di	(170)
F_NC_DI(nc, di)	{}	NC	DI	App 2A 4.5(a)	Set of Registered Facilities included in the Network Risk associated with Network Contingency nc in Dispatch Interval di	I
LCSC(di)	{}	G	DI		Set of Network Contingencies that set the Largest Credible Supply Contingency in Dispatch Interval di	I

Variable	Units	SC	GR	Rule	Description	Ref
BDRR(di)	{}	G	DI	7.2.4(c)	Set of Registered Facilities whose EOI Quantity is higher than it would have been otherwise as a result of a binding ramp rate constraint applied in Dispatch Interval di	I
BESSEM(di)	{}	G	DI	7.8.5(b)(i)	Set of Registered Facilities whose EOI Quantity is constrained to its Enablement Minimum value as a result of a binding Essential System Service Minimum constraint applied in Dispatch Interval di	I
BNCESS(di)	{}	G	DI	9.9.9(g), 5.9.1(b)	Set of Registered Facilities whose EOI Quantity is higher than it otherwise would have been as a result of a binding Constraint Equation relating to an NCESS Contract in Dispatch Interval di	I

Variable	Units	SC	GR	Rule	Description	Ref
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I
D(w)	{}	G	W0		Set of Trading Days in Trading Week w	I
DI(i)	{}	G	I		Set of Dispatch Intervals in Trading Interval i	I
D_M(m)	{}	G	M		Set of Trading Days in Trading Month m	I
D_CY(cy)	{}	G	CY		Set of Trading Days in Capacity Year cy	I
PI4320a(i)	{}	G	I		Set of Trading Intervals within the 90th Trading Day prior to Trading Interval i's Trading Day that form part of the 4320 Trading Intervals prior to and including Trading Interval i	I

Variable	Units	SC	GR	Rule	Description	Ref
PI4320b(i)	{}	G	I		Set of Trading Intervals within Trading Interval i's Trading Day that form part of the 4320 Trading Intervals prior to and including Trading Interval i	I
PD89(d)	{}	G	D		Set of 89 Trading Days prior to Trading Day d	I
PI1440(i)	{}	G	I		Set of 1440 Trading Intervals prior to and including Trading Interval i	I
PITD(i)	{}	G	I		Set of Trading Intervals in the same Trading Day as, but prior to, Trading Interval i	I
PDITD(di)	{}	G	DI		Set of Dispatch Intervals in the same Trading Day as, but prior to, Dispatch Interval di	I
PD1000(d)	{}	G	D		Set of 1000 Trading Days preceding (and excluding) Trading Day d	I
ESROI(d)	{}	G	D		Set of Electric Storage Resource Obligation Intervals applicable on Trading Day d	I
INTDAYS1(w)	{}	G	W0	9.1.4	Set of days from (and including) the settlement day associated with the original Settlement Statement up to (but excluding) settlement day for adjustment 1 Settlement Statement for Trading Week w	I
INTDAYS2(w)	{}	G	W0	9.1.4	Set of days from (and including) the settlement day associated with the original Settlement Statement up to (but excluding) settlement day for adjustment 2 Settlement Statement for Trading Week w	I
INTDAYS3(w)	{}	G	W0	9.1.4	Set of days from (and including) the settlement day associated with the original Settlement Statement up to (but excluding) settlement day for adjustment 3 Settlement Statement for Trading Week w	I
EXPDAYS(d)	{}	G	D		Set of Trading Days that have not yet had a Settlement Statement issued, up to and including Trading Day d-1	I

2.4 Associations

Associations are used to link two entities to each other. These associations are used in the document for the following purposes:

- To reference a variable or attribute that applies to the parent of a child by relying on the primary or additional associations listed below e.g. $UOOM\_F\_I(t,i)$ is referring to the $UOOM\_F\_I$ quantity for the Facility that is associated with tranche t.
- To reference a Facility or NMI associated with an Intermittent Load by relying on the additional associations listed below e.g. $NMI(IML2RG(f,i),i)$ is referring to the set of NMIs that are associated with the Remote Generator that is associated with Intermittent Load f.

2.4.1 Primary Associations

Association	Child SC	Parent SC	Description
F2P	F	P	Association between Facility f and participant p
N2F	N	F	Association between NMI n and Facility f (excluding DSPs)
SCC2F	SCC	F	Association between Separately Certified Component scc and Facility f
CH2N	CH	N	Association between channel ch and NMI n
C2P	C	P	Association between contract c and participant p

Association	Child SC	Parent SC	Description
A2F	A	F	Association between a Capacity Credit Allocation a and Facility f
SA2FE	SA	FE	Association between a SESSM Award sa and a Facility f and Essential System Service e

2.4.2 Additional Associations

Association	Child SC	Parent SC	Description
IML2EG	F	F	Association between Intermittent Load f and any embedded generator
IML2NS	N	F	Association between Intermittent Load f and any separately metered NMI that is measured by another connection point
A2PM	A	P	Association between Capacity Credit Allocation a and the Market Participant making the allocation
A2PR	A	P	Association between Capacity Credit Allocation a and the Market Participant receiving the allocation
T2F	T	F	Association between a price-quantity pair and the Facility associated with the price-quantity pair
T2P	T	P	Associations between a price-quantity pair and the participant associated with the price-quantity pair

3 Metering Calculation Engine

Metering calculations are fundamental to settlement and prudential calculations. Due to the large volumes of data, metering calculations are separated from the main calculation engine.

Metered Schedules are calculated for:

- Non-Dispatchable Loads (excluding those represented by the Notional Wholesale Meter)
- Scheduled Facilities
- Semi-Scheduled Facilities
- Non-Scheduled Facilities
- Notional Wholesale Meter

In order to determine these Metered Schedules the following information is required:

- Connection point energy quantities
- Facility category
- Facility aggregation requirements

The purpose of this section is to define Sent Out Metered Schedules (non-loss adjusted energy) and Metered Schedules (loss adjusted energy) for each category of facility defined in the registration chapter. The Metered Schedules and Sent Out Metered Schedules for unregistered NDLs are the same as the connection point's Metered Schedules as defined previously. Intermittent Load facilities Metered Schedules do not use the same variables as all other facilities. These Metered Schedules are detailed in their own section.

The equations in the following sections incorporate the concept of Aggregated Facilities [MR 2.30], which is a Registered Facility with more than one connection point.

When estimating meter data, AEMO uses more general metering equations to incorporate estimation methodology. When actual data is available, the equations simplify to the previously outlined metering equations. The more general metering equations are detailed in the subsequent subsections.

3.1 Invocation

The following table outlines the invocation for the high-level calculations.

Variable	Scope Set
$MS\_F\_I(n,i)$	$\forall f \in SF(i) \cup SSF(i) \cup NSF(i) \cup NDL(i)$
$SOMS\_F\_I(f,i)$	$\forall f \in SF(i) \cup SSF(i) \cup NSF(i) \cup NDL(i)$

Variable	Units	SC	GR	Rule	Description	Ref
MS_F_I(f, i)	MWh	F	I	9.5.2, 2.30B.10, 2.30B.11	Metered Schedule for Facility f in Trading Interval i	(31)
SOMS_F_I(f, i)	MWh	F	I		Sent Out Metered Schedule for Facility f in Trading Interval i	(32)
NDL(d)	{}	G	D	11	Set of Non-Dispatchable Loads in Trading Day d	(24)
NSF(d)	{}	G	D	11	Set of Non-Scheduled Facilities in Trading Day d	(17)
SF(d)	{}	G	D	11	Set of Scheduled Facilities in Trading Day d	(13)
SSF(d)	{}	G	D	11	Set of Semi-Scheduled Facilities in Trading Day d	(15)

3.2 Connection Point Energy Quantities

Western Power is a Metering Data Agent and provides AEMO with:

- Meter energy data (kWh); and
- Meter standing data (Participant, TLF, DLF).

Each connection point is assigned a NMI (National Meter Identifier).

For any single Trading interval, a NMI may have multiple meter channels that measure and store energy data. The type of data varies; however, the channels containing energy data relevant to AEMO are B channels which measure generation; and E channels which measure consumption.

The image below shows a sample of energy data received from Western Power. In this example it shows that NMI 8001000347 had 9.600 kWh of consumption for Trading Interval 03:30 on its E1 channel.

```
<Header>
  <From description="Western Power Networks">WPNTWRKS</From>
  <To description="Independent Market Operator">IMOWAE</To>
  <MessageID>WPNTWRKSMSG-215630979</MessageID>
  <MessageDate>2018-02-28T22:18:54+08:00</MessageDate>
  <TransactionGroup>MTRD</TransactionGroup>
  <Priority>Low</Priority>
  <Market>WAELEC</Market>
</Header>
<Transactions>
  <Transaction transactionID="WPNTWRKS--232925016" transactionDate="20
    <MeterDataNotification version="r17">
      <RecordCount>665</RecordCount>
      <CSVConsumptionData>100,NEM12,201802282218,WPNTWRKS,IMOWAE
200,8001000347,E1Q1T1,01,E1,,0204000021,kWh,30,
300,20170331,496.800,367.200,7.200,4.800,7.200,4.800,4.800,9.600,12.000,
```

The image below shows a sample of standing data received from Western Power. In this example it shows that NMI 8001000266 had a TLF of TSAV, a DLF of QRT6, and a Financially Responsible Market Participant (FRMP) of ERMPOWER.

```
<Header>
  <From description="Western Power Networks">WPNTWRKS</From>
  <To description="ERM Power Retail">ERMPOWER</To>
  <MessageID>WPNTWRKSMSG-264235142</MessageID>
  <MessageDate>2019-05-10T09:01:46+08:00</MessageDate>
  <TransactionGroup>NMID</TransactionGroup>
  <Priority>Medium</Priority>
  <Market>WAELEC</Market>
</Header>
<Transactions>
  <Transaction transactionDate="2019-05-10T09:01:47+08:00" transactionID="WPNTWRKS-0000a-277865442">
    <NMIStandingDataUpdateNotification version="r9">
      <SingleNMIStandingData>
        <NMI checksum="7">8001000266</NMI>
        <WAMasterData>
          <JurisdictionCode>WA</JurisdictionCode>
          <NMIClassificationCode>LARGE</NMIClassificationCode>
          <TransmissionNodeIdentifier effectiveDate="2006-07-20">TSAV</TransmissionNodeIdentifier>
          <DistributionLossFactorCode effectiveDate="2000-11-30">QRT6</DistributionLossFactorCode>
          <ParentEmbeddedNetworkIdentifier xsi:nil="true"/>
          <ChildEmbeddedNetworkIdentifier>Master-Sub</ChildEmbeddedNetworkIdentifier>
          <Address>
          <Status effectiveDate="2000-11-30">A</Status>
          <DistanceFromSubstation effectiveDate="2016-07-01">3.186</DistanceFromSubstation>
          <Voltage>LV</Voltage>
          <PropertyType>Industrial</PropertyType>
          <PoleNumber xsi:nil="true"/>
        </WAMasterData>
        <RoleAssignments>
          <RoleAssignment effectiveDate="2000-11-30">
            <Party description="Synergy Energy">WPRTL</Party>
            <Role>ROLR</Role>
          </RoleAssignment>
          <RoleAssignment effectiveDate="2017-08-01">
            <Party description="ERM Power Retail">ERMPOWER</Party>
            <Role>RP</Role>
          </RoleAssignment>
          <RoleAssignment effectiveDate="2017-08-01">
            <Party description="ERM Power Retail">ERMPOWER</Party>
            <Role>FRMP</Role>
          </RoleAssignment>
```

Some specific items of note:

- Standing Data only provides data at a specific point in time - i.e. no historical data is stored in the file. Therefore AEMO's databases must consider how it will maintain historical information.
- The TLF is sent to AEMO against the TransmissionNodeIdentifier attribute. Market Participants (other than AEMO) receive files with the Transmission Network Identifier (TNI) in this field, and they do not receive TLFs. A TLF can be derived from a TNI and historical metering data.

Each NMI n has a non-loss adjusted energy quantity associated with it for every Trading Interval i.

Facilities without an interval meter (i.e. SCADA-only facilities) have the identical NMI name and Facility name in AEMO's systems (e.g. n = COLLIE_G1, f = COLLIE_G1).

$$MeterData\_N\_I(n,i) = \begin{cases} SCADA\_F\_I(n,i) & \text{for } n \in NOINTMETER(i) \\ netMQ\_N\_I(n,i) & \text{for } n \notin NOINTMETER(i) \end{cases} \tag{28}$$

$$netMQ\_N\_I(n,i) = \sum_{ch \in B(n,i)} MQ\_CH\_I(ch,i) - \sum_{ch \in E(n,i)} MQ\_CH\_I(ch,i) \tag{29}$$

$$estMeterData\_N\_I(n,i) = MeterData\_N\_I(n, LDLP\_N\_I(n,i)) \times SF\_N\_I(n,i) \tag{30}$$

Variable	Units	SC	GR	Rule	Description	Ref
MeterData_N_I(n, i)	MWh	N	I		Non-loss adjusted energy quantity for NMI n in Trading Interval i	(28)
netMQ_N_I(n, i)	MWh	N	I		Net energy measured by NMI n in Trading Interval i, non-loss adjusted	(29)
estMeterData_N_I(n, i)	MWh	N	I		Non-loss adjusted energy quantity (including estimation) for NMI n in Trading Interval i	(30)
B(d)	{}	G	D		Set of all generation metering channels associated with NMIs in Trading Day d	I
E(d)	{}	G	D		Set of all consumption metering channels associated with NMIs in Trading Day d	I
MQ_CH_I(ch, i)	MWh	CH	I		Energy measured by metering channel ch in Trading Interval i, non-loss adjusted	I
NOINTMETER(d)	{}	G	D		Set of Facilities in WEMS for which no Interval meter exists in Trading Day d	I
SCADA_F_I(f, i)	MWh	F	I	9.9.13	Net generation measured by SCADA for Facility f in Trading Interval i, non-loss adjusted	I

3.3 Metered Schedules (including estimation)

Metered Schedules are required to be estimated for the purposes of determining a Market Participant's Outstanding Amount.
When a Metered Schedule does not exist because data is yet to be provided by the Meter Data Agent, an estimation methodology is used to scale data from a similar period, depending on what data is available. The following sections outline:

- the estimation methodology consistent with the requirements in WEM Procedure: Prudential Requirements.
- how data statuses are used to indicate if data exists;
- how a similar interval is determined using a 'Like Day, Like Period' methodology; and
- how scaling factors are used.

3.3.1 Standard Metered Schedules (including estimation)

Meter Schedules are determined or estimated based on what data is available. The general philosophy for what data to use is based on the following hierarchy as dictated by the WEM Procedure: Prudential Requirements:

1. Use $MeterData\_N\_I$ data for the entire Facility, if $MeterData\_N\_I$ data exists for any NMI associated with Facility f, for Trading Interval i
2. Use SCADA energy data if it exists for Facility f, for Trading Interval i
3. Use EOI Quantity if it exists for Facility f, for Trading Interval i
4. Scale $MeterData\_N\_I$ data for Facility f in the most recent similar interval of Trading Interval i

$$
MS\_F\_I(f,i) = \begin{cases} SOMS\_N\_I(f,i) \times TLF\_N\_D(f,i) \times DLF\_N\_D(f,i) & \text{for } f \in NDL\_MTR(i) \\ SOMS\_F\_I(f,i) \times TLF\_F\_D(f,i) \times DLF\_F\_D(f,i) & \text{for } f \in Typical\_REGF(i) \cup (NDL\_WEMS(i) \cap \overline{IML(i)}) \\ MSIL\_F\_I(f,i) + MSEL\_F\_I(f,i) & \text{for } f \in IML(i) \\ MSEG\_F\_I(EG2IML(f,i),i) & \text{for } f \in EG(i) \\ -1 \times \sum_{f \in SF(i) \cup SSF(i) \cup NSF(i) \cup NDL \cap \overline{NOTIONAL(i)}} MS\_F\_I(f,i) & \text{for } f \in NOTIONAL(i) \\ 0 & \text{otherwise} \end{cases} \tag{31}
$$

$$SOMS\_F\_I(f,i) = \begin{cases} SOMS\_N\_I(f,i) & \text{for } f \in NDL\_MTR(i) \\ SOMStypical\_F\_I(f,i) & \text{for } f \in Typical\_REGF(i) \cup (NDL\_WEMS(i) \cap \overline{IML(i)}) \\ SOMSIL\_F\_I(f,i) + SOMSEL\_F\_I(f,i) & \text{for } f \in IML(i) \\ SOMSEG\_F\_I(EG2IML(f,i),i) & \text{for } f \in EG(i) \\ \dfrac{MS\_F\_I(f,i)}{TLF\_F\_D(f,i) \times DLF\_F\_D(f,i)} & \text{for } f \in NOTIONAL(i) \\ 0 & \text{otherwise} \end{cases} \tag{32}$$

$$SOMS\_N\_I(n,i) = \begin{cases} MeterData\_N\_I(n,i) & \text{if } AfterIMDFlag\_G\_D(i) = 1 \text{ or } isData\_N\_I(n,i) > 0 \\ estMeterData\_N\_I(n,i) & \text{otherwise} \end{cases} \tag{33}$$

$$SOMStypical\_F\_I(f,i) = \begin{cases} \sum_{n \in NMI(f,i)} MeterData\_N\_I(n,i) & \text{if } AfterIMDFlag\_G\_D(i) = 1 \text{ or } isData\_F\_I(f,i) > 0 \\ SCADA\_F\_I(f,i) & \text{elseif } SCADANullFlag\_G\_D(i) = 0 \\ 0.5h \times SCADAEOI\_F\_I(f,i) & \text{elseif } EOINullFlag\_G\_D(i) = 0 \\ \sum_{n \in NMI(f,i)} estMeterData\_N\_I(n,i) & \text{otherwise} \end{cases} \tag{34}$$

Variable	Units	SC	GR	Rule	Description	Ref
MS_F_I(f, i)	MWh	F	I	9.5.2, 2.30B.10, 2.30B.11	Metered Schedule for Facility f in Trading Interval i	(31)
SOMS_F_I(f, i)	MWh	F	I		Sent Out Metered Schedule for Facility f in Trading Interval i	(32)
SOMS_N_I(n, i)	MWh	N	I		Sent Out Metered Schedule (including estimation) for NMI n in Trading Interval i	(33)
SOMStypical_F_I(f, i)	MWh	F	I		Sent Out Metered Schedule (including estimation) for typical registered Facility f in Trading Interval i	(34)
AfterIMDFlag_G_D(d)	Flag	G	D		Flag that is 1 when the Interval Meter Deadline has passed for the Trading Week of Trading Day d, and 0 otherwise	I
DLF_F_D(f, d)		F	D		Distribution Loss Factor for Facility f for Trading Day d	I
DLF_N_D(n, d)		N	D		Distribution Loss Factor for NMI n for Trading Day d	I
EG(d)	{}	G	D	2.30B.2(a)	Set of Registered Facilities that serve an Intermittent Load in Trading Day d	(27)
EOINullFlag_G_D(d)	Flag	G	D		Flag that is 1 when EOI Quantities are unavailable for Trading Day d, and 0 otherwise	I
estMeterData_N_I(n, i)	MWh	N	I		Non-loss adjusted energy quantity (including estimation) for NMI n in Trading Interval i	(30)
IML(d)	{}	G	D	2.30B.1	Set of Loads which have an Intermittent Load component in Trading Day d	(26)
isData_F_I(f, i)	Flag	F	I		Flag that is 1 when Facility f has energy data in Trading Interval i, and 0 otherwise	(52)
isData_N_I(n, i)	Flag	N	I		Flag that is 1 when NMI n has energy data in Trading Interval i, and 0 otherwise	(53)

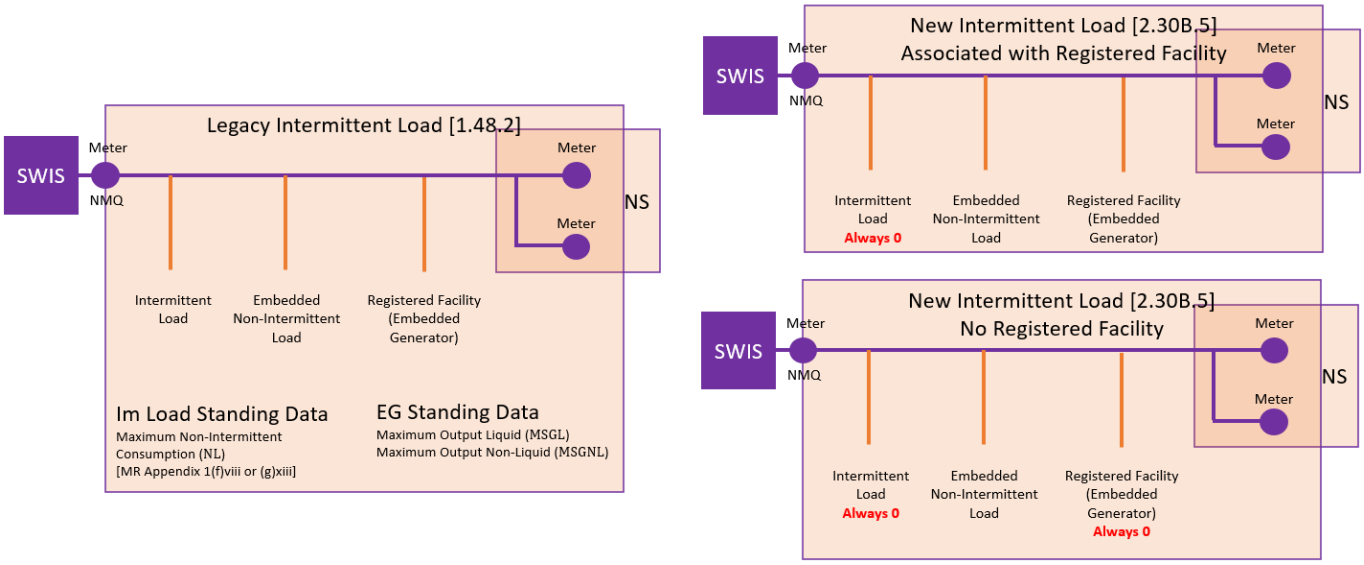
Variable	Units	SC	GR	Rule	Description	Ref
LDLP_N_I(n, i)		N	I		The interval used to determine scaled meter data for NMI n in Trading Interval i	(55)
MeterData_N_I(n, i)	MWh	N	I		Non-loss adjusted energy quantity for NMI n in Trading Interval i	(28)
MSEG_F_I(f, i)	MWh	F	I	9.5.2, 2.30B.10(c) i.3, ii.3, iii.3, iv.3	Metered Schedule for the embedded generator associated with Intermittent Load Facility f in Trading Interval i	(47)
MSEL_F_I(f, i)	MWh	F	I	9.5.2, 2.30B.10(c) i.2, ii.2, iii.2, iv.2	Metered Schedule for the embedded load associated with Facility f in Trading Interval i	(46)
MSIL_F_I(f, i)	MWh	F	I	9.5.2, 2.30B.10(c) i.1, ii.1, iii.1, iv.1	Metered Schedule for the intermittent load associated with Facility f in Trading Interval i	(48)
NDL_MTR(d)	{}	G	D		Set of Non-Dispatchable Loads with interval meters that are not in WEMS in Trading Day d	I
NMI(d)	{}	G	D		Set of all connection points in Trading Day d	I
SF_N_I(n, i)		N	I		Scaling Factor for NMI n in Trading Interval i	(56)
NOTIONAL(d)	{}	G	D	11	Set containing the Notional Wholesale Meter	(21)
SOMSEG_F_I(f, i)	MWh	F	I		Sent Out Metered Schedule for the embedded generator associated with Intermittent Load Facility f in Trading Interval i	(50)
SOMSEL_F_I(f, i)	MWh	F	I		Sent Out Metered Schedule for the embedded load associated with Facility f in Trading Interval i	(49)
SOMSIL_F_I(f, i)	MWh	F	I		Sent Out Metered Schedule for the intermittent load associated with Facility f in Trading Interval i	(51)
SCADA_F_I(f, i)	MWh	F	I	9.9.13	Net generation measured by SCADA for Facility f in Trading Interval i, non-loss adjusted	I
SCADAEOI_F_I(f, i)	MW	F	I		EOI Quantity of Facility f for Trading Interval i	I
SCADANullFlag_G_D(d)	Flag	G	D		Flag that is 1 when net generation quantities measured by SCADA are unavailable for Trading Day d, and 0 otherwise	I
TLF_F_D(f, d)		F	D		Transmission Loss Factor for Facility f for Trading Day d	I
TLF_N_D(n, d)		N	D		Transmission Loss Factor for NMI n for Trading Day d	I
Typical_REGF(d)	{}	G	D		Set containing SFs, SSFs and NSFs, excluding any associated with an Intermittent Load for Trading Day d	(25)

3.3.2 Intermittent Load Metered Schedules (including estimation)

An Intermittent Load comprises the following components that are all measured by the single connection point associated with the Intermittent Load:

- Intermittent load associated with Load f
- Embedded Load (non-Intermittent Load) that is non-Intermittent Load f
- Generation associated with a Registered Facility $IML2EG(f, d)$

The Metered Schedule calculations are different depending on whether the Intermittent Load existed prior to New WEM Commencement Day (Legacy Intermittent Load) or not (New Intermittent Load).
The figure below is a graphical representation of this configuration.



The purpose of this section is to define the Metered Schedule Quantities for each of the components. To do this, various standing data relating to the Intermittent Load and the embedded generator is used; however, the first step is to perform the following preliminary calculations to derive AMQ_F_I.

Note, that the equations (35), (37) and (39) refer to more generalised equations (36), (38) and (40) to handle prudentials as well as settlement.

The net metered quantity associated with the Intermittent Load is calculated:

$$NNMQ\_F\_I(f,i) = \sum_{n \in NMI(f,i)} MeterData\_N\_I(n,i) \tag{35}$$

$$estNNMQ\_F\_I(f,i) = \sum_{n \in NMI(f,i)} estMeterData\_N\_I(n,i) \tag{36}$$

$$NMQ\_F\_I(f,i) = NNMQ\_F\_I(f,i) \times TLF\_F\_D(f,i) \times DLF\_F\_D(f,i) \tag{37}$$

$$estNMQ\_F\_I(f,i) = estNNMQ\_F\_I(f,i) \times TLF\_F\_D(f,i) \times DLF\_F\_D(f,i) \tag{38}$$

The meter data associated with each individual NMI that is separately metered (and settled) associated with the Intermittent Load is calculated:

$$NS\_F\_I(f,i) = \sum_{n \in NS(f,i)} MeterData\_N\_I(n,i) \times TLF\_N\_D(n,i) \times DLF\_N\_D(n,i) \tag{39}$$

$$estNS\_F\_I(f,i) = \sum_{n \in NS(f,i)} estMeterData\_N\_I(n,i) \times TLF\_N\_D(n,i) \times DLF\_N\_D(n,i) \tag{40}$$

Any separately metered (and settled) quantities associated with the Intermittent Load are removed to determine AMQ.

$$AMQ\_F\_I(f,i) = \begin{cases} NMQ\_F\_I(f,i) - NS\_F\_I(f,i) & \text{if } AfterIMDFlag\_G\_D(i) = 1 \text{ or } isData\_F\_I(f,i) > 0 \\ SCADA\_F\_I(f,i) & \text{elseif } SCADANullFlag\_G\_D(i) = 0 \\ 0.5h \times SCADAEOI\_F\_I(f,i) & \text{elseif } EOINullFlag\_G\_D(i) = 0 \\ estNMQ\_F\_I(f,i) - estNS\_F\_I(f,i) & \text{otherwise} \end{cases} \tag{41}$$

Variable	Units	SC	GR	Rule	Description	Ref
NNMQ_F_I(f, i)	MWh	F	I	2.30B.10(a)i	Non-loss adjusted net metered energy measured by the connection point for Facility f in Trading Interval i	(35)
estNNMQ_F_I(f, i)	MWh	F	I	2.30B.10(a)i	Non-loss adjusted net metered energy measured by the connection point (including estimation) for Facility f in Trading Interval i	(36)
NMQ_F_I(f, i)	MWh	F	I	2.30B.10(a)i	Loss adjusted net metered energy measured by the connection point for Facility f in Trading Interval i	(37)
estNMQ_F_I(f, i)	MWh	F	I	2.30B.10(a)i	Loss adjusted net metered energy (including estimation) measured by the connection point for Facility f in Trading Interval i	(38)
NS_F_I(f, i)	MWh	F	I	2.30B.10(a)ii	Net supply that is separately metered associated with Facility f for Trading Interval i	(39)
estNS_F_I(f, i)	MWh	F	I	2.30B.10(a)ii	Net supply (including estimation) that is separately metered associated with Facility f for Trading Interval i	(40)
AMQ_F_I(f, i)	MWh	F	I	2.30B.10(a)vi, 2.30B.11(a)iii	Adjusted meter quantity (including estimation) for Facility f in Trading Interval i	(41)
AfterIMDFlag_G_D(d)	Flag	G	D		Flag that is 1 when the Interval Meter Deadline has passed for the Trading Week of Trading Day d, and 0 otherwise	I
DLF_F_D(f, d)		F	D		Distribution Loss Factor for Facility f for Trading Day d	I
DLF_N_D(n, d)		N	D		Distribution Loss Factor for NMI n for Trading Day d	I
EOINullFlag_G_D(d)	Flag	G	D		Flag that is 1 when EOI Quantities are unavailable for Trading Day d, and 0 otherwise	I
estMeterData_N_I(n, i)	MWh	N	I		Non-loss adjusted energy quantity (including estimation) for NMI n in Trading Interval i	(30)
isData_F_I(f, i)	Flag	F	I		Flag that is 1 when Facility f has energy data in Trading Interval i, and 0 otherwise	(52)
MeterData_N_I(n, i)	MWh	N	I		Non-loss adjusted energy quantity for NMI n in Trading Interval i	(28)
NMI(d)	{}	G	D		Set of all connection points in Trading Day d	I
NS(d)	{}	G	D	2.30B.10(a)ii	Set of all connection points (NMIs) measuring an Intermittent Load which are separately metered (and settled) in Trading Day d	I
SCADA_F_I(f, i)	MWh	F	I	9.9.13	Net generation measured by SCADA for Facility f in Trading Interval i, non-loss adjusted	I
SCADAEOI_F_I(f, i)	MW	F	I		EOI Quantity of Facility f for Trading Interval i	I
SCADANullFlag_G_D(d)	Flag	G	D		Flag that is 1 when net generation quantities measured by SCADA are unavailable for Trading Day d, and 0 otherwise	I
TLF_F_D(f, d)		F	D		Transmission Loss Factor for Facility f for Trading Day d	I
TLF_N_D(n, d)		N	D		Transmission Loss Factor for NMI n for Trading Day d	I

Then the AMQ_F_I value is split into three components based on whether it existed prior to New WEM Commencement Day, the standing data of the Intermittent Load or its associated embedded generator.

For Legacy Intermittent Loads:

- If AMQ_F_I is positive (generating), then the generation is attributed to the embedded generator up until its maximum sent out generation, with any excess generation being attributed to the Intermittent Load Metered Schedules.
- If AMQ_F_I is negative (consuming), then the consumption is attributed to the embedded load up until its maximum non-intermittent consumption, with any excess consumption being attributed to the Intermittent Load Metered Schedules.

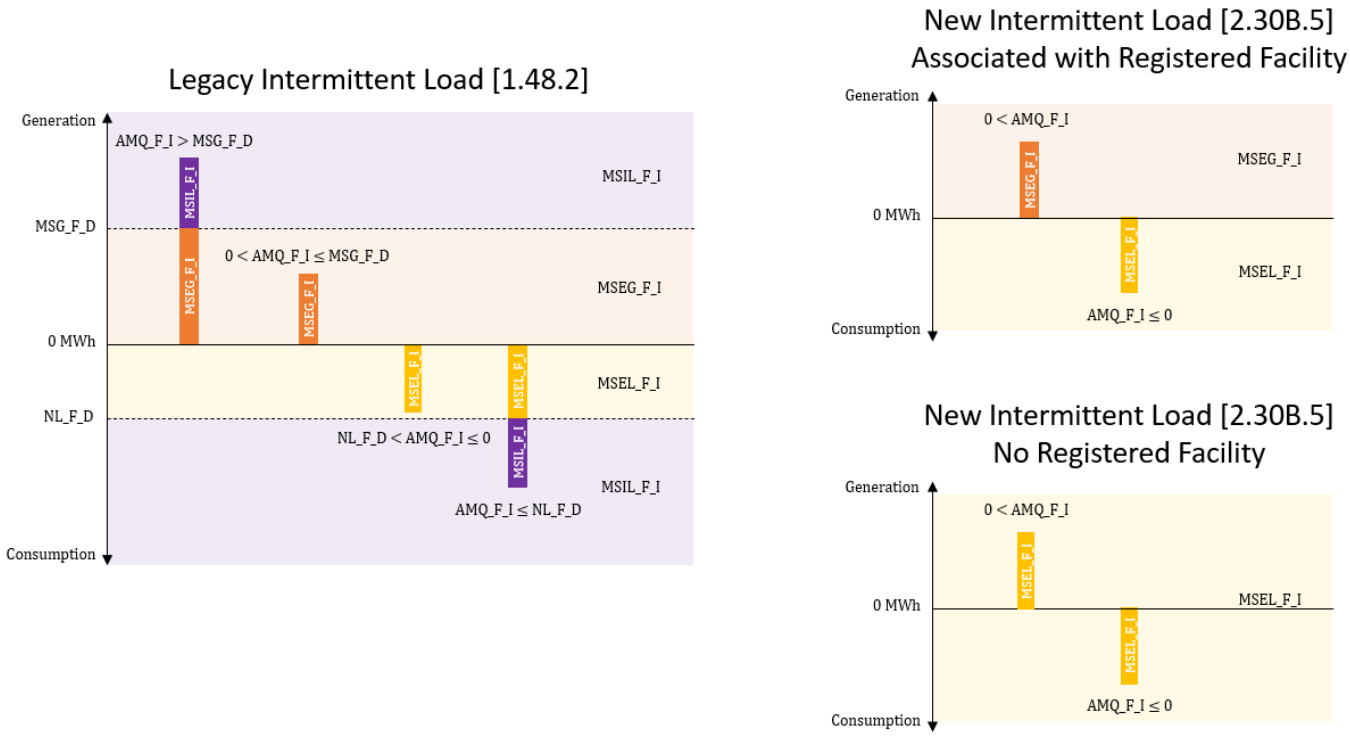
For New Intermittent Loads that are associated with a Registered Facility:

- If AMQ_F_I is positive (generating), then the generation is attributed to the embedded generator.
- If AMQ_F_I is negative (consuming), then the consumption is attributed to the embedded load.

For New Intermittent Loads that are not associated with a Registered Facility:

- AMQ_F_I is attributed to the embedded load.

The diagram below illustrates this concept.



Mathematically, this is achieved by performing the following calculations.

The maximum non-intermittent Load associated with Intermittent load f is determined as:

$$NL\_F\_D(f,d) = -NLstanding\_F\_D(f,d) \times TLF\_F\_D(f,d) \times DLF\_F\_D(f,d) \tag{42}$$

The maximum Sent Out Generation for an embedded generator, e, associated with Intermittent Load f is determined as:

$$MSGEG\_F\_D(f,d) = MSG\_F\_D(IML2EG(f,d),d) \tag{43}$$

$$MSG\_F\_D(f,d) = 0.5h \times SOC\_F\_D(f,d) \times TLF\_F\_D(f,d) \times DLF\_F\_D(f,d) \tag{44}$$

$$SOC\_F\_D(f,d) = max(0, MSOC\_F\_D(f,d)) \tag{45}$$

Although the equations in the rules for Legacy Intermittent Loads are written differently to the equations below, they are mathematically equivalent.

$$MSEL\_F\_I(f,i) = \begin{cases} min(0, max(NL\_F\_D(f,i), AMQ\_F\_I(f,i))) & \text{for } f \in IML(i) \cap LegacyIML(i) \\ min(0, AMQ\_F\_I(f,i)) & \text{for } f \in IML(i) \cap \overline{LegacyIML(i)} \\ & \text{and } IML2EG(f,i) \text{ is not NULL} \\ AMQ\_F\_I(f,i) & \text{for } f \in IML(i) \cap \overline{LegacyIML(i)} \\ & \text{and } IML2EG(f,i) \text{ is NULL} \end{cases} \quad (46)$$

$$MSEG\_F\_I(f,i) = \begin{cases} max(0, min(MSGEG\_F\_D(f,i), AMQ\_F\_I(f,i))) & \text{for } f \in IML(i) \cap LegacyIML(i) \\ max(0, AMQ\_F\_I(f,i)) & \text{for } f \in IML(i) \cap \overline{LegacyIML(i)} \\ & \text{and } IML2EG(f,i) \text{ is not NULL} \\ 0 & \text{for } f \in IML(i) \cap \overline{LegacyIML(i)} \\ & \text{and } IML2EG(f,i) \text{ is NULL} \end{cases} \quad (47)$$

$$MSIL\_F\_I(f,i) = \begin{cases} AMQ\_F\_I(f,i) - MSEL\_F\_I(f,i) - MSEG\_F\_I(f,i) & \text{for } f \in IML(i) \cap LegacyIML(i) \\ 0 & \text{for } f \in IML(i) \cap \overline{LegacyIML(i)} \\ & \text{and } IML2EG(f,i) \text{ is not NULL} \\ 0 & \text{for } f \in IML(i) \cap \overline{LegacyIML(i)} \\ & \text{and } IML2EG(f,i) \text{ is NULL} \end{cases} \quad (48)$$

The non-loss adjusted Metered Schedules for Embedded Load and Embedded Generator and Intermittent Load are defined as:

$$SOMSEL\_F\_I(f,i) = \frac{MSEL\_F\_I(f,i)}{TLF\_F\_D(f,i) \times DLF\_F\_D(f,i)} \quad (49)$$

$$SOMSEG\_F\_I(f,i) = \frac{MSEG\_F\_I(f,i)}{TLF\_F\_D(f,i) \times DLF\_F\_D(f,i)} \quad (50)$$

$$SOMSIL\_F\_I(f,i) = \frac{MSIL\_F\_I(f,i)}{TLF\_F\_D(f,i) \times DLF\_F\_D(f,i)} \quad (51)$$

Variable	Units	SC	GR	Rule	Description	Ref
NL_F_D(f, d)	MWh	F	D	2.30B.10(a)iii	Maximum possible consumption that is non-intermittent associated with Facility f in Trading Day d. This has a negative value.	(42)
MSGEG_F_D(f, d)	MWh	F	D	2.30B.10(a)v	Maximum sent out generation of the embedded generator serving Intermittent Load Facility f in Trading Day d	(43)
MSG_F_D(f, d)	MWh	F	D	2.30B.10(a)v	Maximum sent out generation of Facility f in Trading Day d	(44)
SOC_F_D(f, d)	MW	F	D	11	Sent Out Capacity of Facility f in Trading Day d	(45)
MSEL_F_I(f, i)	MWh	F	I	9.5.2, 2.30B.10(c) i.2, ii.2, iii.2, iv.2	Metered Schedule for the embedded load associated with Facility f in Trading Interval i	(46)
MSEG_F_I(f, i)	MWh	F	I	9.5.2, 2.30B.10(c) i.3, ii.3, iii.3, iv.3	Metered Schedule for the embedded generator associated with Intermittent Load Facility f in Trading Interval i	(47)

Variable	Units	SC	GR	Rule	Description	Ref
MSIL_F_I(f, i)	MWh	F	I	9.5.2, 2.30B.10(c) i.1, ii.1, iii.1, iv.1	Metered Schedule for the intermittent load associated with Facility f in Trading Interval i	(48)
SOMSEL_F_I(f, i)	MWh	F	I		Sent Out Metered Schedule for the embedded load associated with Facility f in Trading Interval i	(49)
SOMSEG_F_I(f, i)	MWh	F	I		Sent Out Metered Schedule for the embedded generator associated with Intermittent Load Facility f in Trading Interval i	(50)
SOMSIL_F_I(f, i)	MWh	F	I		Sent Out Metered Schedule for the intermittent load associated with Facility f in Trading Interval i	(51)
AMQ_F_I(f, i)	MWh	F	I	2.30B.10(a)vi, 2.30B.11(a)iii	Adjusted meter quantity for Facility f in Trading Interval i	(41)
DLF_F_D(f, d)		F	D		Distribution Loss Factor for Facility f for Trading Day d	I
IML(d)	{}	G	D	2.30B.1	Set of Loads which have an Intermittent Load component in Trading Day d	(26)
LegacyIML(d)	{}	G	D	1.48.2	Set of Intermittent Loads that were treated by AEMO as an Intermittent Load on the day before New WEM Commencement Day, and continue to retain this status on Trading Day d	I
MSOC_F_D(f, d)	MW	F	D	App 1 (b)v, (c)v, (d)v	Maximum sent out capacity under optimal conditions of Facility f in Trading Day d	I
NLstanding_F_D(f, d)	MWh	F	D	App 1 (g)iii	Maximum possible consumption that is non-intermittent (nominated in standing data) associated with Facility f in Trading Day d. This has a positive value.	I
TLF_F_D(f, d)		F	D		Transmission Loss Factor for Facility f for Trading Day d	I

3.3.3 Data Statuses

Statuses are set up to distinguish between NULL values and 0 values in AEMO's generic settlement calculation engine. Although these statuses are defined as equations in this section, they are treated as inputs in the metering calculations.

$$isData\_F\_I(f,i) = \begin{cases} 1 & \text{if } \sum_{n \in NMI(f,i)} isData\_N\_I(n,i) > 0 \\ 0 & \text{otherwise} \end{cases} \tag{52}$$

$$isData\_N\_I(n,i) = \begin{cases} 1 & \text{if } n \in NOINTMETER(i) \text{ and } SCADANullFlag\_G\_D(i) = 0 \\ 1 & \text{if } (n \notin NOINTMETER(i) \text{ and } MQNullFlag\_N\_I(n,i) = 0 \\ 0 & \text{otherwise} \end{cases} \tag{53}$$

Variable	Units	SC	GR	Rule	Description	Ref
isData_F_I(f, i)	Flag	F	I		Flag that is 1 when Facility f has energy data in Trading Interval i, and 0 otherwise	(52)
isData_N_I(n, i)	Flag	N	I		Flag that is 1 when NMI n has energy data in Trading Interval i, and 0 otherwise	(53)
B(d)	{}	G	D		Set of all generation metering channels associated with NMIs in Trading Day d	I

Variable	Units	SC	GR	Rule	Description	Ref
E(d)	{}	G	D		Set of all consumption metering channels associated with NMIs in Trading Day d	I
MQNullFlag_N_I(n, i)	Flag	N	I		Flag that is 1 when metering data is unavailable for all of the B and E channels associated with NMI n in Trading Interval i, and 0 otherwise	I
NMI(d)	{}	G	D		Set of all connection points in Trading Day d	I
NOINTMETER(d)	{}	G	D		Set of Facilities in WEMS for which no Interval meter exists in Trading Day d	I
SCADANullFlag_G_D(d)	Flag	G	D		Flag that is 1 when net generation quantities measured by SCADA are unavailable for Trading Day d, and 0 otherwise	I

3.3.4 Like Day, Like Period (LDLP)

A 'Like Day' of Trading Interval i is defined as follows:

- If i falls on a Trading Day d that is a Public Holiday, then a 'Like Day' is any Trading Day that is a Sunday.
- If i falls on a Trading Day d that is not a public holiday, then a 'Like Day' is any Trading Day that is not a Public Holiday and is the same day of the week as d.

The set of Trading Days that are a 'Like Day' of Trading Interval i is infinitely large. For the purposes of estimation, the set of Like Days we will use will be defined as the union of:

- the set of Like Days that occur after the last Trading Day for which the relevant Interval Meter Deadline has passed; and
- the set containing the most recent Like Day for which the relevant Interval Meter Deadline has passed.

A 'Like Period' of Trading Interval i is defined as any Trading Interval that is the same time of day as i.

A 'Like Day, Like Period' of i, is defined as a Trading Interval that both falls on a 'Like Day' of i and is a 'Like Period' of i.

$$LDLP(i) = \text{The set of 'Like Day, Like Periods' of } i \text{ as illustrated in the description above and table below.} \quad (54)$$

$LDLP(i)$ set is ordered from most recent interval to least recent interval. LDLP(i)[1] refers to the most recent interval in the set and LDLP(i)[j] refers to the least recent interval in the set.

Refer to the table below for examples illustrating LDLP(i) for estimating Trading Interval i when the calculation is performed at time j.

#	i @ j	LDLP(i) @ j	Purpose of example
1	20:30 Fri 03 May 2019 calculated @ 23:59 01 May 2019	{20:30 Fri 26 Apr 2019, ~~20:30 Fri 19 Apr 2019~~, 20:30 Fri 12 Apr 2019, 20:30 Fri 05 Apr 2019, 20:30 Fri 29 Mar 2019, 20:30 Fri 22 Mar 2019, 20:30 Fri 15 Mar 2019, 20:30 Fri 08 Mar 2019, 20:30 Fri 01 Mar 2019, 20:30 Fri 22 Feb 2019}	Shows omission of Public Holidays (Good Friday) when i is not a Public Holiday.
2	20:30 Fri 03 May 2019 calculated @ 00:00 02 May 2019	{20:30 Fri 26 Apr 2019, ~~20:30 Fri 19 Apr 2019~~, 20:30 Fri 12 Apr 2019, 20:30 Fri 05 Apr 2019, 20:30 Fri 29 Mar 2019}	Compare with example 1 to show effect of calculating after the Interval Meter Deadline for Trading Month March 2019 on 8 May 2019.
3	08:00 Thu 25 Apr 2019 calculated @ 13:00 27 Apr 2019	{08:00 Sun 21 Apr 2019, 08:00 Sun 14 Apr 2019, 08:00 Sun 07 Apr 2019, 08:00 Sun 31 Mar 2019, 08:00 Sun 24 Mar 2019, 08:00 Sun 17 Mar 2019, 08:00 Sun 10 Mar 2019, 08:00 Sun 03 Mar 2019, 08:00 Sun 24 Feb 2019}	Shows example when i falls on a Trading Day that is a Public Holiday (ANZAC Day).

#	i @ j	LDLP(i) @ j	Purpose of example
4	07:30 Thu 25 Apr 2019 calculated @ 13:00 27 Apr 2019	{07:30 Thu 18 Apr 2019, 07:30 Thu 11 Apr 2019, 07:30 Thu 04 Apr 2019, 07:30 Thu 28 Mar 2019, 07:30 Thu 21 Mar 2019, 07:30 Thu 14 Mar 2019, 07:30 Thu 07 Mar 2019, 07:30 Thu 28 Feb 2019}	Compare with example 3 to show distinction between a Trading Day that is a Public Holiday and a calendar day that is a Public Holiday.

In subsequent sections, $LDLP\_N\_I(n,i)$ will be used as the inputs to functions that expect a single Trading Interval (and not a set of Trading Intervals). The purpose of this variable is to return the interval itself, if data is available, otherwise to return the most recent interval in the set LDLP(i), for which data exists. This is defined mathematically in the equations below.

$$LDLP\_N\_I(n,i) = \begin{cases} i & \text{if } isData\_N\_I(n,i) = 1 \text{ or } AfterIMDFlag\_G\_D(i) = 1 \\ LDLP(i)[1] & \text{elseif } isData\_N\_I(n, LDLP(i)[1]) = 1 \\ LDLP(i)[2] & \text{elseif } isData\_N\_I(n, LDLP(i)[2]) = 1 \\ \quad\vdots & \quad\vdots \\ LDLP(i)[j-1] & \text{elseif } isData\_N\_I(n, LDLP(i)[j-1]) = 1 \\ LDLP(i)[j] & \text{otherwise} \end{cases} \tag{55}$$

Variable	Units	SC	GR	Rule	Description	Ref
LDLP_N_I(n, i)		N	I		The interval used to determine scaled meter data for NMI n in Trading Interval i	(55)
AfterIMDFlag_G_D(d)	Flag	G	D		Flag that is 1 when the Interval Meter Deadline has passed for the Trading Week of Trading Day d, and 0 otherwise	I
isData_N_I(n, i)	Flag	N	I		Flag that is 1 when NMI n has energy data in Trading Interval i, and 0 otherwise	(53)
LDLP(i)	{}	G	I		Set of Like Day, Like Periods of Trading Interval i. $LDLP(i)[1]$ represents the most recent Like Day, Like Period of Trading Interval i and $LDLP(i)[j]$ represents the least recent Like Day, Like Period of Trading Interval i	(54)

3.3.5 Scaling Factors

$$SF\_N\_I(n,i) = \begin{cases} ACTIVE\_N\_D(n,i) \times \dfrac{LOADFCST\_G\_I(i)}{LOADFCST\_G\_I(LDLP\_N\_I(n,i))} & \text{if } LOADFCST\_G\_I(i) \neq 0 \\ & \text{and } LOADFCST\_G\_I(LDLP\_N\_I(n,i)) \neq 0 \\ ACTIVE\_N\_D(n,i) & \text{otherwise} \end{cases} \tag{56}$$

Variable	Units	SC	GR	Rule	Description	Ref
SF_N_I(n, i)		N	I		Scaling Factor for NMI n in Trading Interval i	(56)
ACTIVE_N_D(n, d)	Flag	N	D		1 if the NMI n is active and associated with a Market Participant in Trading Day d and 0 otherwise	I
LDLP_N_I(n, i)		N	I		The interval used to determine scaled meter data for NMI n in Trading Interval i	(55)
LOADFCST_G_I(i)	MW	G	I		Load Forecast in Trading Interval i	I

3.4 Metering Aggregations

3.4.1 Invocation

The following table outlines the preliminary invocation for the high-level calculations.

Variable	Scope Set
$ABSNDL\_P\_I(p,i)$	$\forall p \in P(i)$
$CCQNDL\_P\_I(p,i)$	$\forall p \in P(i)$
$DSPL\_F\_I(f,i)$	$\forall f \in DSP(i)$
$MSNDL\_P\_I(p,i)$	$\forall p \in P(i)$
$SOMS\_G\_I(i)$	N/A

Variable	Units	SC	GR	Rule	Description	Ref
ABSNDL_P_I(p, i)	MWh	P	I		Sum of the absolute value of Metered Schedules for all Non-Dispatchable Loads for participant p in Trading Interval i	(58)
CCQNDL_P_I(p, i)	MWh	P	I		Sum of all Non-Dispatchable Load Metered Schedules that are negative for participant p in Trading Interval i	(57)
DSPL_F_I(f, i)	MWh	F	I	9.5.4	Demand Side Programme Load for Facility f in Trading Interval i	(60)
MSNDL_P_I(p, i)	MWh	P	I		Sum of all Non-Dispatchable Load Metered Schedules for Market Participant p in Trading Interval i	(59)
SOMS_G_I(i)	MWh	G	I	11	Total Sent Out Generation in Trading Interval i	(61)
DSP(d)	{}	G	D	11	Set of Demand Side Programmes in Trading Day d	(11)
P(d)	{}	G	D		Set of participants (Rule Participants, ERA and the Coordinator) in Trading Day d	(3)

3.4.2 CCQNDL_P_I

$$CCQNDL\_P\_I(p,i) = \sum_{f \in NDL(p,i)} min(0, MS\_F\_I(f,i)) \tag{57}$$

Variable	Units	SC	GR	Rule	Description	Ref
CCQNDL_P_I(p, i)	MWh	P	I		Sum of all Non-Dispatchable Load Metered Schedules that are negative for participant p in Trading Interval i	(57)
MS_F_I(f, i)	MWh	F	I	9.5.2, 9.5.3, 2.30B.10, 2.30B.11	Metered Schedule for Facility f in Trading Interval i	(31)
NDL(d)	{}	G	D	11	Set of Non-Dispatchable Loads in Trading Day d	(24)

3.4.3 ABSNDL_P_I

$$ABSNDL\_P\_I(p,i) = \sum_{f \in NDL(p,i)} |MS\_F\_I(f,i)| \tag{58}$$

Variable	Units	SC	GR	Rule	Description	Ref
ABSNDL_P_I(p, i)	MWh	P	I		Sum of the absolute value of Metered Schedules for all Non-Dispatchable Loads for participant p in Trading Interval i	(58)
MS_F_I(f, i)	MWh	F	I	9.5.2, 9.5.3, 2.30B.10, 2.30B.11	Metered Schedule for Facility f in Trading Interval i	(31)
NDL(d)	{}	G	D	11	Set of Non-Dispatchable Loads in Trading Day d	(24)

3.4.4 MSNDL_P_I

$$MSNDL\_P\_I(p,i) = \sum_{f \in NDL(p,i)} MS\_F\_I(f,i) \tag{59}$$

Variable	Units	SC	GR	Rule	Description	Ref
MSNDL_P_I(p, i)	MWh	P	I		Sum of all Non-Dispatchable Load Metered Schedules for Market Participant p in Trading Interval i	(59)
MS_F_I(f, i)	MWh	F	I	9.5.2, 9.5.3, 2.30B.10, 2.30B.11	Metered Schedule for Facility f in Trading Interval i	(31)
NDL(d)	{}	G	D	11	Set of Non-Dispatchable Loads in Trading Day d	(24)

3.4.5 DSPL_F_I

$$DSPL\_F\_I(f,i) = \sum_{n \in DSPNMI(f,i)} -SOMS\_N\_I(n,i) \tag{60}$$

Variable	Units	SC	GR	Rule	Description	Ref
DSPL_F_I(f, i)	MWh	F	I	9.5.4	Demand Side Programme Load for Facility f in Trading Interval i	(60)
SOMS_N_I(n, i)	MWh	N	I		Sent Out Metered Schedule (including estimation) for NMI n in Trading Interval i	(33)
NMI(d)	{}	G	D		Set of all connection points in Trading Day d	I

3.4.6 SOMS_G_I

$$SOMS\_G\_I(i) = \sum_{f \in SF(i) \cup SSF(i) \cup NSF(i)} max(0, SOMS\_F\_I(f,i)) \tag{61}$$

Variable	Units	SC	GR	Rule	Description	Ref
SOMS_G_I(i)	MWh	G	I	11	Total Sent Out Generation in Trading Interval i	(61)
SOMS_F_I(f, i)	MWh	F	I		Sent Out Metered Schedule for Facility f in Trading Interval i	(32)
NSF(d)	{}	G	D	11	Set of Non-Scheduled Facilities in Trading Day d	(17)
SF(d)	{}	G	D	11	Set of Scheduled Facilities in Trading Day d	(13)
SSF(d)	{}	G	D	11	Set of Semi-Scheduled Facilities in Trading Day d	(15)

4 Calculation Engine

AEMO uses the same calculation engine for both settlement and prudentials. Settlement calculations are determined for a Trading Week; however, prudential calculations are determined for each Trading Day. Therefore, the common calculation engine has been implemented on a daily basis, and can then be aggregated to achieve the required settlement outputs.

4.1 Invocation

The following table outlines the invocation for the high-level calculations that occur after the metering calculations.

Variable	Scope Set
$TOTAL\_P\_D(p, d)$	$\forall d \in D(w)$ and $\forall p \in P(d)$
$SOMS\_G\_I(i)$	N/A

Variable	Units	SC	GR	Rule	Description	Ref
TOTAL_P_D(p, d)	$	P	D		Total settlement amount (including GST and interest) for participant p in Trading Day d	(62)
SOMS_G_I(i)	MWh	G	I	11	Total Sent Out Generation in Trading Interval i	(61)
D(w)	{}	G	W0		Set of Trading Days in Trading Week w	I

4.2 Daily Aggregations

$$TOTAL\_P\_D(p, d) = NOINT\_P\_D(p, d) + NETINT\_P\_D(p, d) \tag{62}$$

$$\begin{aligned} NOINT\_P\_D(p, d) = {} & NETSA\_P\_D(p, d) + SFMFSA\_P\_D(p, d) \\ & + SFRFSA\_P\_D(p, d) + SFCFSA\_P\_D(p, d) + GST\_P\_D(p, d) \end{aligned} \tag{63}$$

Variable	Units	SC	GR	Rule	Description	Ref
TOTAL_P_D(p, d)	$	P	D		Total settlement amount (including GST and interest) for participant p in Trading Day d	(62)
NOINT_P_D(p, d)	$	P	D		Total settlement amount (including GST, excluding interest) for participant p in Trading Day d	(63)
NETINT_P_D(p, d)	$	P	D		Net interest paid/charged to participant p for Trading Day d	(412)
NETSA_P_D(p, d)	$	P	D	9.6.3	Net settlement amount for participant p in Trading Day d	(64)
SFMFSA_P_D(p, d)	$	P	D	9.13.2	Service Fee Settlement Amount paid to AEMO for Trading Day d	(403)
SFRFSA_P_D(p, d)	$	P	D	9.13.3	Service Fee Settlement Amount paid to the ERA for Trading Day d	(404)
SFCFSA_P_D(p, d)	$	P	D	9.13.4	Service Fee Settlement Amount paid to the Coordinator for Trading Day d	(405)
GST_P_D(p, d)	$	P	D		Net GST paid/charged to participant p for Trading Day d	(409)

4.2.1 Net Settlement Amount

These equations are based on the equations stated in MR 9.6.

$$\begin{aligned} NETSA\_P\_D(p, d) = {} & STEMSA\_P\_D(p, d) + RCSA\_P\_D(p, d) + RTESA\_P\_D(p, d) + ESSSA\_P\_D(p, d) \\ & + OCSA\_P\_D(p, d) + MPFSA\_P\_D(p, d) + DLASA\_P\_D(p, d) + MSCSA\_P\_D(p, d) \end{aligned} \tag{64}$$

Variable	Units	SC	GR	Rule	Description	Ref
NETSA_P_D(p, d)	$	P	D	9.6.3	Net settlement amount for participant p in Trading Day d	(64)
STEMSA_P_D(p, d)	$	P	D	9.7.2	Settlement amount for energy cleared in STEM for participant p in Trading Day d	(65)
RCSA_P_D(p, d)	$	P	D	9.8.2	Reserve Capacity settlement amount for participant p in Trading Day d	(290)
RTESA_P_D(p, d)	$	P	D	9.9.2	Real-Time Energy settlement amount for participant p in Trading Day d	(72)
ESSSA_P_D(p, d)	$	P	D	9.10.2	Essential System Services settlement amount for participant p in Trading Day d	(110)
OCSA_P_D(p, d)	$	P	D	9.11.2	Outage compensation settlement amount for participant p in Trading Day d	(95)
MPFSA_P_D(p, d)	$	P	D	9.12.2	Market Participant Fee Settlement Amount charged to participant p for Trading Day d	(397)
DLASA_P_D(p, d)	$	P	D	9.20.11(e)	Default Levy Adjustment settlement amount for participant p in Trading Day d	(406)
MSCSA_P_D(p, d)	$	P	D	9.11A.3	Market suspension compensation settlement amount for participant p in Trading Day d	(101)

4.3 STEM

$$STEMSA\_P\_D(p,d) = STEMSAS\_P\_D(p,d) - STEMSAD\_P\_D(p,d) \tag{65}$$

Variable	Units	SC	GR	Rule	Description	Ref
STEMSA_P_D(p, d)	$	P	D	9.7.2	Settlement amount for energy cleared in STEM for participant p in Trading Day d	(65)
STEMSAS_P_D(p, d)	$	P	D	9.7	Settlement amount for energy sold in STEM for participant p in Trading Day d	(66)
STEMSAD_P_D(p, d)	$	P	D	9.7	Settlement amount for energy purchased in STEM for participant p in Trading Day d	(67)

4.3.1 STEM Payments and Charges

These equations are based on the equations stated in 9.7. They have been modified to separate quantities into payments and charges.

$$STEMSAS\_P\_D(p,d) = \sum_{i \in I(d)} STEMSAS\_P\_I(p,i) \tag{66}$$

$$STEMSAD\_P\_D(p,d) = \sum_{i \in I(d)} STEMSAD\_P\_I(p,i) \tag{67}$$

$$STEMSAS\_P\_I(p,i) = \begin{cases} STEMP\_G\_I(i) \times STEMSQ\_P\_I(p,i) & SSF\_G\_D(i) = 1 \\ 0 & SSF\_G\_D(i) = 0 \end{cases} \tag{68}$$

$$STEMSAD\_P\_I(p,i) = \begin{cases} STEMP\_G\_I(i) \times STEMDQ\_P\_I(p,i) & SSF\_G\_D(i) = 1 \\ 0 & SSF\_G\_D(i) = 0 \end{cases} \tag{69}$$

$$STEMSQ\_P\_I(p,i) = max(0, STEMQ\_P\_I(p,i) \times SSF\_G\_D(i)) \tag{70}$$

$$STEMDQ\_P\_I(p,i) = -min(0, STEMQ\_P\_I(p,i) \times SSF\_G\_D(i)) \quad (71)$$

Variable	Units	SC	GR	Rule	Description	Ref
STEMSAS_P_D(p, d)	$	P	D	9.7	Settlement amount for energy sold in STEM for participant p in Trading Day d	(66)
STEMSAD_P_D(p, d)	$	P	D	9.7	Settlement amount for energy purchased in STEM for participant p in Trading Day d	(67)
STEMSAS_P_I(p, i)	$	P	I	9.7	Settlement amount for energy sold in STEM for participant p in Trading Interval i	(68)
STEMSAD_P_I(p, i)	$	P	I	9.7	Settlement amount for energy purchased in STEM for participant p in Trading Interval i	(69)
STEMSQ_P_I(p, i)	MWh	P	I	6.9.13(c)	Energy sold in STEM by participant p in Trading Interval i	(70)
STEMDQ_P_I(p, i)	MWh	P	I	6.9.13(b)	Energy bought in STEM by participant p in Trading Interval i	(71)
SSF_G_D(d)	Flag	G	D	6.21.1(a)	Flag that is 0 if STEM was suspended in Trading Day d, and 1 otherwise	I
STEMP_G_I(i)	$/MWh	G	I	6.21.1(b)	STEM Clearing Price declared for Trading Interval i	I
STEMQ_P_I(p, i)	MWh	P	I	6.21.1(c)	Energy purchased (sold) in STEM by participant p in Trading Interval i	I
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.4 Real-Time Energy

Real-Time Energy is split into the following parts:

- Energy payments and charges
- Energy Uplift payments and charges

$$RTESA\_P\_D(p,d) = ETSA\_P\_D(p,d) - ETDA\_P\_D(p,d) + EUP\_P\_D(p,d) - EUR\_P\_D(p,d) \quad (72)$$

Variable	Units	SC	GR	Rule	Description	Ref
RTESA_P_D(p, d)	$	P	D	9.9.2	Real-Time Energy settlement amount for participant p in Trading Day d	(72)
ETSA_P_D(p, d)	$	P	D		Energy trading amount for energy sold in the Real-Time Energy market for participant p for Trading Day d	(73)
ETDA_P_D(p, d)	$	P	D		Energy trading amount for energy purchased in the Real-Time Energy market for participant p for Trading Day d	(74)
EUP_P_D(p, d)	$	P	D		Energy uplift amount payable to participant p for Trading Day d	(81)
EUR_P_D(p, d)	$	P	D		Energy uplift recoverable amount for participant p for Trading Day d	(89)

4.4.1 Energy Payments and Charges

$$ETSA\_P\_D(p,d) = \sum_{i \in I(d)} ETSA\_P\_I(p,i) \quad (73)$$

$$ETDA\_P\_D(p,d) = \sum_{i \in I(d)} ETDA\_P\_I(p,i) \quad (74)$$

$$ETSA\_P\_I(p,i) = FRTP\_G\_I(i) \times NTSQ\_P\_I(p,i) \tag{75}$$

$$ETDA\_P\_I(p,i) = FRTP\_G\_I(i) \times NTDQ\_P\_I(p,i) \tag{76}$$

$$NTSQ\_P\_I(p,i) = max(0, NTQ\_P\_I(p,i)) \tag{77}$$

$$NTDQ\_P\_I(p,i) = -min(0, NTQ\_P\_I(p,i)) \tag{78}$$

$$NTQ\_P\_I(p,i) = \left(\sum_{f \in REG\_F(p,i)} MS\_F\_I(f,i) \right) + MSNDL\_P\_I(p,i) - NCP\_P\_I(p,i) \tag{79}$$

$$NCP\_P\_I(p,i) = NBP\_P\_I(p,i) - STEMDQ\_P\_I(p,i) + STEMSQ\_P\_I(p,i) \tag{80}$$

Variable	Units	SC	GR	Rule	Description	Ref
ETSA_P_D(p, d)	$	P	D		Energy trading amount for energy sold in the Real-Time Energy market for participant p for Trading Day d	(73)
ETDA_P_D(p, d)	$	P	D		Energy trading amount for energy purchased in the Real-Time Energy market for participant p for Trading Day d	(74)
ETSA_P_I(p, i)	$	P	I		Energy trading amount for energy sold in the Real-Time Energy market for participant p for Trading Interval i	(75)
ETDA_P_I(p, i)	$	P	I		Energy trading amount for energy purchased in the Real-Time Energy market for participant p for Trading Interval i	(76)
FRTP_G_I(i)	$/MWh	G	I	11	Final Reference Trading Price for Trading Interval i	I
NTSQ_P_I(p, i)	MWh	P	I		Quantity of energy sold in the Real-Time Energy market for participant p for Trading Interval i	(77)
NTDQ_P_I(p, i)	MWh	P	I		Quantity of energy purchased in the Real-Time Energy market for participant p for Trading Interval i	(78)
NTQ_P_I(p, i)	MWh	P	I	9.9.5	Net Trading Quantity for participant p for Trading Interval i	(79)
MS_F_I(f, i)	MWh	F	I	9.5.2, 9.5.3, 2.30B.10, 2.30B.11	Metered Schedule for Facility f in Trading Interval i	(31)
MSNDL_P_I(p, i)	MWh	P	I		Sum of all Non-Dispatchable Load Metered Schedules for Market Participant p in Trading Interval i	(59)
NCP_P_I(p, i)	MWh	P	I	6.9.13	Net Contract Position for participant p in Trading Interval i	(80)
NBP_P_I(p, i)	MWh	P	I	6.9.2	Net Bilateral Position for participant p in Trading Interval i	I
STEMSQ_P_I(p, i)	MWh	P	I	6.9.13(c)	Energy sold in STEM by participant p in Trading Interval i	(70)
STEMDQ_P_I(p, i)	MWh	P	I	6.9.13(b)	Energy bought in STEM by participant p in Trading Interval i	(71)
REG_F(d)	{}	G	D	11	Set of Registered Facilities in Trading Day d	(23)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.4.2 Energy Uplift Payments

Energy Uplift Payments are made to Market Participants in respect of their Registered Facilities when the marginal offer price at which they are cleared is greater than the Energy Market Clearing Price (defined at the Reference Node),

thereby leaving them out of pocket.

$$EUP\_P\_D(p,d) = \sum_{i \in I(d)} EUP\_P\_I(p,i) \tag{81}$$

$$EUP\_P\_I(p,i) = \sum_{f \in REG\_F(p,i)} EUP\_F\_I(f,i) \tag{82}$$

$$EUP\_F\_I(f,i) = \sum_{di \in DI(i)} EUP\_F\_DI(f,di) \tag{83}$$

$$EUP\_F\_DI(f,di) = MISPRICE\_F\_DI(f,di) \times UPLIFTP\_F\_DI(f,di) \times UPLIFTQ\_F\_DI(f,di) \tag{84}$$

$$MISPRICE\_F\_DI(f,di) = \begin{cases} 1 & \text{for} \Big(RTECQ\_F\_DI(f,di) > 0 \text{ and } CRENT\_F\_DI(f,di) > 0 \\ & \text{and } MOP\_F\_DI(f,di) > FEMCP\_G\_DI(di) \\ & \text{and } f \notin BDRR(di) \text{ and } f \notin BESSEM(di) \text{ and } f \notin BNCESS(di) \Big) \\ & \text{or } RTMSuspFlag\_G\_DI(di) = 1 \\ 0 & \text{otherwise} \end{cases} \tag{85}$$

$$UPLIFTP\_F\_DI(f,di) = max(0, MOP\_F\_DI(f,di) - FRTP\_G\_I(di)) \tag{86}$$

$$UPLIFTQ\_F\_DI(f,di) = max(0, MS\_F\_DI(f,di)) \tag{87}$$

$$MS\_F\_DI(f,di) = \begin{cases} \dfrac{SCADA\_F\_DI(f,di)}{SCADA\_F\_I(f,di)} \times MS\_F\_I(f,di) & \text{for } SCADA\_F\_I(f,di) \neq 0 \\ \dfrac{MS\_F\_I(f,di)}{6} & \text{otherwise} \end{cases} \tag{88}$$

Variable	Units	SC	GR	Rule	Description	Ref
EUP_P_D(p, d)	$	P	D		Energy uplift amount payable to participant p for Trading Day d	(81)
EUP_P_I(p, i)	$	P	I	9.9.6	Energy uplift amount payable to participant p for Trading Interval i	(82)
EUP_F_I(f, i)	$	F	I	9.9.7	Energy Uplift Payment for Facility f for Trading Interval i	(83)
EUP_F_DI(f, di)	$	F	DI	9.9.8	Energy Uplift Payment for Facility f for Dispatch Interval di	(84)
MISPRICE_F_DI(f, di)	Flag	F	DI	9.9.9	Mispricing trigger for Facility f in Dispatch Interval di	(85)
UPLIFTP_F_DI(f, di)	$/MWh	F	DI	9.9.10	Energy Uplift Price for Facility f in Dispatch Interval di	(86)
UPLIFTQ_F_DI(f, di)	MWh	F	DI	9.9.11	Energy Uplift Quantity for Facility f in Dispatch Interval di	(87)
BDRR(di)	{}	G	DI	9.9.9(e), 7.2.4(c)	Set of Registered Facilities whose EOI Quantity is higher than it would have been otherwise as a result of a binding ramp rate constraint applied in Dispatch Interval di	I

Variable	Units	SC	GR	Rule	Description	Ref
BESSEM(di)	{}	G	DI	9.9.9(f), 7.8.5(b)(i)	Set of Registered Facilities whose EOI Quantity is constrained to its Enablement Minimum value as a result of a binding Essential System Service Minimum constraint applied in Dispatch Interval di	I
BNCESS(di)	{}	G	DI	9.9.9(g), 5.9.1(b)	Set of Registered Facilities whose EOI Quantity is higher than it otherwise would have been as a result of a binding Constraint Equation relating to an NCESS Contract in Dispatch Interval di	I
CRENT_F_DI(f, di)	$/MW	F	DI	7.13.1EA(b)	Congestion Rental for Facility f in Dispatch Interval di	I
DI(i)	{}	G	I		Set of Dispatch Intervals in Trading Interval i	I
FEMCP_G_DI(di)	$/MWh	G	DI	11	Final Energy Market Clearing Price for Dispatch Interval di	I
FRTP_G_I(i)	$/MWh	G	I	11	Final Reference Trading Price for Trading Interval i	I
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I
MOP_F_DI(f, di)	$/MWh	F	DI	9.9.9(c)	Marginal Offer Price for Facility f in Dispatch Interval di	I
MS_F_DI(f, di)	MWh	F	DI	9.9.12	Estimated of Injection or Withdrawal MWh for Facility f in Dispatch Interval di	(88)
MS_F_I(f, i)	MWh	F	I	9.5.2, 9.5.3, 2.30B.10, 2.30B.11	Metered Schedule for Facility f in Trading Interval i	(31)
REG_F(d)	{}	G	D	11	Set of Registered Facilities in Trading Day d	(23)
RTECQ_F_DI(f, di)	MWh	F	DI	9.9.9(a)	Cleared Real-Time Energy Quantity for Facility f in Dispatch Interval di	I
RTMSuspFlag_G_DI(di)	Flag	G	DI	9.9.8(a)	Flag that is 1 if the Real-Time Market was suspended in Dispatch Interval di, and 0 otherwise	I
SCADA_F_I(f, i)	MWh	F	I	9.9.13	Net generation measured by SCADA for Facility f in Trading Interval i, non-loss adjusted	I
SCADA_F_DI(f, di)	MWh	F	DI	7.13.1E(a)i	Net generation measured by SCADA for Facility f in Dispatch Interval di, non-loss adjusted	I

4.4.3 Energy Uplift Charges (Recoverable)

The cost of Energy Uplift Payments is allocated according to Consumption Share.

$$EUR\_P\_D(p,d) = \sum_{i \in I(d)} EUR\_P\_I(p,i) \tag{89}$$

$$EUR\_P\_I(p,i) = EUR\_G\_I(i) \times CS\_P\_I(p,i) \tag{90}$$

$$EUR\_G\_I(i) = \sum_{p \in MP(i)} EUP\_P\_I(p,i) \tag{91}$$

Variable	Units	SC	GR	Rule	Description	Ref
EUR_P_D(p, d)	$	P	D		Energy uplift recoverable amount for participant p for Trading Day d	(89)
EUR_P_I(p, i)	$	P	I	9.9.15	Energy uplift recoverable for participant p for Trading Interval i	(90)
EUR_G_I(i)	$	G	I	9.9.14	Total energy uplift recoverable amount for Trading Interval i	(91)
EUP_P_I(p, i)	$	P	I	9.9.6	Energy uplift amount payable to participant p for Trading Interval i	(82)
CS_P_I(p, i)		P	I	9.5.6	Consumption share of participant p in Trading Interval i	(92)
MP(d)	{}	G	D	11	Set of Market Participants in Trading Day d	(8)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.4.4 Consumption Share

$$CS\_P\_I(p,i) = \begin{cases} \dfrac{CCQ\_P\_I(p,i)}{CCQ\_G\_I(i)} & \text{for } CCQ\_G\_I \neq 0 \\ 0 & \text{for } CCQ\_G\_I = 0 \end{cases} \tag{92}$$

$$CCQ\_G\_I(i) = \sum_{p \in MP(i)} CCQ\_P\_I(p,i) \tag{93}$$

$$CCQ\_P\_I(p,i) = CCQNDL\_P\_I(p,i) + \sum_{f \in REG\_F(p,i)} min(0, MS\_F\_I(f,i)) \tag{94}$$

Variable	Units	SC	GR	Rule	Description	Ref
CS_P_I(p, i)		P	I	9.5.6	Consumption share of participant p in Trading Interval i	(92)
CCQ_P_I(p, i)	MWh	P	I	9.5.7	Consumption Contributing Quantity for participant p in Trading Interval i	(94)
CCQ_G_I(i)	MWh	G	I	9.5.8	Sum of all Consumption Contributing Quantities for Trading Interval i	(94)
MS_F_I(f, i)	MWh	F	I	9.5.2, 9.5.3, 2.30B.10, 2.30B.11	Metered Schedule for Facility f in Trading Interval i	(31)
CCQNDL_P_I(p, i)	MWh	P	I		Sum of all Non-Dispatchable Load Metered Schedules that are negative for participant p in Trading Interval i	(57)
REG_F(d)	{}	G	D	11	Set of Registered Facilities in Trading Day d	(23)
MP(d)	{}	G	D	11	Set of Market Participants in Trading Day d	(8)

4.5 Changed Outage Compensation

Changed Outage Compensation is split into two parts:

- Compensation paid to a Market Participant to cover the costs of a changed outage.
- Charge to Market Participants to recover the cost of outage compensation.

These equations are based on the equations stated in MR 9.11.

$$OCSA\_P\_D(p,d) = OCP\_P\_D(p,d) - OCR\_P\_D(p,d) \tag{95}$$

Variable	Units	SC	GR	Rule	Description	Ref
OCSA_P_D(p, d)	$	P	D	9.11.2	Outage compensation settlement amount for participant p in Trading Day d	(95)
OCP_P_D(p, d)	$	P	D	9.11.3	Outage compensation payment for participant p in Trading Day d	(96)
OCR_P_D(p, d)	$	P	D	9.11.6	Charge to fund outage compensation, for participant p in Trading Day d	(98)

4.5.1 Outage Compensation Payments

$$OCP\_P\_D(p,d) = \sum_{i \in I(d)} OCP\_P\_I(p,i) \tag{96}$$

$$OCP\_P\_I(p,i) = \sum_{f \in REG\_F(p,i)} OCP\_F\_I(f,i) \tag{97}$$

Variable	Units	SC	GR	Rule	Description	Ref
OCP_P_D(p, d)	$	P	D	9.11.3	Outage compensation payment for participant p in Trading Day d	(96)
OCP_P_I(p, i)	$	P	I	9.11.4	Outage compensation payment for participant p in Trading Interval i	(97)
OCP_F_I(f, i)	$	F	I	3.18H.5(a)	Outage compensation payment for Facility f for Trading Interval i	I
REG_F(d)	{}	G	D	11	Set of Registered Facilities in Trading Day d	(23)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.5.2 Outage Compensation Charges (Recoverable)

$$OCR\_P\_D(p,d) = \sum_{i \in I(d)} OCR\_P\_I(p,i) \tag{98}$$

$$OCR\_P\_I(p,i) = OCP\_G\_I(i) \times CS\_P\_I(p,i) \tag{99}$$

$$OCP\_G\_I(i) = \sum_{p \in MP(i)} OCP\_P\_I(p,i) \tag{100}$$

Variable	Units	SC	GR	Rule	Description	Ref
OCR_P_D(p, d)	$	P	D	9.11.6	Charge to fund outage compensation, for participant p in Trading Day d	(98)
OCR_P_I(p, i)	$	P	I	9.11.7	Charge to fund outage compensation, for participant p in Trading Interval i	(99)
OCP_G_I(i)	$	G	I	9.11.5	Sum of all outage compensation payments for Trading Interval i	(100)
OCP_P_I(p, i)	$	P	I	9.11.4	Outage compensation payment for participant p in Trading Interval i	(97)
CS_P_I(p, i)		P	I	9.5.6	Consumption share of participant p in Trading Interval i	(92)
MP(d)	{}	G	D	11	Set of Market Participants in Trading Day d	(8)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.6 RTM Suspension Compensation

Real-Time Market Suspension Compensation is split into the following parts:

- Market Participant Deficit Amount paid to a Market Participant to cover a shortfall during a suspension.
- Charge to Market Participants to recover the cost of a Market Suspension Deficit Amount.
- Charge to a Market Participant to recover a Market Participant Excess Amount.
- Market Suspension Excess Amount paid to Market Participants to redistribute the excess paid during a suspension.

These equations are based on the equations stated in MR 9.11A.

$$\begin{aligned} MSCSA\_P\_D(p,d) = MPDA\_P\_D(p,d) - MPEA\_P\_D(p,d) \\ - MSDAcharge\_P\_D(p,d) + MSEArebate\_P\_D(p,d) \end{aligned} \tag{101}$$

Variable	Units	SC	GR	Rule	Description	Ref
MSCSA_P_D(p, d)	$	P	D	9.11A.3	Market suspension compensation settlement amount for participant p in Trading Day d	(101)
MPDA_P_D(p, d)	$	P	D	9.11A.4	Market Participant Deficit Amount payable to participant p in Trading Day d	(102)
MPEA_P_D(p, d)	$	P	D	9.11A.5	Market Participant Excess Amount recoverable from participant p in Trading Day d	(106)
MSDAcharge_P_D(p, d)	$	P	D	9.11A.6	Market suspension deficit amount recoverable from participant p in Trading Day d	(107)
MSEArebate_P_D(p, d)	$	P	D	9.11A.9	Market suspension excess amount payable to participant p in Trading Day d	(103)

4.6.1 RTM Suspension Compensation Payments

$$MPDA\_P\_D(p,d) = \sum_{i \in I(d)} MPDA\_P\_I(p,i) \tag{102}$$

$$MSEArebate\_P\_D(p,d) = \sum_{i \in I(d)} MSEArebate\_P\_I(p,i) \tag{103}$$

$$MSEArebate\_P\_I(p,i) = MSEA\_G\_I(i) \times CS\_P\_I(p,i) \tag{104}$$

$$MSEA\_G\_I(i) = \sum_{p \in MP(i)} MPEA\_P\_I(p,i) \tag{105}$$

Variable	Units	SC	GR	Rule	Description	Ref
MPDA_P_D(p, d)	$	P	D	9.11A.4	Market Participant Deficit Amount payable to participant p in Trading Day d	(102)
MSEArebate_P_D(p, d)	$	P	D	9.11A.9	Market suspension excess amount payable to participant p in Trading Day d	(103)
MSEArebate_P_I(p, i)	$	P	I	9.11A.10	Market suspension excess amount payable to participant p in Trading Interval i	(104)

Variable	Units	SC	GR	Rule	Description	Ref
CS_P_I(p, i)		P	I	9.5.6	Consumption share of participant p in Trading Interval i	(92)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I
MP(d)	{}	G	D	11	Set of Market Participants in Trading Day d	(8)
MPDA_P_I(p, i)	$	P	D	7.11B.1AC(f)	Market Participant Deficit Amount payable to participant p in Trading Interval i	I
MPEA_P_I(p, i)	$	P	I	7.11B.1AB(b)	Market Participant Excess Amount recoverable from participant p in Trading Interval i	I
MSEA_G_I(i)	$	G	I	9.11A.11	Market suspension excess amount recoverable in Trading Interval i	(105)

4.6.2 RTM Suspension Compensation Charges (Recoverable)

$$MPEA\_P\_D(p,d) = \sum_{i \in I(d)} MPEA\_P\_I(p,i) \tag{106}$$

$$MSDAcharge\_P\_D(p,d) = \sum_{i \in I(d)} MSDAcharge\_P\_I(p,i) \tag{107}$$

$$MSDAcharge\_P\_I(p,i) = MSDA\_G\_I(i) \times CS\_P\_I(p,i) \tag{108}$$

$$MSDA\_G\_I(i) = \sum_{p \in MP(i)} MPDA\_P\_I(p,i) \tag{109}$$

Variable	Units	SC	GR	Rule	Description	Ref
MPEA_P_D(p, d)	$	P	D	9.11A.5	Market Participant Excess Amount recoverable from participant p in Trading Day d	(106)
MSDAcharge_P_D(p, d)	$	P	D	9.11A.6	Market suspension deficit amount recoverable from participant p in Trading Day d	(107)
MSDAcharge_P_I(p, i)	$	P	I	9.11A.7	Market suspension deficit amount recoverable from participant p in Trading Interval i	(108)
MSDA_G_I(i)	$	G	I	9.11A.8	Market suspension deficit amount recoverable in Trading Interval i	(109)
CS_P_I(p, i)		P	I	9.5.6	Consumption share of participant p in Trading Interval i	(92)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I
MP(d)	{}	G	D	11	Set of Market Participants in Trading Day d	(8)
MPDA_P_I(p, i)	$	P	D	7.11B.1AC(f)	Market Participant Deficit Amount payable to participant p in Trading Interval i	I
MPEA_P_I(p, i)	$	P	I	7.11B.1AB(b)	Market Participant Excess Amount recoverable from participant p in Trading Interval i	I

4.7 Essential System Services

Essential System Services (ESS) encompasses all of Frequency Co-optimised Essential System Services (FCESS) and Non-Co-optimised Essential System Services (NCESS).

Essential System Services is split into the following parts:

- Contingency Raise payments, including SESSM Award payments and refunds
- Contingency Raise charges, including runway share
- Contingency Lower payments and charges
- RoCoF Control Service payments and charges, including Minimum RoCoF Requirement and Additional RoCoF Requirement
- Regulation Raise payments and charges
- Regulation Lower payments and charges
- Regulation Share
- System Restart Service payments and charges
- NCESS payments and charges
- FCESS Uplift payments, including Enablement Losses and FCESS Uplift shares

$$ESSSA\_P\_D(p,d) = ESSpayment\_P\_D(p,d) - ESScharge\_P\_D(p,d) \tag{110}$$

$$\begin{aligned} ESSpayment\_P\_D(p,d) = {} & CRpayment\_P\_D(p,d) + CLpayment\_P\_D(p,d) + RoCoFpayment\_P\_D(p,d) \\ & + RRpayment\_P\_D(p,d) + RLpayment\_P\_D(p,d) + SRSpayment\_P\_D(p,d) \\ & + NCESSpayment\_P\_D(p,d) + FCESSUpayment\_P\_D(p,d) \end{aligned} \tag{111}$$

$$\begin{aligned} ESScharge\_P\_D(p,d) = {} & CRcharge\_P\_D(p,d) + CLcharge\_P\_D(p,d) + RoCoFcharge\_P\_D(p,d) \\ & + RRcharge\_P\_D(p,d) + RLcharge\_P\_D(p,d) \\ & + SRScharge\_P\_D(p,d) + NCESScharge\_P\_D(p,d) \end{aligned} \tag{112}$$

Variable	Units	SC	GR	Rule	Description	Ref
ESSSA_P_D(p, d)	$	P	D	9.10.2	Essential System Services settlement amount for participant p in Trading Day d	(110)
ESSpayment_P_D(p, d)	$	P	D	9.10.3	Essential System Service amount payable to participant p for Trading Day d	(111)
ESScharge_P_D(p, d)	$	P	D	9.10.28	Essential System Service amount recoverable from participant p for Trading Day d	(112)
CRpayment_P_D(p, d)	$	P	D	9.10.4	Contingency Reserve Raise amount payable to participant p for Trading Day d	(113)
CLpayment_P_D(p, d)	$	P	D	9.10.8	Contingency Reserve Lower amount payable to participant p for Trading Day d	(175)
RoCoFpayment_P_D(p, d)	$	P	D	9.10.12	RoCoF Control Service amount payable to participant p for Trading Day d	(188)
RRpayment_P_D(p, d)	$	P	D		Regulation Raise amount payable to participant p for Trading Day d	(224)
RLpayment_P_D(p, d)	$	P	D		Regulation Lower amount payable to participant p for Trading Day d	(240)
SRSpayment_P_D(p, d)	$	P	D	9.10.25	System Restart Service amount payable to participant p for Trading Day d	(253)
NCESSpayment_P_D(p, d)	$	P	D	9.10.27A	NCESS amount payable to participant p for Trading Day d	(258)
FCESSUpayment_P_D(p, d)	$	P	D	9.10.27E	FCESS Uplift Payment amount payable to participant p for Trading Day d	(264)
CRcharge_P_D(p, d)	$	P	D	9.10.29	Contingency Reserve Raise amount recoverable from participant p for Trading Day d	(136)

Variable	Units	SC	GR	Rule	Description	Ref
CLcharge_P_D(p, d)	$	P	D	9.10.31	Contingency Reserve Lower amount recoverable from participant p for Trading Day d	(183)
RoCoFcharge_P_D(p, d)	$	P	D	9.10.33	RoCoF Control Service amount recoverable from participant p for Trading Day d	(196)
RRcharge_P_D(p, d)	$	P	D		Regulation Raise amount recoverable from participant p for Trading Day d	(232)
RLcharge_P_D(p, d)	$	P	D		Regulation Lower amount recoverable from participant p for Trading Day d	(248)
SRScharge_P_D(p, d)	$	P	D	9.10.40	System Restart Service amount recoverable from participant p for Trading Day d	(255)
NCESScharge_P_D(p, d)	$	P	D	9.10.44	NCESS amount recoverable from participant p for Trading Day d	(261)

4.7.1 Contingency Raise Payments

$$CRpayment\_P\_D(p,d) = \sum_{i \in I(d)} CRpayment\_P\_I(p,i) \tag{113}$$

$$CRpayment\_P\_I(p,i) = \sum_{f \in REG\_F(p,i)} CRpayment\_F\_I(f,i) \tag{114}$$

$$CRpayment\_F\_I(f,i) = \sum_{di \in DI(i)} CRpayment\_F\_DI(f,di) \tag{115}$$

$$CRpayment\_F\_DI(f,di) = CRenablement\_F\_DI(f,di) + CRavailability\_F\_DI(f,di) - CRrefund\_F\_DI(f,di) \tag{116}$$

$$CRenablement\_F\_DI(f,di) = \frac{5}{60} h \times FCRprice\_G\_DI(di) \times CRquantity\_F\_DI(f,di) \times FPFCR\_F\_DI(f,di) \tag{117}$$

$$CRquantity\_F\_DI(f,di) = \begin{cases} ESSEQCR\_F\_DI(f,di) & \text{for } CRestFlag\_F\_DI(f,di) = 0 \\ ESSEQCRest\_F\_DI(f,di) & \text{for } CRestFlag\_F\_DI(f,di) = 1 \end{cases} \tag{118}$$

$$CRavailability\_F\_DI(f,di) = \sum_{sa \in ACR(f,di)} AP\_SA\_DI(sa,di) \tag{119}$$

$$CRrefund\_F\_DI(f,di) = \sum_{sa \in ACR(f,di)} Refund\_SA\_DI(sa,di) \tag{120}$$

Variable	Units	SC	GR	Rule	Description	Ref
CRpayment_P_D(p, d)	$	P	D	9.10.4	Contingency Reserve Raise amount payable to participant p for Trading Day d	(113)
CRpayment_P_I(p, i)	$	P	I		Contingency Reserve Raise amount payable to participant p for Trading Interval i	(114)
CRpayment_F_I(f, i)	$	F	I	9.10.5	Contingency Reserve Raise amount payable to Facility f for Trading Interval i	(115)

Variable	Units	SC	GR	Rule	Description	Ref
CRpayment_F_DI(f, di)	$	F	DI	9.10.6	Contingency Reserve Raise amount payable to Facility f for Dispatch Interval di	(116)
CRenablement_F_DI(f, di)	$	F	DI		Contingency Reserve Raise amount payable for enablement to Facility f for Dispatch Interval di	(117)
CRavailability_F_DI(f, di)	$	F	DI	App 2C 2.8(a)iii	Contingency Reserve Raise amount payable for availability to Facility f for Dispatch Interval di	(119)
AP_SA_DI(sa, di)	$	SA	DI	App 2C 2.2(c)	SESSM Availability Payment under SESSM Award sa in Dispatch Interval di	(121)
Refund_SA_DI(sa, di)	$	SA	DI	App 2C 2.6	SESSM refund under SESSM Award sa in Dispatch Interval di	(122)
CRrefund_F_DI(f, di)	$	F	DI	App 2C 2.8(b)iii	Facility SESSM Refund for Contingency Reserve Raise for Facility f for Dispatch Interval di	(120)
FCRprice_G_DI(di)	$/MW/h	G	DI	11	Final Contingency Reserve Raise Market Clearing Price for Dispatch Interval di	I
CRquantity_F_DI(f, di)	MW	F	DI	9.10.6(c)	Contingency Reserve Raise enablement quantity for Facility f for Dispatch Interval di	(118)
CRestFlag_F_DI(f, di)	Flag	F	DI	9.10.6(c)ii	Flag that is 1 when AEMO's reasonable estimate of Facility f's ability to provide Contingency Reserve Raise in Dispatch Interval di is used, and 0 otherwise	I
ESSEQCR_F_DI(f, di)	MW	F	DI	9.10.6(c)i	Essential System Service Enablement Quantity for Contingency Reserve Raise for Facility f for Dispatch Interval di	I
ESSEQCRest_F_DI(f, di)	MW	F	DI	9.10.6(c)ii	AEMO's estimate of capability of Facility f to provide Contingency Reserve Raise for Dispatch Interval di	I
FPFCR_F_DI(f, di)		F	DI	9.10.6(d)	Facility Performance Factor for Contingency Reserve Raise for Facility f for Dispatch Interval di	I
REG_F(d)	{}	G	D	11	Set of Registered Facilities in Trading Day d	(23)
ACR(d)	{}	G	D		Set of SESSM Awards for Contingency Reserve Raise on Trading Day d	I
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I
DI(i)	{}	G	I		Set of Dispatch Intervals in Trading Interval i	I

4.7.1.1 SESSM Award Availability Payments

A SESSM Award is granted to a Market Participant in relation to a Facility to provide a specific FCESS.

In the first three years of operation of the market, a SESSM Award Duration is restricted to a maximum of 1 year and a maximum of 3 years thereafter.

A SESSM Award Duration is Trading Day based but may not align with a Trading Week or a Trading Month or a Capacity Year. A SESSM Award Duration is represented in the formulas as a Trading Day range, where the function $SArange(sa)$ is used to return the full time range of the relevant SESSM Award i.e. from Trading Day, to Trading Day.

$$AP\_SA\_DI(sa, di) = \begin{cases} PDIAP\_SA\_X(sa, SArange(sa)) & AQ\_SA\_DI(sa, di) > 0 \\ 0 & \text{otherwise} \end{cases} \quad (121)$$

Variable	Units	SC	GR	Rule	Description	Ref
AP_SA_DI(sa, di)	$	SA	DI	App 2C 2.2(c)	SESSM Availability Payment under SESSM Award sa in Dispatch Interval di	(121)
AQ_SA_DI(sa, di)	MW or MWs	SA	DI	11	SESSM Availability Quantity for SESSM Award sa in Dispatch Interval di	I
PDIAP_SA_X(sa, x)	$	SA	X	App 2C 2.2(c)i	Per-Dispatch Interval Availability Payment for SESSM Award sa for SESSM Award Duration x	I

4.7.1.2 SESSM Award Refunds

$$Refund\_SA\_DI(sa,di) = \begin{cases} 0 & \text{if } isRefundExempt\_SA\_DI(sa,di)=1 \text{ or } RTMSuspFlag\_G\_DI(di)=1 \\ min(AP\_SA\_DI(sa,di) \times RefundFactor\_G\_D(di) \times Shortfall\_SA\_DI(sa,di), & \text{otherwise} \\ \quad PaymentCap\_SA\_X(sa,SArange(sa)) - CumRefund\_SA\_DI(sa,di)) & \end{cases} \quad (122)$$

$$RefundFactor\_G\_D(d) = 3 \quad (123)$$

$$CumRefund\_SA\_DI(sa,di) = CumRefundStart\_SA\_D(sa,di) + \sum_{j \in PDITD(di)} Refund\_SA\_DI(sa,j) \quad (124)$$

$$Shortfall\_SA\_DI(sa,di) = \begin{cases} max\left(0, \frac{AQ\_SA\_DI(sa,di) - max(0, Offer\_FE\_DI(SA2FE(sa),DI) - BaseQuantity\_SA\_DI(sa,di))}{AQ\_SA\_DI(sa,di)}\right) & \text{if } AQ\_SA\_DI(sa,di) \neq 0 \\ 0 & \text{otherwise} \end{cases} \quad (125)$$

$$PaymentCap\_SA\_X(sa,SArange(sa)) = \sum_{di \in SESSMDI(sa)} AP\_SA\_DI(sa,di) \quad (126)$$

Variable	Units	SC	GR	Rule	Description	Ref
Refund_SA_DI(sa, di)	$	SA	DI	App 2C 2.6	SESSM refund under SESSM Award sa in Dispatch Interval di	(122)
AP_SA_DI(sa, di)	$	SA	DI	App 2C 2.2(c)	SESSM Availability Payment under SESSM Award sa in Dispatch Interval di	(121)
RefundFactor_G_D(d)		G	D	App 2C 2.6(e)	SESSM refund factor in Trading Day d	(123)
isRefundExempt_SA_DI(sa, di)	Flag	SA	DI		Flag that is 1 when SESSM Award sa is not subject to refunds in Dispatch Interval di, and 0 otherwise	(127)
Shortfall_SA_DI(sa, di)	MW or MWs	SA	DI	App 2C 2.7	SESSM shortfall for SESSM Award sa in Dispatch Interval di	(125)
PaymentCap_SA_X(sa, x)	$	SA	X	App 2C 2.3(c)	Total SESSM Availability payments that would be made over the SESSM Service Timing if it met its SESSM Availability Requirement under SESSM Award sa for SESSM Award Duration x	(126)
CumRefund_SA_DI(sa, di)	$	SA	DI		Cumulative SESSM refunds under SESSM Award sa up to, but excluding, Dispatch Interval di	(124)

Variable	Units	SC	GR	Rule	Description	Ref
CumRefundStart_SA_D(sa, d)	$	SA	D		Cumulative SESSM refunds under SESSM Award sa prior to Trading Day d	I
AQ_SA_DI(sa, di)	MW or MWs	SA	DI	11	SESSM Availability Quantity for SESSM Award sa in Dispatch Interval di	I
Offer_FE_DI(f, e, di)	MW or MWs	FE	DI	App 2C 2.4(a)	Sum of quantities offered (or AEMO's reasonable estimate of) by Facility f, for Essential System Service e in Dispatch Interval di	I
BaseQuantity_SA_DI(sa, di)	MW or MWs	SA	DI	11	Base ESS Quantity for SESSM Award sa in Dispatch Interval di	I
SESSMDI(sa)	{}	SA	X	App 2C 2.3(c)i	Set of all Dispatch Intervals in the SESSM Service Timing for SESSM Award sa	I
PDITD(di)	{}	G	DI		Set of Dispatch Intervals in the same Trading Day as, but prior to, Dispatch Interval di	I

4.7.1.3 SESSM Award Refund Exempt

$$isRefundExempt\_SA\_DI(sa,di) = \begin{cases} 1 & \text{if } isSufficientlyAvailable\_SA\_DI(sa,di) + isAtRefundCap\_SA\_DI(sa,di) + isNotObliged\_SA\_DI(sa,di) > 0 \\ 0 & \text{otherwise} \end{cases} \tag{127}$$

$$isNotObliged\_SA\_DI(sa,di) = \begin{cases} 1 & AQ\_SA\_DI(sa,di) = 0 \\ 0 & \text{otherwise} \end{cases} \tag{128}$$

$$isAtRefundCap\_SA\_DI(sa,di) = \begin{cases} 1 & CumRefund\_SA\_DI(sa,di) \geq PaymentCap\_SA\_X(sa, SArange(sa)) \\ 0 & \text{otherwise} \end{cases} \tag{129}$$

$$isSufficientlyAvailable\_SA\_DI(sa,di) = \begin{cases} 1 & OutageCount\_SA\_DI(sa,di) \leq MaxUnavailability\_SA\_X(sa, SArange(sa)) \\ 0 & \text{otherwise} \end{cases} \tag{130}$$

$$isAvailable\_SA\_DI(sa,di) = \begin{cases} 1 & \text{if } Offer\_FE\_DI(SA2FE(sa),di) \geq (BaseQuantity\_SA\_DI(sa,di) + AQ\_SA\_DI(sa,di)) \\ & \text{or } AQ\_SA\_DI(sa,di) = 0 \\ 0 & otherwise \end{cases} \tag{131}$$

$$OutageCount\_SA\_DI(sa,di) = \sum_{j \in SESSMDI(sa), j \leq di} (1 - isAvailable\_SA\_DI(sa,j)) \tag{132}$$

$$MaxUnavailability\_SA\_X(sa, SArange(sa)) = floor(N\_SA\_X(sa, SArange(sa)) \times (1 - MinAvailability\_SA\_X(sa, SArange(sa)))) \tag{133}$$

$$N\_SA\_X(sa, SArange(sa)) = \sum_{di \in SESSMDI(sa)} isAQpositive\_SA\_DI(sa,di) \tag{134}$$

$$isAQpositive\_SA\_DI(sa,di) = \begin{cases} 1 & \text{for } AQ\_SA\_DI(sa,di) > 0 \\ 0 & \text{otherwise} \end{cases} \tag{135}$$

Variable	Units	SC	GR	Rule	Description	Ref
isRefundExempt_SA_DI(sa, di)	Flag	SA	DI		Flag that is 1 when SESSM Award sa is not subject to refunds in Dispatch Interval di, and 0 otherwise	(127)
isSufficientlyAvailable_SA_DI(sa, di)	Flag	SA	DI		Flag that is 1 when SESSM Award sa has been sufficiently available up to and including Dispatch Interval di, and 0 otherwise	(130)
isAtRefundCap_SA_DI(sa, di)	Flag	SA	DI		Flag that is 1 when SESSM Award sa has reached its payment cap by Dispatch Interval di, and 0 otherwise	(129)
isNotObliged_SA_DI(sa, di)	Flag	SA	DI		Flag that is 1 when SESSM Award sa is not obliged to provide a service in Dispatch Interval di, and 0 otherwise	(128)
OutageCount_SA_DI(sa, di)		SA	DI	App 2C 2.5	Number of Dispatch Intervals that the Facility has been unavailable for under SESSM Award sa, up to and including Dispatch Interval di	(132)
MaxUnavailability_SA_X(sa, x)		SA	X	App 2C 2.3(b)	Number of Dispatch Intervals for which the relevant Facility may be unavailable under SESSM Award sa for SESSM Award Duration x	(133)
MinAvailability_SA_X(sa, x)		SA	X	11	SESSM Availability Requirement for SESSM Award sa for SESSM Award Duration x	I
isAvailable_SA_DI(sa, di)	Flag	SA	DI	App 2C 2.5(a)	Flag that is 1 when the Facility associated with SESSM Award sa was available in respect of its obligations under SESSM Award sa to provide the relevant Frequency Co-optimised Essential System Service in Dispatch Interval di, and 0 otherwise	(131)
BaseQuantity_SA_DI(sa, di)	MW or MWs	SA	DI	11	Base ESS Quantity for SESSM Award sa in Dispatch Interval di	I
N_SA_X(sa, x)		SA	X	App 2C 2.3(a)	Number of Dispatch Intervals with a positive SESSM Availability Quantity for SESSM Award sa for SESSM Award Duration x	(134)
isAQpositive_SA_DI(sa, di)	Flag	SA	DI		Flag that is 1 when SESSM Availability Quantity is positive for SESSM Award sa in Dispatch Interval di, and 0 otherwise	(135)
AQ_SA_DI(sa, di)	MW or MWs	SA	DI	11	SESSM Availability Quantity for SESSM Award sa in Dispatch Interval di	I
PaymentCap_SA_X(sa, x)	$	SA	X	App 2C 2.3(c)	Total SESSM Availability payments that would be made over the SESSM Service Timing if it met its SESSM Availability Requirement under SESSM Award sa for SESSM Award Duration x	(126)
CumRefund_SA_DI(sa, di)	$	SA	DI		Cumulative SESSM refunds under SESSM Award sa up to, but excluding, Dispatch Interval di	(124)
SESSMDI(sa)	{}	SA	X	App 2C 2.3(c)i	Set of all Dispatch Intervals in the SESSM Service Timing for SESSM Award sa	I

4.7.2 Contingency Raise Charges (Recoverable)

$$CRcharge\_P\_D(p,d) = \sum_{i \in I(d)} CRcharge\_P\_I(p,i) \tag{136}$$

$$CRcharge\_P\_I(p,i) = \sum_{di \in DI(i)} CRcharge\_P\_DI(p,di) \tag{137}$$

$$CRcharge\_P\_DI(p,di) = \begin{cases} RTMSuspShare\_P\_DI(p,di) \times CRpayment\_G\_DI(di) & \text{if } RTMSuspFlag\_G\_DI(di) = 1 \\ TRS\_P\_DI(p,di) \times CRpayment\_G\_DI(di) & \text{otherwise} \end{cases} \tag{138}$$

$$CRpayment\_G\_DI(di) = \sum_{f \in REG\_F(di)} CRpayment\_F\_DI(f,di) + \sum_{f \in REG\_F(di)} FCESSUShareCR\_F\_DI(f,di) \tag{139}$$

Variable	Units	SC	GR	Rule	Description	Ref
CRcharge_P_D(p, d)	$	P	D	9.10.29	Contingency Reserve Raise amount recoverable from participant p for Trading Day d	(136)
CRcharge_P_I(p, i)	$	P	I	9.10.30	Contingency Reserve Raise amount recoverable from participant p for Trading Interval i	(137)
CRcharge_P_DI(p, di)	$	P	DI		Contingency Reserve Raise amount recoverable from participant p for Dispatch Interval di	(138)
CRpayment_G_DI(di)	$	G	DI	9.10.7	Contingency Reserve Raise amount payable for Dispatch Interval di	(139)
CRpayment_F_DI(f, di)	$	F	DI	9.10.6	Contingency Reserve Raise amount payable to Facility f for Dispatch Interval di	(116)
RTMSuspShare_P_DI(p, di)		P	I	9.10.30A	Real-Time Market suspension share for participant p in Dispatch Interval di	(171)
TRS_P_DI(p, di)		P	DI	App 2A 5.3	Total runway share for participant p in Dispatch Interval di	(140)
FCESSUShareCR_F_DI(f, di)	$	F	DI	9.10.3K	Share of FCESS Uplift Payments to be allocated to Contingency Reserve Raise for Facility f for Dispatch Interval di	(285)
REG_F(d)	{}	G	D	11	Set of Registered Facilities in Trading Day d	(23)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I
DI(i)	{}	G	I		Set of Dispatch Intervals in Trading Interval i	I

4.7.2.1 Total Runway Share

$$TRS\_P\_DI(p,di) = FShare\_P\_DI(p,di) + NShare\_P\_DI(p,di) \tag{140}$$

$$FShare\_P\_DI(p,di) = \sum_{f \in AF\_DI(p,di)} FShare\_F\_DI(f,di) \tag{141}$$

$$FShare\_F\_DI(f,di) = FShare\_G\_DI(di) \times FRS\_F\_DI(f,di) \tag{142}$$

$$FShare\_G\_DI(di) = 1 - NShare\_G\_DI(di) \tag{143}$$

$$NShare\_G\_DI(di) = \begin{cases} \frac{max(0, LNR\_G\_DI(di) - LFR\_G\_DI(di))}{LNR\_G\_DI(di)} & \text{for } LNR\_G\_DI(di) \neq 0 \\ 0 & \text{for } LNR\_G\_DI(di) = 0 \end{cases} \tag{144}$$

$$NShare\_P\_DI(p, di) = \sum_{nc \in ANC\_DI(di)} \sum_{f \in CF\_NC\_DI(p,nc,di)} NShare\_FNC\_DI(f, nc, di) \quad (145)$$

$$NShare\_FNC\_DI(f, nc, di) = \frac{NShare\_G\_DI(di)}{M\_G\_DI(di)} \times NRS\_FNC\_DI(f, nc, di) \quad (146)$$

$$M\_G\_DI(di) = |ANC\_DI(di)| \quad (147)$$

$$ANC\_DI(di) = \{nc \in NC\_DI(di) : NRisk\_NC\_DI(nc, di) > 0MW\} \quad (148)$$

$$NRisk\_NC\_DI(nc, di) = \begin{cases} NR\_NC\_DI(di) & \text{for } nc \in LCSC(di) \\ 0 & \text{otherwise} \end{cases} \quad (149)$$

Variable	Units	SC	GR	Rule	Description	Ref
TRS_P_DI(p, di)		P	DI	App 2A 5.3	Total runway share for participant p in Dispatch Interval di	(140)
FShare_P_DI(p, di)		P	DI	App 2A 5.3(a)	Runway share related to the facility component for participant p in Dispatch Interval di	(141)
FShare_F_DI(f, di)		F	DI		Runway share related to the facility component for Facility f in Dispatch Interval di	(142)
FShare_G_DI(di)		G	DI	App 2A 5.1(b)	Runway share related to the facility component in Dispatch Interval di	(143)
FRS_F_DI(f, di)		F	DI	App 2A 3.3	Facility runway share for Facility f in Dispatch Interval di	(150)
NShare_G_DI(di)		G	DI	App 2A 5.1(a)	Runway share related to the network component in Dispatch Interval di	(144)
LNR_G_DI(di)	MW	G	DI	App 2A 5.1(i)	The largest Network Risk associated with the Largest Credible Supply Contingency in Dispatch Interval di	I
LFR_G_DI(di)	MW	G	DI	App 2A 3.2	The largest runway facility risk associated with the applicable facilities in Dispatch Interval di	(155)
NShare_P_DI(p, di)		P	DI	App 2A 5.3(b)	Runway share related to the network component for participant p in Dispatch Interval di	(145)
NShare_FNC_DI(f, nc, di)		FNC	DI		Runway share for Facility f related to the Network Contingency nc in Dispatch Interval di	(146)
M_G_DI(di)		G	DI	App 2A 4.4	Number of applicable Network Contingencies in Dispatch Interval di	(147)
NRS_FNC_DI(f, nc, di)		FNC	DI	App 2A 4.5(c)	Network runway share for Facility f in relation to Network Contingency nc in Dispatch Interval di	(164)
NRisk_NC_DI(nc, di)	MW	NC	DI	App 2A 4.2	The runway network risk for Network Contingency nc in Dispatch Interval di	(149)
NR_NC_DI(nc, di)	MW	NC	DI	7.13.1EA(c)ii.1	Network Risk for Network Contingency nc in Dispatch Interval di	I
AF_DI(di)	{}	G	DI	App 2A 2.3	Set of applicable facilities in Dispatch Interval di	(156)
ANC_DI(di)	{}	G	DI	App 2A 4.3	Set of applicable Network Contingencies in Dispatch Interval di	(148)
NC_DI(di)	{}	G	DI	App 2A 4.1	Set of Network Contingencies that were taken into account when setting the Contingency Reserve Raise requirement in Dispatch Interval di	I

Variable	Units	SC	GR	Rule	Description	Ref
CF_NC_DI(nc, di)	{}	NC	DI	App 2A 4.5(a)	Set of causer facilities that are applicable facilities or additional applicable facilities associated with Network Contingency nc in Dispatch Interval di	(170)
LCSC(di)	{}	G	DI		Set of Network Contingencies that set the Largest Credible Supply Contingency in Dispatch Interval di	I

4.7.2.2 Facility Runway Share

This section calculates the facility runway shares for Facilities deemed to be causers of Facility Contingencies. Each Facility is ranked in ascending order of their Facility Risk value and allocated a runway share based on that rank.

$$FRS\_F\_DI(f,di) = \sum_{r=1}^{FRrank\_F\_DI(f,di)} \frac{\left(\frac{FRisk\_F\_DI(AF[r],di) - FRisk\_F\_DI(AF[r-1],di)}{LFR\_G\_DI(di)}\right)}{MAXr\_G\_DI(di) - r + 1}, \text{where } FRisk\_F\_DI(AF[0],di) = 0 \tag{150}$$

$$FRrank\_F\_DI(f,di) = \text{Position of applicable facility } f \text{ in } AFordered\_G\_DI(di) \tag{151}$$

$$AFordered\_G\_DI(di) = AF\_DI(di) \text{ ordered by ascending } FRisk\_F\_DI(f,di) \text{ and then alphabetically} \tag{152}$$

The expression $AF[r]$ returns the r-th element of the set $AFordered\_G\_DI(di)$ and the following equation shows the interaction between $AFordered\_G\_DI(di)$, $FRrank\_F\_DI(f,di)$ and $AF[r]$:

$$AF[FRrank\_F\_DI(f,di)] = f \tag{153}$$

$$MAXr\_G\_DI(di) = |AF\_DI(di)| \tag{154}$$

$$LFR\_G\_DI(di) = FRisk\_F\_DI(AF[MAXr\_G\_DI(di)],di) \tag{155}$$

$$AF\_DI(di) = \{f \in App2AF\_DI(di) : FRisk\_F\_DI(f,di) \geq 10MW\} \tag{156}$$

$$AFadditional\_DI(di) = \{f \in App2AIML\_DI(di) : FRisk\_F\_DI(f,di) \geq 10MW\} \tag{157}$$

$$FRisk\_F\_DI(f,di) = \begin{cases} FR\_F\_DI(f,di) & \text{for } f \in App2AIML\_DI(di) \cup App2AFa(di) \cup App2AFb\_DI(di) \\ \dfrac{SCADAIML\_F\_DI(f,di-1)}{5/60h} & \text{for } f \in App2AFc\_DI(di) \\ 0 & \text{otherwise} \end{cases} \tag{158}$$

Identify which facilities will be included for the purposes of cost allocation:

$$App2AIML\_DI(di) = App2AFbc(d) \cap \overline{App2AF\_DI(di)} \tag{159}$$

$$App2AF\_DI(di) = App2AFa(di) \cup App2AFb\_DI(di) \cup App2AFc\_DI(di) \tag{160}$$

$$App2AFa(d) = (SF(d) \cup SSF(d)) \cap \overline{EG(d)} \tag{161}$$

$$App2AFbc(d) = ((SF(d) \cup SSF(d) \cup NSF(d)) \cap EG(d)) \cup IML(d) \tag{162}$$

$$App2AFb\_DI(di) = App2AFbc(d) \cap \overline{App2AFc\_DI(di)} \tag{163}$$

Variable	Units	SC	GR	Rule	Description	Ref
FRS_F_DI(f, di)		F	DI	App 2A 3.3	Facility runway share for Facility f in Dispatch Interval di	(150)
FRrank_F_DI(f, di)		F	DI	App 2A 3.3(b)	The element number of Facility f in the set of applicable facilities, where 1 is the applicable facility with the lowest Facility Risk in Dispatch Interval di	(151)
AFordered_G_DI(di)	{}	G	DI	App 2A 3.1	Ordered set of applicable facilities in Dispatch Interval di (ordered by ascending Facility Risk)	(152)
AF[r]		G	DI	App 2A 3.1	The r-th element of the set *AFordered_G_DI* in Dispatch Interval di	(153)
MAXr_G_DI(di)		G	DI	App 2A 3.3(c)	The number of applicable facilities in Dispatch Interval di	(154)
LFR_G_DI(di)	MW	G	DI	App 2A 3.2	The largest runway facility risk associated with the applicable facilities in Dispatch Interval di	(155)
AF_DI(di)	{}	G	DI	App 2A 2.3	Set of applicable facilities in Dispatch Interval di	(156)
AFadditional_DI(di)	{}	G	DI	App 2A 2.4	Set of additional applicable facilities in Dispatch Interval di	(157)
FRisk_F_DI(f, di)	MW	F	DI	App 2A 2.2	The runway facility risk for Facility f in Dispatch Interval di	(158)
App2AIML_DI(di)	{}	G	DI	App 2A 2.1A	Set of facilities (identified in Appendix 2A 2.1A) to be included in the runway share calculation in Dispatch Interval di	(159)
App2AF_DI(di)	{}	G	DI	App 2A 2.1	Set of facilities (identified in Appendix 2A 2.1) to be included in the runway share calculation in Dispatch Interval di	(160)
App2AFa(d)	{}	G	D	App 2A 2.1(a)	Set of facilities (identified in Appendix 2A 2.1(a)) to be included in the runway share calculation in Trading Day d	(161)
App2AFbc(d)	{}	G	D	App 2A 2.1(b), 2.1(c)	Set of facilities (identified in Appendix 2A 2.1(b) and 2.1(c)) to be included in the runway share calculation in Trading Day d	(162)
App2AFb_DI(di)	{}	G	DI	App 2A 2.1(b)	Set of facilities (identified in Appendix 2A 2.1(b)) to be included in the runway share calculation in Dispatch Interval di	(163)
App2AFc_DI(di)	{}	G	DI	App 2A 2.1(c)	Set of facilities (identified in Appendix 2A 2.1(c)) to be included in the runway share calculation in Dispatch Interval di	I
EG(d)	{}	G	D	2.30B.2(a)	Set of Registered Facilities that serve an Intermittent Load in Trading Day d	(27)
FR_F_DI(f, di)	MW	F	DI	7.13.1EA(c)i	Facility Risk for Facility f in Dispatch Interval di	I
NSF(d)	{}	G	D	11	Set of Non-Scheduled Facilities in Trading Day d	(17)
SCADAIML_F_DI(f, di)	MWh	F	DI	7.13.1E(a)v	Net generation measured by SCADA for the Energy Producing System supplying Intermittent Load f in Dispatch Interval di, non-loss adjusted	I
SF(d)	{}	G	D	11	Set of Scheduled Facilities in Trading Day d	(13)
SSF(d)	{}	G	D	11	Set of Semi-Scheduled Facilities in Trading Day d	(15)

4.7.2.3 Network Runway Share

This section calculates the Network Contingency runway shares for Registered Facilities deemed to be causers of Network Contingencies. Each Registered Facility that is a member of the set of causer facilities is ranked in ascending

order of their Facility Risk value and allocated a runway share based on that rank.

$$NRS\_FNC\_DI(f, nc, di) = \sum_{r=1}^{NRrank\_FNC\_DI(f,nc,di)} \frac{\left(\frac{FRisk\_F\_DI(CF[r],di) - FRisk\_F\_DI(CF[r-1],di)}{LFR\_NC\_DI(nc,di)}\right)}{MAXr\_NC\_DI(nc, di) - r + 1}, \text{where } FRisk\_F\_DI(CF[0], di) = 0 \tag{164}$$

$$NRrank\_FNC\_DI(f, nc, di) = \text{Position of Facility } f \text{ in } CFordered\_NC\_DI(nc, di) \tag{165}$$

$$CFordered\_NC\_DI(nc, di) = CF\_NC\_DI(nc, di) \text{ ordered by ascending } FRisk\_F\_DI(f, di) \text{ and then alphabetically} \tag{166}$$

The expression $CF[r]$ returns the r-th element of the set $CFordered\_NC\_DI(nc, di)$ and the following equation shows the interaction between $CFordered\_NC\_DI(nc, di)$, $NRrank\_FNC\_DI(f, nc, di)$ and $CF[r]$:

$$CF[NRrank\_FNC\_DI(f, nc, di)] = f \tag{167}$$

$$MAXr\_NC\_DI(nc, di) = |CF\_NC\_DI(nc, di)| \tag{168}$$

$$LFR\_NC\_DI(nc, di) = FRisk\_F\_DI(CF[MAXr\_NC\_DI(nc, di)], di) \tag{169}$$

$$CF\_NC\_DI(nc, di) = \{f \in F\_NC\_DI(nc, di) \cap (AF\_DI(di) \cup AFadditional\_DI(di))\} \tag{170}$$

Variable	Units	SC	GR	Rule	Description	Ref
NRS_FNC_DI(f, nc, di)		FNC	DI	App 2A 4.5(c)	Network runway share for Facility f in relation to Network Contingency nc in Dispatch Interval di	(164)
NRrank_FNC_DI(f, nc, di)		FNC	DI	App 2A 4.5(c)ii	The element number of Facility f in the set of causer facilities associated with Network Contingency nc, where 1 is the causer facility with the lowest Facility Risk in Dispatch Interval di	(165)
FRisk_F_DI(f, di)	MW	F	DI	App 2A 2.2	The runway facility risk for Facility f in Dispatch Interval di	(158)
LFR_NC_DI(nc, di)	MW	NC	DI	App 2A 4.5(c)	Largest Facility Risk in relation to Network Contingency nc in Dispatch Interval di	(169)
MAXr_NC_DI(nc, di)		NC	DI	App 2A 4.5(c)iii	The number of causer facilities associated with Network Contingency nc in Dispatch Interval di	(168)
CFordered_NC_DI(nc, di)	{}	NC	DI	App 2A 4.5(b)	Ordered set of causer facilities associated with Network Contingency nc in Dispatch Interval di (ordered by ascending Facility Risk)	(166)
CF[r]		NC	DI	App 2A 4.5(b)	The r-th element of the set *CFordered_NC_DI* in Dispatch Interval di	(167)
CF_NC_DI(nc, di)	{}	NC	DI	App 2A 4.5(a)	Set of causer facilities that are applicable facilities or additional applicable facilities associated with Network Contingency nc in Dispatch Interval di	(170)
F_NC_DI(nc, di)	{}	NC	DI	App 2A 4.5(a)	Set of Registered Facilities included in the Network Risk associated with Network Contingency nc in Dispatch Interval di	I

4.7.2.4 RTM Suspension Share

When the Real-Time Market is suspended, the Central Dispatch Process is not available to determine the Facility Risk and Network Risks which input to the runway share determined in Appendix 2A. Instead, the contribution share for Contingency Reserve Raise is calculated using the Metered Schedules for Facilities with injection greater than 10MW in the Dispatch Interval.

$$RTMSuspShare\_P\_DI(p,di) = \frac{RTMSuspCQ\_P\_DI(p,di)}{RTMSuspCQ\_G\_DI(di)} \tag{171}$$

$$RTMSuspCQ\_G\_DI(di) = \sum_{p \in MP(di)} RTMSuspCQ\_P\_DI(p,di) \tag{172}$$

$$RTMSuspCQ\_P\_DI(p,di) = \sum_{f \in App2AF\_DI(p,di)} RTMSuspCQ\_F\_DI(f,di) \tag{173}$$

$$RTMSuspCQ\_F\_DI(f,di) = \begin{cases} max(0, MS\_F\_I(f,di)) & \text{for } f \in App2AIML\_DI(di) \cup App2AFa(di) \cup App2AFb\_DI(di) \\ & \text{and } SCADAEOI\_F\_DI(f,di) > 10 \\ max(0, SCADAIML\_F\_DI(f,di) & \text{for } f \in App2AFc\_DI(di) \\ \times TLF\_F\_D(f,di) \times DLF\_F\_D(f,di)) & and \frac{SCADAIML\_F\_DI(f,di)}{5/60h} > 10 \\ 0 & \text{otherwise} \end{cases} \tag{174}$$

Variable	Units	SC	GR	Rule	Description	Ref
RTMSuspShare_P_DI(p, di)		P	DI	9.10.30A	Real-Time Market suspension share for participant p in Dispatch Interval di	(171)
RTMSuspCQ_G_DI(di)		G	DI	9.10.30D	Sum of all Real-Time Market suspension contributing quantities in Dispatch Interval di	(172)
RTMSuspCQ_P_DI(p, di)		P	DI	9.10.30B	Real-Time Market suspension contributing quantity for participant p in Dispatch Interval di	(173)
RTMSuspCQ_F_DI(di)		G	DI	9.10.30C	Real-Time Market suspension contributing quantity for Facility f in Dispatch Interval di	(172)
App2AIML_DI(di)	{}	G	DI	App 2A 2.1A	Set of facilities (identified in Appendix 2A 2.1A) to be included in the runway share calculation in Dispatch Interval di	(159)
App2AFa(d)	{}	G	D	App 2A 2.1(a)	Set of facilities (identified in Appendix 2A 2.1(a)) to be included in the runway share calculation in Trading Day d	(161)
App2AFb_DI(di)	{}	G	DI	App 2A 2.1(b)	Set of facilities (identified in Appendix 2A 2.1(b)) to be included in the runway share calculation in Dispatch Interval di	(163)
App2AFc_DI(di)	{}	G	DI	App 2A 2.1(c)	Set of facilities (identified in Appendix 2A 2.1(c)) to be included in the runway share calculation in Dispatch Interval di	I
DI(i)	{}	G	I		Set of Dispatch Intervals in Trading Interval i	I
DLF_F_D(f, d)		F	D		Distribution Loss Factor for Facility f for Trading Day d	I
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I
MS_F_I(f, i)	MWh	F	I	9.5.2, 9.5.3, 2.30B.10, 2.30B.11	Metered Schedule for Facility f in Trading Interval i	(31)

Variable	Units	SC	GR	Rule	Description	Ref
SCADAEOI_F_DI(f, di)	MW	F	DI		EOI Quantity of Facility f for Dispatch Interval di	I
SCADAIMLEOI_F_DI(f, di)	MW	F	DI		EOI Quantity of the Energy Producing System supplying Intermittent Load f in Dispatch Interval di	I
TLF_F_D(f, d)		F	D		Transmission Loss Factor for Facility f for Trading Day d	I

4.7.3 Contingency Lower Payments

$$CLpayment\_P\_D(p,d) = \sum_{i \in I(d)} CLpayment\_P\_I(p,i) \tag{175}$$

$$CLpayment\_P\_I(p,i) = \sum_{f \in REG\_F(p,i)} CLpayment\_F\_I(f,i) \tag{176}$$

$$CLpayment\_F\_I(f,i) = \sum_{di \in DI(i)} CLpayment\_F\_DI(f,di) \tag{177}$$

$$CLpayment\_F\_DI(f,di) = CLenablement\_F\_DI(f,di) + CLavailability\_F\_DI(f,di) - CLrefund\_F\_DI(f,di) \tag{178}$$

$$CLenablement\_F\_DI(f,di) = \frac{5}{60} h \times FCLprice\_G\_DI(di) \times CLquantity\_F\_DI(f,di) \times FPFCL\_F\_DI(f,di) \tag{179}$$

$$CLquantity\_F\_DI(f,di) = \begin{cases} ESSEQCL\_F\_DI(f,di) & \text{for } CLestFlag\_F\_DI(f,di) = 0 \\ ESSEQCLest\_F\_DI(f,di) & \text{for } CLestFlag\_F\_DI(f,di) = 1 \end{cases} \tag{180}$$

$$CLavailability\_F\_DI(f,di) = \sum_{sa \in ACL(f,di)} AP\_SA\_DI(sa,di) \tag{181}$$

$$CLrefund\_F\_DI(f,di) = \sum_{sa \in ACL(f,di)} Refund\_SA\_DI(sa,di) \tag{182}$$

Variable	Units	SC	GR	Rule	Description	Ref
CLpayment_P_D(p, d)	$	P	D	9.10.8	Contingency Reserve Lower amount payable to participant p for Trading Day d	(175)
CLpayment_P_I(p, i)	$	P	I		Contingency Reserve Lower amount payable to participant p for Trading Interval i	(176)
CLpayment_F_I(f, i)	$	F	I	9.10.9	Contingency Reserve Lower amount payable to Facility f for Trading Interval i	(177)
CLpayment_F_DI(f, di)	$	F	DI	9.10.10	Contingency Reserve Lower amount payable to Facility f for Dispatch Interval di	(178)
CLenablement_F_DI(f, di)	$	F	DI		Contingency Reserve Lower amount payable for enablement to Facility f for Dispatch Interval di	(179)
CLavailability_F_DI(f, di)	$	F	DI	App 2C 2.8(a)iv	Contingency Reserve Lower amount payable for availability to Facility f for Dispatch Interval di	(181)

Variable	Units	SC	GR	Rule	Description	Ref
CLrefund_F_DI(f, di)	$	F	DI	App 2C 2.8(b)iv	Facility SESSM Refund for Contingency Reserve Lower for Facility f for Dispatch Interval di	(182)
AP_SA_DI(sa, di)	$	SA	DI	App 2C 2.2(c)	SESSM Availability Payment under SESSM Award sa in Dispatch Interval di	(121)
Refund_SA_DI(sa, di)	$	SA	DI	App 2C 2.6	SESSM refund under SESSM Award sa in Dispatch Interval di	(122)
FCLprice_G_DI(di)	$/MW/h	G	DI	11	Final Contingency Reserve Lower Market Clearing Price for Dispatch Interval di	I
CLquantity_F_DI(f, di)	MW	F	DI	9.10.10(c)	Contingency Reserve Lower enablement quantity for Facility f for Dispatch Interval di	(180)
CLestFlag_F_DI(f, di)	Flag	F	DI	9.10.10(c)ii	Flag that is 1 when AEMO's reasonable estimate of Facility f's ability to provide Contingency Reserve Lower in Dispatch Interval di is used, and 0 otherwise	I
ESSEQCL_F_DI(f, di)	MW	F	DI	9.10.10(c)i	Essential System Service Enablement Quantity for Contingency Reserve Lower for Facility f for Dispatch Interval di	I
ESSEQCLest_F_DI(f, di)	MW	F	DI	9.10.10(c)ii	AEMO's estimate of capability of Facility f to provide Contingency Reserve Lower for Dispatch Interval di	I
FPFCL_F_DI(f, di)		F	DI	9.10.10(d)	Facility Performance Factor for Contingency Reserve Lower for Facility f for Dispatch Interval di	I
REG_F(d)	{}	G	D	11	Set of Registered Facilities in Trading Day d	(23)
ACL(d)	{}	G	D		Set of SESSM Awards for Contingency Reserve Lower on Trading Day d	I
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I
DI(i)	{}	G	I		Set of Dispatch Intervals in Trading Interval i	I

4.7.4 Contingency Lower Charges (Recoverable)

$$CLcharge\_P\_D(p,d) = \sum_{i \in I(d)} CLcharge\_P\_I(p,i) \tag{183}$$

$$CLcharge\_P\_I(p,i) = CS\_P\_I(p,i) \times CLpayment\_G\_I(i) \tag{184}$$

$$CLpayment\_G\_I(i) = \sum_{p \in MP(i)} CLpayment\_P\_I(p,i) + \sum_{p \in MP(i)} FCESSUShareCL\_P\_I(p,i) \tag{185}$$

$$FCESSUShareCL\_P\_I(p,i) = \sum_{f \in REG\_F(p,i)} FCESSUShareCL\_F\_I(f,i) \tag{186}$$

$$FCESSUShareCL\_F\_I(f,i) = \sum_{d \in DI(di)} FCESSUShareCL\_F\_DI(f,di) \tag{187}$$

Variable	Units	SC	GR	Rule	Description	Ref
CLcharge_P_D(p, d)	$	P	D	9.10.31	Contingency Reserve Lower amount recoverable from participant p for Trading Day d	(183)
CLcharge_P_I(p, i)	$	P	I	9.10.32	Contingency Reserve Lower amount recoverable from participant p for Trading Interval i	(184)
CLpayment_G_I(i)	$	G	I	9.10.9	Contingency Reserve Lower amount payable for Trading Interval i	(185)
FCESSUShareCL_P_I(p, i)	$	P	I		Share of FCESS Uplift Payments to be allocated to Contingency Reserve Lower for Participant p for Trading Interval i	(186)
FCESSUShareCL_F_I(f, i)	$	F	I		Share of FCESS Uplift Payments to be allocated to Contingency Reserve Lower for Facility f for Trading Interval i	(187)
CLpayment_P_I(p, i)	$	P	I		Contingency Reserve Lower amount payable to participant p for Trading Interval i	(176)
FCESSUShareCL_F_DI(f, di)	$	F	DI	9.10.3L	Share of FCESS Uplift Payments to be allocated to Contingency Reserve Lower for Facility f for Dispatch Interval di	(286)
CS_P_I(p, i)		P	I	9.5.6	Consumption share of participant p in Trading Interval i	(92)
MP(d)	{}	G	D	11	Set of Market Participants in Trading Day d	(8)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.7.5 RoCoF Control Service Payments

$$RoCoFpayment\_P\_D(p,d) = \sum_{i \in I(d)} RoCoFpayment\_P\_I(p,i) \tag{188}$$

$$RoCoFpayment\_P\_I(p,i) = \sum_{f \in REG\_F(p,i)} RoCoFpayment\_F\_I(f,i) \tag{189}$$

$$RoCoFpayment\_F\_I(f,i) = \sum_{di \in DI(i)} RoCoFpayment\_F\_DI(f,di) \tag{190}$$

$$\begin{aligned} RoCoFpayment\_F\_DI(f,di) = {} & RoCoFenablement\_F\_DI(f,di) \\ & + RoCoFavailability\_F\_DI(f,di) - RoCoFrefund\_F\_DI(f,di) \end{aligned} \tag{191}$$

$$\begin{aligned} RoCoFenablement\_F\_DI(f,di) = {} & \frac{5}{60} h \times FRoCoFprice\_G\_DI(di) \\ & \times RoCoFquantity\_F\_DI(f,di) \times FPFRoCoF\_F\_DI(f,di) \end{aligned} \tag{192}$$

$$RoCoFquantity\_F\_DI(f,di) = \begin{cases} ESSEQRoCoF\_F\_DI(f,di) & \text{for } RoCoFestFlag\_F\_DI(f,di) = 0 \\ ESSEQRoCoFest\_F\_DI(f,di) & \text{for } RoCoFestFlag\_F\_DI(f,di) = 1 \end{cases} \tag{193}$$

$$RoCoFavailability\_F\_DI(f,di) = \sum_{sa \in ARCS(f,di)} AP\_SA\_DI(sa,di) \tag{194}$$

$$RoCoFrefund\_F\_DI(f,di) = \sum_{sa \in ARCS(f,di)} Refund\_SA\_DI(sa,di) \tag{195}$$

Variable	Units	SC	GR	Rule	Description	Ref
RoCoFpayment_P_D(p, d)	$	P	D	9.10.12	RoCoF Control Service amount payable to participant p for Trading Day d	(188)
RoCoFpayment_P_I(p, i)	$	P	I		RoCoF Control Service amount payable to participant p for Trading Interval i	(189)
RoCoFpayment_F_I(f, i)	$	F	I	9.10.13	RoCoF Control Service amount payable to Facility f for Trading Interval i	(190)
RoCoFpayment_F_DI(f, di)	$	F	DI	9.10.14	RoCoF Control Service amount payable to Facility f for Dispatch Interval di	(191)
RoCoFenablement_F_DI(f, di)	$	F	DI		RoCoF Control Service amount payable for enablement to Facility f for Dispatch Interval di	(192)
RoCoFavailability_F_DI(f, di)	$	F	DI	App 2C 2.8(a)v	RoCoF Control Service amount payable for availability to Facility f for Dispatch Interval di	(194)
RoCoFrefund_F_DI(f, di)	$	F	DI	App 2C 2.8(b)v	Facility SESSM Refund for RoCoF Control Service for Facility f for Dispatch Interval di	(195)
AP_SA_DI(sa, di)	$	SA	DI	App 2C 2.2(c)	SESSM Availability Payment under SESSM Award sa in Dispatch Interval di	(121)
Refund_SA_DI(sa, di)	$	SA	DI	App 2C 2.6	SESSM refund under SESSM Award sa in Dispatch Interval di	(122)
FRoCoFprice_G_DI(di)	$/MW	G	DI	11	Final RoCoF Control Service Market Clearing Price for Dispatch Interval di	I
RoCoFquantity_F_DI(f, di)	MW	F	DI	9.10.14(c)	RoCoF Control Service enablement quantity for Facility f for Dispatch Interval di	(193)
RoCoFestFlag_F_DI(f, di)	Flag	F	DI	9.10.14(c)ii	Flag that is 1 when AEMO's reasonable estimate of Facility f's ability to provide RoCoF in Dispatch Interval di is used, and 0 otherwise	I
ESSEQRoCoF_F_DI(f, di)	MW	F	DI	9.10.14(c)i	Essential System Service Enablement Quantity for RoCoF Control Service for Facility f for Dispatch Interval di	I
ESSEQRoCoFest_F_DI(f, di)	MW	F	DI	9.10.14(c)ii	AEMO's estimate of capability of Facility f to provide RoCoF Control Service for Dispatch Interval di	I
FPFRoCoF_F_DI(f, di)		F	DI	9.10.14(d)	Facility Performance Factor for RoCoF Control Service for Facility f for Dispatch Interval di	I
REG_F(d)	{}	G	D	11	Set of Registered Facilities in Trading Day d	(23)
ARCS(d)	{}	G	D		Set of SESSM Awards for RoCoF Control Service on Trading Day d	I
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I
DI(i)	{}	G	I		Set of Dispatch Intervals in Trading Interval i	I

4.7.6 RoCoF Control Service Charges (Recoverable)

$$RoCoFcharge\_P\_D(p,d) = \sum_{i \in I(d)} RoCoFcharge\_P\_I(p,i) \tag{196}$$

$$RoCoFcharge\_P\_I(p,i) = RoCoFmincharge\_P\_I(p,i) + RoCoFaddcharge\_P\_I(p,i) \tag{197}$$

$$RoCoFaddcharge\_P\_I(p,i) = \sum_{di \in DI(i)} RoCoFaddcharge\_P\_DI(p,di) \tag{198}$$

Variable	Units	SC	GR	Rule	Description	Ref
RoCoFcharge_P_D(p, d)	$	P	D	9.10.33	RoCoF Control Service amount recoverable from participant p for Trading Day d	(196)
RoCoFcharge_P_I(p, i)	$	P	I	9.10.34	RoCoF Control Service amount recoverable from participant p for Trading Interval i	(197)
RoCoFmincharge_P_I(p, i)	$	P	I	9.10.42	RoCoF Control Service amount recoverable related to the Minimum RoCoF Control Requirement from participant p for Trading Interval i	(199)
RoCoFaddcharge_P_I(p, i)	$	P	I		RoCoF Control Service amount recoverable related to the Additional RoCoF Control Requirement from participant p for Trading Interval i	(198)
RoCoFaddcharge_P_DI(p, di)	$	P	DI	9.10.43	RoCoF Control Service amount recoverable related to the Additional RoCoF Control Requirement from participant p for Dispatch Interval di	(222)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I
DI(i)	{}	G	I		Set of Dispatch Intervals in Trading Interval i	I

4.7.6.1 Minimum RoCoF Control Service Charges

$$RoCoFmincharge\_P\_I(p,i) = RoCoFsharemin\_P\_I(p,i) \times RoCoFminpayment\_G\_I(i) \tag{199}$$

$$RoCoFminpayment\_G\_I(i) = \sum_{di \in DI(i)} RoCoFminpayment\_G\_DI(di) \tag{200}$$

$$RoCoFminpayment\_G\_DI(di) = \begin{cases} \dfrac{RoCoFreqmin\_G\_DI(di)}{RoCoFreq\_G\_DI(di)} \times RoCoFpayment\_G\_DI(di) & \text{for } RoCoFreq\_G\_DI(di) \neq 0 \\ 0 & \text{for } RoCoFreq\_G\_DI(di) = 0 \end{cases} \tag{201}$$

$$RoCoFpayment\_G\_DI(di) = \sum_{f \in REG\_F(di)} RoCoFpayment\_F\_DI(f,di) + \sum_{f \in REG\_F(di)} FCESSUShareRCS\_F\_DI(f,di) \tag{202}$$

Variable	Units	SC	GR	Rule	Description	Ref
RoCoFmincharge_P_I(p, i)	$	P	I	9.10.42	RoCoF Control Service amount recoverable related to the Minimum RoCoF Control Requirement from participant p for Trading Interval i	(199)
RoCoFsharemin_P_I(p, i)		P	I	App 2B 2.8	Share of costs related to procuring Minimum RoCoF Control Requirement for participant p for Trading Interval i	(203)
RoCoFminpayment_G_I(i)	$	G	I	9.10.18	RoCoF Control Service amount payable related to the Minimum RoCoF Control Requirement for Trading Interval i	(200)
RoCoFminpayment_G_DI(di)	$	G	DI	9.10.16	RoCoF Control Service amount payable related to the Minimum RoCoF Control Requirement for Dispatch Interval di	(201)
RoCoFreq_G_DI(di)	MWs	G	DI	9.10.16(c)	RoCoF Control Requirement in Dispatch Interval di	I

Variable	Units	SC	GR	Rule	Description	Ref
RoCoFreqmin_G_DI(di)	MWs	G	DI	9.10.16(b)	Minimum RoCoF Control Requirement in Dispatch Interval di	I
RoCoFpayment_G_DI(di)	$	G	DI	9.10.15	RoCoF Control Service amount payable for Dispatch Interval di	(202)
RoCoFpayment_F_DI(f, di)	$	F	DI	9.10.14	RoCoF Control Service amount payable to Facility f for Dispatch Interval di	(191)
FCESSUShareRCS_F_DI(f, di)	$	F	DI	9.10.3M	Share of FCESS Uplift Payments to be allocated to RoCoF Control Service for Facility f for Dispatch Interval di	(287)
REG_F(d)	{}	G	D	11	Set of Registered Facilities in Trading Day d	(23)
DI(i)	{}	G	I		Set of Dispatch Intervals in Trading Interval i	I

4.7.6.2 Share of Minimum RoCoF Charges

$$RoCoFsharemin\_P\_I(p,i) = NetworkShare\_P\_I(p,i) + InjectionShare\_P\_I(p,i) + OfftakeShare\_P\_I(p,i) \quad (203)$$

$$InjectionShare\_P\_I(p,i) = \sum_{f \in InjectionC\_I(p,i)} InjectionShare\_F\_I(f,i) \quad (204)$$

$$OfftakeShare\_P\_I(p,i) = \sum_{f \in OfftakeC\_I(p,i)} OfftakeShare\_F\_I(f,i) \quad (205)$$

Network Share

$$NetworkShare\_P\_I(p,i) = \begin{cases} \frac{NetworkCF\_G\_D(i)}{Groups\_G\_I(i)} & \text{for } p \in WPNTWK(i) \\ 0 & \text{otherwise} \end{cases} \quad (206)$$

$$Groups\_G\_I(i) = NetworkCF\_G\_D(i) + InjectionCF\_G\_I(i) + OfftakeCF\_G\_I(i) \quad (207)$$

$$NetworkCF\_G\_D(i) = \begin{cases} 0 & \text{for } |NetworkC(i)| = 0 \\ 1 & \text{otherwise} \end{cases} \quad (208)$$

$$NetworkC(d) = \{f \in NTWK(p,d) : p \in WPNTWK(d) \text{ and } RoCoFRTC\_F\_D(f,d) \leq RoCoFRTCRL\_G\_D(d)\} \quad (209)$$

Injection Share

$$InjectionShare\_F\_I(f,i) = \frac{InjectionCF\_G\_I(i)}{Groups\_G\_I(i)} \times \frac{InjectionCQ\_F\_I(f,i)}{InjectionCQ\_G\_I(i)} \quad (210)$$

$$InjectionCQ\_G\_I(i) = \sum_{f \in InjectionC\_I(i)} InjectionCQ\_F\_I(f,i) \quad (211)$$

$$InjectionCQ\_F\_I(f,i) = |MS\_F\_I(f,i)| \quad (212)$$

$$InjectionCF\_G\_I(i) = \begin{cases} 0 & \text{for } |InjectionC\_I(i)| = 0 \\ 1 & \text{otherwise} \end{cases} \quad (213)$$

$$InjectionC\_I(i) = \{f \in InjectionC(i) : MS\_F\_I(f,i) \neq 0\} \quad (214)$$

$$InjectionC(d) = \{f \in (SF(d) \cup SSF(d) \cup NSF(d)) \cap \overline{PureLoad(d)} : RoCoFRTC\_F\_D(f,d) \leq RoCoFRTCRL\_G\_D(d)\} \quad (215)$$

Offtake Share

$$OfftakeShare\_F\_I(f,i) = \frac{OfftakeCF\_G\_I(i)}{Groups\_G\_I(i)} \times \frac{OfftakeCQ\_F\_I(f,i)}{OfftakeCQ\_G\_I(i)} \tag{216}$$

$$OfftakeCQ\_G\_I(i) = \sum_{f \in OfftakeC\_I(i)} OfftakeCQ\_F\_I(f,i) \tag{217}$$

$$OfftakeCQ\_F\_I(f,i) = |MS\_F\_I(f,i)| \tag{218}$$

$$OfftakeCF\_G\_I(i) = \begin{cases} 0 & \text{for } |OfftakeC\_I(i)| = 0 \\ 1 & \text{otherwise} \end{cases} \tag{219}$$

$$OfftakeC\_I(i) = \{f \in OfftakeC(i) : MS\_F\_I(f,i) \neq 0\} \tag{220}$$

$$OfftakeC(d) = \{f \in NDL(d) \cup PureLoad(d) : RoCoFRTC\_F\_D(f,d) \leq RoCoFRTCRL\_G\_D(d)\} \tag{221}$$

Variable	Units	SC	GR	Rule	Description	Ref
RoCoFsharemin_P_I(p, i)		P	I	App 2B 2.8	Share of costs related to procuring Minimum RoCoF Control Requirement for participant p for Trading Interval i	(203)
NetworkShare_P_I(p, i)		P	I	App 2B 2.5	Share of Minimum RoCoF Control Service costs associated with being a network causer for participant p in Trading Interval i	(206)
InjectionShare_P_I(p, i)		P	I		Share of Minimum RoCoF Control Service costs associated with being an injection causer for participant p in Trading Interval i	(204)
OfftakeShare_P_I(p, i)		P	I		Share of Minimum RoCoF Control Service costs associated with being an offtake causer for participant p in Trading Interval i	(205)
Groups_G_I(i)		G	I	App 2B 2.4	Number of non-empty causer groups related to Minimum RoCoF Control Services in Trading Interval i	(207)
NetworkCF_G_D(d)	Flag	G	I	App 2B 2.3(a)	Flag that is 1 when there are network causers in Trading Day d, and 0 otherwise	(208)
InjectionCF_G_I(i)	Flag	G	I	App 2B 2.3(b)	Flag that is 1 when there are injection causers in Trading Interval i, and 0 otherwise	(213)
OfftakeCF_G_I(i)	Flag	G	I	App 2B 2.3(c)	Flag that is 1 when there are offtake causers in Trading Interval i, and 0 otherwise	(219)
RoCoFRTC_F_D(f, d)	Hz /500ms	F	D	11	RoCoF Ride-Through Capability for Facility f for Trading Day d	I
RoCoFRTCRL_G_D(d)	Hz /500ms	G	D	11	RoCoF Ride-Through Cost Recovery Limit for Trading Day d	I
InjectionShare_F_I(f, i)		F	I		Share of Minimum RoCoF Control Service costs associated with being an injection causer for Facility f in Trading Interval i	(210)
OfftakeShare_F_I(f, i)		F	I		Share of Minimum RoCoF Control Service costs associated with being an offtake causer for Facility f in Trading Interval i	(216)
InjectionCQ_F_I(f, i)	MWh	F	I		Injection causer contribution quantity for Facility f in Trading Interval i	(212)
OfftakeCQ_F_I(f, i)	MWh	F	I		Offtake causer contribution quantity for Facility f in Trading Interval i	(218)

Variable	Units	SC	GR	Rule	Description	Ref
InjectionCQ_G_I(i)	MWh	G	I		Injection causer contribution quantity for Trading Interval i	(211)
OfftakeCQ_G_I(i)	MWh	G	I		Offtake causer contribution quantity for Trading Interval i	(217)
MS_F_I(f, i)	MWh	F	I	9.5.2, 9.5.3, 2.30B.10, 2.30B.11	Metered Schedule for Facility f in Trading Interval i	(31)
NetworkC(d)	{}	G	D	App 2B 2.2(a)	Set of facilities that are network causers in Trading Day d	(209)
InjectionC(d)	{}	G	D		Set of facilities that are potentially injection causers in Trading Day d	(215)
InjectionC_I(i)	{}	G	I	App 2B 2.2(b)	Set of facilities that are injection causers in Trading Interval i	(214)
OfftakeC(d)	{}	G	D		Set of facilities that are potentially offtake causers in Trading Day d	(221)
OfftakeC_I(i)	{}	G	I	App 2B 2.2(c)	Set of facilities that are offtake causers in Trading Interval i	(220)
NDL(d)	{}	G	D	11	Set of Non-Dispatchable Loads in Trading Day d	(24)
WPNTWK(d)	{}	G	D		Set containing Western Power in Trading Day d	(6)
PureLoad(d)	{}	G	D	App 2B 2.2(c)i	Set of Scheduled Facilities, Semi-Scheduled Facilities or Non-Scheduled Facilities that comprise only Loads in Trading Day d	I
SF(d)	{}	G	D	11	Set of Scheduled Facilities in Trading Day d	(13)
SSF(d)	{}	G	D	11	Set of Semi-Scheduled Facilities in Trading Day d	(15)
NSF(d)	{}	G	D	11	Set of Non-Scheduled Facilities in Trading Day d	(17)

4.7.6.3 Additional RoCoF Control Service Charges

$$RoCoFaddcharge\_P\_DI(p,di) = \begin{cases} RTMSuspShare\_P\_DI(p,di) \times RoCoFaddpayment\_G\_DI(di) & \text{if } RTMSuspFlag\_G\_DI(di) = 1 \\ TRS\_P\_DI(p,di) \times RoCoFaddpayment\_G\_DI(di) & \text{otherwise} \end{cases} \quad (222)$$

$$RoCoFaddpayment\_G\_DI(di) = RoCoFpayment\_G\_DI(di) - RoCoFminpayment\_G\_DI(di) \quad (223)$$

Variable	Units	SC	GR	Rule	Description	Ref
RoCoFaddcharge_P_DI(p, di)	$	P	DI	9.10.43	RoCoF Control Service amount recoverable related to the Additional RoCoF Control Requirement from participant p for Dispatch Interval di	(222)
RoCoFaddpayment_G_DI(di)	$	G	DI	9.10.19	RoCoF Control Service amount payable related to the Additional RoCoF Control Requirement for Dispatch Interval di	(223)
RoCoFminpayment_G_DI(di)	$	G	DI	9.10.16	RoCoF Control Service amount payable related to the Minimum RoCoF Control Requirement for Dispatch Interval di	(201)
RoCoFpayment_G_DI(di)	$	G	DI	9.10.15	RoCoF Control Service amount payable for Dispatch Interval di	(202)
TRS_P_DI(p, di)		P	DI	App 2A 5.3	Total runway share for participant p in Dispatch Interval di	(140)

4.7.7 Regulation Raise Payments

$$RRpayment\_P\_D(p,d) = \sum_{i \in I(d)} RRpayment\_P\_I(p,i) \tag{224}$$

$$RRpayment\_P\_I(p,i) = \sum_{f \in REG\_F(p,i)} RRpayment\_F\_I(f,i) \tag{225}$$

$$RRpayment\_F\_I(f,i) = \sum_{di \in DI(i)} RRpayment\_F\_DI(f,di) \tag{226}$$

$$RRpayment\_F\_DI(f,di) = RRenablement\_F\_DI(f,di) + RRavailability\_F\_DI(f,di) - RRrefund\_F\_DI(f,di) \tag{227}$$

$$RRenablement\_F\_DI(f,di) = \frac{5}{60} h \times FRRprice\_G\_DI(di) \times RRquantity\_F\_DI(f,di) \times FPFRR\_F\_DI(f,di) \tag{228}$$

$$RRquantity\_F\_DI(f,di) = \begin{cases} ESSEQRR\_F\_DI(f,di) & \text{for } RRestFlag\_F\_DI(f,di) = 0 \\ ESSEQRRest\_F\_DI(f,di) & \text{for } RRestFlag\_F\_DI(f,di) = 1 \end{cases} \tag{229}$$

$$RRavailability\_F\_DI(f,di) = \sum_{sa \in ARR(f,di)} AP\_SA\_DI(sa,di) \tag{230}$$

$$RRrefund\_F\_DI(f,di) = \sum_{sa \in ARR(f,di)} Refund\_SA\_DI(sa,di) \tag{231}$$

Variable	Units	SC	GR	Rule	Description	Ref
RRpayment_P_D(p, d)	$	P	D		Regulation Raise amount payable to participant p for Trading Day d	(224)
RRpayment_P_I(p, i)	$	P	I		Regulation Raise amount payable to participant p for Trading Interval i	(225)
RRpayment_F_I(f, i)	$	F	I		Regulation Raise amount payable to Facility f for Trading Interval i	(226)
RRpayment_F_DI(f, di)	$	F	DI	9.10.22	Regulation Raise amount payable to Facility f for Dispatch Interval di	(227)
RRenablement_F_DI(f, di)	$	F	DI		Regulation Raise amount payable for enablement to Facility f for Dispatch Interval di	(228)
RRavailability_F_DI(f, di)	$	F	DI	App 2C 2.8(a)i	Regulation Raise amount payable for availability to Facility f for Dispatch Interval di	(230)
RRrefund_F_DI(f, di)	$	F	DI	App 2C 2.8(b)i	Facility SESSM Refund for Regulation Raise for Facility f for Dispatch Interval di	(231)
AP_SA_DI(sa, di)	$	SA	DI	App 2C 2.2(c)	SESSM Availability Payment under SESSM Award sa in Dispatch Interval di	(121)
Refund_SA_DI(sa, di)	$	SA	DI	App 2C 2.6	SESSM refund under SESSM Award sa in Dispatch Interval di	(122)
FRRprice_G_DI(di)	$/MW/h	G	DI	11	Final Regulation Raise Market Clearing Price for Dispatch Interval di	I
RRquantity_F_DI(f, di)	MW	F	DI	9.10.22(c)	Regulation Raise enablement quantity for Facility f for Dispatch Interval di	(229)

Variable	Units	SC	GR	Rule	Description	Ref
RRestFlag_F_DI(f, di)	Flag	F	DI	9.10.22(c)ii	Flag that is 1 when AEMO's reasonable estimate of Facility f's ability to provide Regulation Raise in Dispatch Interval di is used, and 0 otherwise	I
ESSEQRR_F_DI(f, di)	MW	F	DI	9.10.22(c)i	Essential System Service Enablement Quantity for Regulation Raise for Facility f for Dispatch Interval di	I
ESSEQRRest_F_DI(f, di)	MW	F	DI	9.10.22(c)ii	AEMO's estimate of capability of Facility f to provide Regulation Raise for Dispatch Interval di	I
FPFRR_F_DI(f, di)		F	DI	9.10.22(d)	Facility Performance Factor for Regulation Raise for Facility f for Dispatch Interval di	I
REG_F(d)	{}	G	D	11	Set of Registered Facilities in Trading Day d	(23)
ARR(d)	{}	G	D		Set of SESSM Awards for Regulation Raise on Trading Day d	I
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I
DI(i)	{}	G	I		Set of Dispatch Intervals in Trading Interval i	I

4.7.8 Regulation Raise Charges (Recoverable)

$$RRcharge\_P\_D(p,d) = \sum_{i \in I(d)} RRcharge\_P\_I(p,i) \tag{232}$$

$$RRcharge\_P\_I(p,i) = RS\_P\_I(p,i) \times RRpayment\_G\_I(i) \tag{233}$$

$$RRpayment\_G\_I(i) = \sum_{p \in MP(i)} RRpayment\_P\_I(p,i) + \sum_{p \in MP(i)} FCESSUShareRR\_P\_I(p,i) \tag{234}$$

$$FCESSUShareRR\_P\_I(p,i) = \sum_{f \in REG\_F(p,i)} FCESSUShareRR\_F\_I(f,i) \tag{235}$$

$$FCESSUShareRR\_F\_I(f,i) = \sum_{d \in DI(di)} FCESSUShareRR\_F\_DI(f,di) \tag{236}$$

Variable	Units	SC	GR	Rule	Description	Ref
RRcharge_P_D(p, d)	$	P	D		Regulation Raise amount recoverable from participant p for Trading Day d	(232)
RRcharge_P_I(p, i)	$	P	I		Regulation Raise amount recoverable from participant p for Trading Interval i	(233)
RRpayment_G_I(i)	$	G	I		Regulation Raise amount payable for Trading Interval i	(234)
FCESSUShareRR_P_I(p, i)	$	P	I		Share of FCESS Uplift Payments to be allocated to Regulation Raise for Participant p for Trading Interval i	(235)
FCESSUShareRR_F_I(f, i)	$	F	I		Share of FCESS Uplift Payments to be allocated to Regulation Raise for Facility f for Trading Interval i	(236)
RRpayment_P_I(p, i)	$	P	I		Regulation Raise amount payable to participant p for Trading Interval i	(225)
FCESSUShareRR_F_DI(f, di)	$	F	DI	9.10.3N	Share of FCESS Uplift Payments to be allocated to Regulation Raise for Facility f for Dispatch Interval di	(288)

Variable	Units	SC	GR	Rule	Description	Ref
RS_P_I(p, i)		P	I	9.10.37	Regulation share of participant p in Trading Interval i	(237)
MP(d)	{}	G	D	11	Set of Market Participants in Trading Day d	(8)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.7.9 Regulation Share

$$RS\_P\_I(p,i) = \frac{RCQ\_P\_I(p,i)}{RCQ\_G\_I(i)} \tag{237}$$

$$RCQ\_G\_I(i) = \sum_{p \in MP(i)} RCQ\_P\_I(p,i) \tag{238}$$

$$RCQ\_P\_I(p,i) = ABSNDL\_P\_I(p,i) + \sum_{f \in SSF(p,i) \cup NSF(p,i)} |MS\_F\_I(f,i)| \tag{239}$$

Variable	Units	SC	GR	Rule	Description	Ref
RS_P_I(p, i)		P	I	9.10.37	Regulation share of participant p in Trading Interval i	(237)
RCQ_P_I(p, i)	MWh	P	I	9.10.38	Regulation contributing quantity for participant p in Trading Interval i	(239)
RCQ_G_I(i)	MWh	G	I	9.10.39	Sum of all Regulation contributing quantities for Trading Interval i	(239)
MS_F_I(f, i)	MWh	F	I	9.5.2, 9.5.3, 2.30B.10, 2.30B.11	Metered Schedule for Facility f in Trading Interval i	(31)
ABSNDL_P_I(p, i)	MWh	P	I		Sum of the absolute value of Metered Schedules for all Non-Dispatchable Loads for participant p in Trading Interval i	(58)
SSF(d)	{}	G	D	11	Set of Semi-Scheduled Facilities in Trading Day d	(15)
NSF(d)	{}	G	D	11	Set of Non-Scheduled Facilities in Trading Day d	(17)
MP(d)	{}	G	D	11	Set of Market Participants in Trading Day d	(8)

4.7.10 Regulation Lower Payments

$$RLpayment\_P\_D(p,d) = \sum_{i \in I(d)} RLpayment\_P\_I(p,i) \tag{240}$$

$$RLpayment\_P\_I(p,i) = \sum_{f \in REG\_F(p,i)} RLpayment\_F\_I(f,i) \tag{241}$$

$$RLpayment\_F\_I(f,i) = \sum_{di \in DI(i)} RLpayment\_F\_DI(f,di) \tag{242}$$

$$RLpayment\_F\_DI(f,di) = RLenablement\_F\_DI(f,di) + RLavailability\_F\_DI(f,di) - RLrefund\_F\_DI(f,di) \tag{243}$$

$$RLenablement\_F\_DI(f,di) = \frac{5}{60} h \times FRLprice\_G\_DI(di) \times RLquantity\_F\_DI(f,di) \times FPFRL\_F\_DI(f,di) \tag{244}$$

$$RLquantity\_F\_DI(f,di) = \begin{cases} ESSEQRL\_F\_DI(f,di) & \text{for } RLestFlag\_F\_DI(f,di) = 0 \\ ESSEQRLest\_F\_DI(f,di) & \text{for } RLestFlag\_F\_DI(f,di) = 1 \end{cases} \quad (245)$$

$$RLavailability\_F\_DI(f,di) = \sum_{sa \in ARL(f,di)} AP\_SA\_DI(sa,di) \quad (246)$$

$$RLrefund\_F\_DI(f,di) = \sum_{sa \in ARL(f,di)} Refund\_SA\_DI(sa,di) \quad (247)$$

Variable	Units	SC	GR	Rule	Description	Ref
RLpayment_P_D(p, d)	$	P	D		Regulation Lower amount payable to participant p for Trading Day d	(240)
RLpayment_P_I(p, i)	$	P	I		Regulation Lower amount payable to participant p for Trading Interval i	(241)
RLpayment_F_I(f, i)	$	F	I		Regulation Lower amount payable to Facility f for Trading Interval i	(242)
RLpayment_F_DI(f, di)	$	F	DI	9.10.23	Regulation Lower amount payable to Facility f for Dispatch Interval di	(243)
RLenablement_F_DI(f, di)	$	F	DI		Regulation Lower amount payable for enablement to Facility f for Dispatch Interval di	(244)
RLavailability_F_DI(f, di)	$	F	DI	App 2C 2.8(a)ii	Regulation Lower amount payable for availability to Facility f for Dispatch Interval di	(246)
RLrefund_F_DI(f, di)	$	F	DI	App 2C 2.8(b)ii	Facility SESSM Refund for Regulation Lower for Facility f for Dispatch Interval di	(247)
AP_SA_DI(sa, di)	$	SA	DI	App 2C 2.2(c)	SESSM Availability Payment under SESSM Award sa in Dispatch Interval di	(121)
Refund_SA_DI(sa, di)	$	SA	DI	App 2C 2.6	SESSM refund under SESSM Award sa in Dispatch Interval di	(122)
FRLprice_G_DI(di)	$/MW/h	G	DI	11	Final Regulation Lower Market Clearing Price for Dispatch Interval di	I
RLquantity_F_DI(f, di)	MW	F	DI	9.10.23(c)	Regulation Lower enablement quantity for Facility f for Dispatch Interval di	(245)
RLestFlag_F_DI(f, di)	Flag	F	DI	9.10.23(c)ii	Flag that is 1 when AEMO's reasonable estimate of Facility f's ability to provide Regulation Lower in Dispatch Interval di is used, and 0 otherwise	I
ESSEQRL_F_DI(f, di)	MW	F	DI	9.10.23(c)i	Essential System Service Enablement Quantity for Regulation Lower for Facility f for Dispatch Interval di	I
ESSEQRLest_F_DI(f, di)	MW	F	DI	9.10.23(c)ii	AEMO's estimate of capability of Facility f to provide Regulation Lower for Dispatch Interval di	I
FPFRL_F_DI(f, di)		F	DI	9.10.23(d)	Facility Performance Factor for Regulation Lower for Facility f for Dispatch Interval di	I
REG_F(d)	{}	G	D	11	Set of Registered Facilities in Trading Day d	(23)
ARL(d)	{}	G	D		Set of SESSM Awards for Regulation Lower on Trading Day d	I
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I
DI(i)	{}	G	I		Set of Dispatch Intervals in Trading Interval i	I

4.7.11 Regulation Lower Charges (Recoverable)

$$RLcharge\_P\_D(p,d) = \sum_{i \in I(d)} RLcharge\_P\_I(p,i) \quad (248)$$

$$RLcharge\_P\_I(p,i) = RS\_P\_I(p,i) \times RLpayment\_G\_I(i) \tag{249}$$

$$RLpayment\_G\_I(i) = \sum_{p \in MP(i)} RLpayment\_P\_I(p,i) + \sum_{p \in MP(i)} FCESSUShareRL\_P\_I(p,i) \tag{250}$$

$$FCESSUShareRL\_P\_I(p,i) = \sum_{f \in REG\_F(p,i)} FCESSUShareRL\_F\_I(f,i) \tag{251}$$

$$FCESSUShareRL\_F\_I(f,i) = \sum_{d \in DI(di)} FCESSUShareRL\_F\_DI(f,di) \tag{252}$$

Variable	Units	SC	GR	Rule	Description	Ref
RLcharge_P_D(p, d)	$	P	D		Regulation Lower amount recoverable from participant p for Trading Day d	(248)
RLcharge_P_I(p, i)	$	P	I		Regulation Lower amount recoverable from participant p for Trading Interval i	(249)
RLpayment_G_I(i)	$	G	I		Regulation Lower amount payable for Trading Interval i	(250)
FCESSUShareRL_P_I(p, i)	$	P	I		Share of FCESS Uplift Payments to be allocated to Regulation Lower for Participant p for Trading Interval i	(251)
FCESSUShareRL_F_I(f, i)	$	F	I	9.10.3O	Share of FCESS Uplift Payments to be allocated to Regulation Lower for Facility f for Trading Interval i	(252)
RLpayment_P_I(p, i)	$	P	I		Regulation Lower amount payable to participant p for Trading Interval i	(241)
FCESSUShareRL_F_DI(f, di)	$	F	DI	9.10.3O	Share of FCESS Uplift Payments to be allocated to Regulation Lower for Facility f for Dispatch Interval di	(289)
RS_P_I(p, i)		P	I	9.10.37	Regulation share of participant p in Trading Interval i	(237)
MP(d)	{}	G	D	11	Set of Market Participants in Trading Day d	(8)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.7.12 System Restart Service Payments

$$SRSpayment\_P\_D(p,d) = \sum_{i \in I(d)} SRSpayment\_P\_I(p,i) \tag{253}$$

$$SRSpayment\_P\_I(p,i) = \sum_{c \in SRS(p,i)} SRSpayment\_C\_I(c,i) \tag{254}$$

Variable	Units	SC	GR	Rule	Description	Ref
SRSpayment_P_D(p, d)	$	P	D	9.10.25	System Restart Service amount payable to participant p for Trading Day d	(253)
SRSpayment_P_I(p, i)	$	P	I	9.10.26	System Restart Service amount payable to participant p for Trading Interval i	(254)
SRSpayment_C_I(c, i)	$	C	I	9.10.26(a)	System Restart Service amount payable under System Restart Service Contract c for Trading Interval i	I
SRS(d)	{}	G	D		Set of System Restart Service Contracts in Trading Day d	I

Variable	Units	SC	GR	Rule	Description	Ref
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.7.13 System Restart Service Charges (Recoverable)

$$SRScharge\_P\_D(p,d) = \sum_{i \in I(d)} SRScharge\_P\_I(p,i) \tag{255}$$

$$SRScharge\_P\_I(p,i) = CS\_P\_I(p,i) \times SRSpayment\_G\_I(i) \tag{256}$$

$$SRSpayment\_G\_I(i) = \sum_{p \in MP(i)} SRSpayment\_P\_I(p,i) \tag{257}$$

Variable	Units	SC	GR	Rule	Description	Ref
SRScharge_P_D(p, d)	$	P	D	9.10.40	System Restart Service amount recoverable from participant p for Trading Day d	(255)
SRScharge_P_I(p, i)	$	P	I	9.10.41	System Restart Service amount recoverable from participant p for Trading Interval i	(256)
SRSpayment_G_I(i)	$	G	I	9.10.27	System Restart Service amount payable for Trading Interval i	(257)
SRSpayment_P_I(p, i)	$	P	I	9.10.26	System Restart Service amount payable to participant p for Trading Interval i	(254)
CS_P_I(p, i)		P	I	9.5.6	Consumption share of participant p in Trading Interval i	(92)
MP(d)	{}	G	D	11	Set of Market Participants in Trading Day d	(8)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.7.14 NCESS Payments

$$NCESSpayment\_P\_D(p,d) = \sum_{i \in I(d)} NCESSpayment\_P\_I(p,i) \tag{258}$$

$$NCESSpayment\_P\_I(p,i) = \sum_{di \in DI(i)} NCESSpayment\_P\_DI(p,di) \tag{259}$$

$$NCESSpayment\_P\_DI(p,di) = \sum_{c \in NCESS(p,di)} NCESSpayment\_C\_DI(c,di) \tag{260}$$

Variable	Units	SC	GR	Rule	Description	Ref
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I
NCESSpayment_P_D(p, d)	$	P	D	9.10.27A	NCESS amount payable to participant p for Trading Day d	(258)
NCESSpayment_P_I(p, i)	$	P	I	9.10.27B	NCESS amount payable to participant p for Trading Interval i	(259)
NCESSpayment_P_DI(p, di)	$	P	DI	9.10.27C	NCESS amount payable to participant p for Dispatch Interval di	(260)
NCESSpayment_C_DI(c, di)	$	C	DI	5.9.1	NCESS amount payable under NCESS Contract c for Dispatch Interval di	I
NCESS(d)	{}	G	D		Set of NCESS Contracts in Trading Day d	I

Variable	Units	SC	GR	Rule	Description	Ref
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I
DI(i)	{}	G	I		Set of Dispatch Intervals in Trading Interval i	I

4.7.15 NCESS Charges (Recoverable)

$$NCESScharge\_P\_D(p,d) = \sum_{i \in I(d)} NCESScharge\_P\_I(p,i) \tag{261}$$

$$NCESScharge\_P\_I(p,i) = CS\_P\_I(p,i) \times NCESSpayment\_G\_I(i) \tag{262}$$

$$NCESSpayment\_G\_I(i) = \sum_{p \in MP(i)} NCESSpayment\_P\_I(p,i) \tag{263}$$

Variable	Units	SC	GR	Rule	Description	Ref
NCESScharge_P_D(p, d)	$	P	D	9.10.44	NCESS amount recoverable from participant p for Trading Day d	(261)
NCESScharge_P_I(p, i)	$	P	I	9.10.45	NCESS amount recoverable from participant p for Trading Interval i	(262)
NCESSpayment_G_I(i)	$	G	I	9.10.27D	NCESS amount payable for Trading Interval i	(263)
NCESSpayment_P_I(p, i)	$	P	I	9.10.27B	NCESS amount payable to participant p for Trading Interval i	(259)
CS_P_I(p, i)		P	I	9.5.6	Consumption share of participant p in Trading Interval i	(92)
MP(d)	{}	G	D	11	Set of Market Participants in Trading Day d	(8)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.7.16 FCESS Uplift Payments

FCESS Uplift Payments are made to Market Participants in respect of their Registered Facilities in specific circumstances where a generator may be required to run to provide a FCESS but would not otherwise be required for energy.

The cost of FCESS Uplift Payments is allocated according to the causer pays principle for the relevant FCESS.

$$FCESSUpayment\_P\_D(p,d) = \sum_{i \in I(d)} FCESSUpayment\_P\_I(p,i) \tag{264}$$

$$FCESSUpayment\_P\_I(p,i) = \sum_{f \in REG\_F(p,i)} FCESSUpayment\_F\_I(f,i) \tag{265}$$

$$FCESSUpayment\_F\_I(f,i) = \sum_{di \in DI(i)} FCESSUpayment\_F\_DI(f,di) \tag{266}$$

$$FCESSUpayment\_F\_DI(f,di) = \begin{cases} 0 & \text{if } RTMSuspFlag\_G\_DI(di) = 1 \\ max(ELCR\_F\_DI(f,di), ELCL\_F\_DI(f,di), & \\ ELRCS\_F\_DI(f,di), ELRR\_F\_DI(f,di), ELRL\_F\_DI(f,di)) & \text{otherwise} \end{cases} \tag{267}$$

Variable	Units	SC	GR	Rule	Description	Ref
FCESSUpayment_P_D(p, d)	$	P	D	9.10.27E	FCESS Uplift Payment amount payable to participant p for Trading Day d	(264)
FCESSUpayment_P_I(p, i)	$	P	I		FCESS Uplift Payment amount payable to participant p for Trading Interval i	(265)
FCESSUpayment_F_I(f, i)	$	F	I	9.10.27F	FCESS Uplift Payment amount payable for Facility f for Trading Interval i	(266)
FCESSUpayment_F_DI(f, di)	$	F	DI	9.10.27L	FCESS Uplift Payment amount payable for Facility f for Dispatch Interval di	(267)
ELCR_F_DI(f, di)	$	F	DI	9.10.3C	Eligible Enablement Losses in respect of Contingency Reserve Raise for Facility f for Dispatch Interval di	(268)
DI(i)	{}	G	I		Set of Dispatch Intervals in Trading Interval i	I
ELCL_F_DI(f, di)	$	F	DI	9.10.3D	Eligible Enablement Losses in respect of Contingency Reserve Lower for Facility f for Dispatch Interval di	(271)
ELRCS_F_DI(f, di)	$	F	DI	9.10.3D	Eligible Enablement Losses in respect of RoCoF Control Service for Facility f for Dispatch Interval di	(274)
ELRR_F_DI(f, di)	$	F	DI	9.10.3E	Eligible Enablement Losses in respect of Regulation Raise for Facility f for Dispatch Interval di	(277)
ELRL_F_DI(f, di)	$	F	DI	9.10.3F	Eligible Enablement Losses in respect of Regulation Lower for Facility f for Dispatch Interval di	(280)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I
REG_F(d)	{}	G	D	11	Set of Registered Facilities in Trading Day d	(23)
RTMSuspFlag_G_DI(di)	Flag	G	DI	9.10.3H	Flag that is 1 if the Real-Time Market was suspended in Dispatch Interval di, and 0 otherwise	I

4.7.17 FCESS Enablement Losses

Enablement Losses are calculated for a Registered Facility in respect of each individual FCESS. Only Scheduled Facilities and Semi-Scheduled Facilities are eligible for FCESS Uplift payments. For an eligible Registered Facility, the Enablement Losses are the difference between its marginal energy offer price and the market clearing price for energy, multiplied by the highest Enablement Minimum for any FCESS that it is enabled to provide in that Dispatch Interval, with adjustments for Loss Factors.

4.7.17.1 Contingency Reserve Raise Enablement Losses

$$ELCR\_F\_DI(f, di) = \begin{cases} max\Big(0, ELCRFactor\_F\_DI(f, di) \times TLF\_F\_D(f, di) \times DLF\_F\_D(f, di) \\ \times \frac{5}{60h} \times max(0, EMCR\_F\_DI(f, di)) \times EPCR\_F\_DI(f, di)\Big) & \text{for } f \in SF(d) \cup SSF(d) \\ 0 & \text{otherwise} \end{cases} \quad (268)$$

$$ELCRFactor\_F\_DI(f, di) = \begin{cases} 1 & \text{if } CRquantity\_F\_DI(f, di) > 0 \text{ and } MISPRICE\_F\_DI(f, di) = 0 \\ 0 & \text{otherwise} \end{cases} \quad (269)$$

$$EPCR\_F\_DI(f, di) = LFAOPCR\_F\_DI(f, di) - FEMCP\_G\_DI(di) \quad (270)$$

Variable	Units	SC	GR	Rule	Description	Ref
ELCR_F_DI(f, di)	$	F	DI	9.10.3C	Enablement Losses in respect of Contingency Reserve Raise for Facility f for Dispatch Interval di	(268)
ELCRFactor_F_DI(f, di)	Flag	F	DI	9.10.3C	Flag that is 1 when Facility f was enabled to provide, and provided, Contingency Reserve Raise in Dispatch Interval di	(269)
EPCR_F_DI(f, di)	$/MWh	F	DI	9.10.3C	Enablement price for Contingency Reserve Raise for Facility f for Dispatch Interval di	(270)
TLF_F_D(f, d)		F	D		Transmission Loss Factor for Facility f for Trading Day d	I
DLF_F_D(f, d)		F	D		Distribution Loss Factor for Facility f for Trading Day d	I
EMCR_F_DI(f, di)	MW	F	DI	11	Enablement Minimum for Contingency Reserve Raise for Facility f in Dispatch Interval di	I
CRquantity_F_DI(f, di)	MW	F	DI	9.10.6(c)	Contingency Reserve Raise enablement quantity for Facility f for Dispatch Interval di	(118)
MISPRICE_F_DI(f, di)	Flag	F	DI	9.9.9	Mispricing trigger for Facility f in Dispatch Interval di	(85)
LFAOPCR_F_DI(f, di)	$/MWh	F	DI	11	Loss Factor Adjusted Price in the Price-Quantity Pair for energy in the Real-Time Market Submission for Facility f for Dispatch Interval di which corresponds to its Enablement Minimum for Contingency Reserve Raise	I
FEMCP_G_DI(di)	$/MWh	G	DI	11	Final Energy Market Clearing Price for Dispatch Interval di	I
SF(d)	{}	G	D	11	Set of Scheduled Facilities in Trading Day d	(13)
SSF(d)	{}	G	D	11	Set of Semi-Scheduled Facilities in Trading Day d	(15)

4.7.17.2 Contingency Reserve Lower Enablement Losses

$$ELCL\_F\_DI(f, di) = \begin{cases} max\Big(0, ELCLFactor\_F\_DI(f, di) \times TLF\_F\_D(f, di) \times DLF\_F\_D(f, di) \\ \times \frac{5}{60h} \times max(0, EMCL\_F\_DI(f, di)) \times EPCL\_F\_DI(f, di)\Big) & \text{for } f \in SF(d) \cup SSF(d) \\ 0 & \text{otherwise} \end{cases} \quad (271)$$

$$ELCLFactor\_F\_DI(f, di) = \begin{cases} 1 & \text{if } CLquantity\_F\_DI(f, di) > 0 \text{ and } MISPRICE\_F\_DI(f, di) = 0 \\ 0 & \text{otherwise} \end{cases} \quad (272)$$

$$EPCL\_F\_DI(f, di) = LFAOPCL\_F\_DI(f, di) - FEMCP\_G\_DI(di) \quad (273)$$

Variable	Units	SC	GR	Rule	Description	Ref
ELCL_F_DI(f, di)	$	F	DI	9.10.3D	Enablement Losses in respect of Contingency Reserve Lower for Facility f for Dispatch Interval di	(271)
ELCLFactor_F_DI(f, di)	Flag	F	DI	9.10.3D	Flag that is 1 when Facility f was enabled to provide, and provided, Contingency Reserve Lower in Dispatch Interval di	(272)

Variable	Units	SC	GR	Rule	Description	Ref
EPCL_F_DI(f, di)	$/MWh	F	DI	9.10.3D	Enablement price for Contingency Reserve Lower for Facility f for Dispatch Interval di	(273)
TLF_F_D(f, d)		F	D		Transmission Loss Factor for Facility f for Trading Day d	I
DLF_F_D(f, d)		F	D		Distribution Loss Factor for Facility f for Trading Day d	I
EMCL_F_DI(f, di)	MW	F	DI	11	Enablement Minimum for Contingency Reserve Lower for Facility f in Dispatch Interval di	I
CLquantity_F_DI(f, di)	MW	F	DI	9.10.10(c)	Contingency Reserve Lower enablement quantity for Facility f for Dispatch Interval di	(180)
MISPRICE_F_DI(f, di)	Flag	F	DI	9.9.9	Mispricing trigger for Facility f in Dispatch Interval di	(85)
LFAOPCL_F_DI(f, di)	$/MWh	F	DI	11	Loss Factor Adjusted Price in the Price-Quantity Pair for energy in the Real-Time Market Submission for Facility f for Dispatch Interval di which corresponds to its Enablement Minimum for Contingency Reserve Lower	I
FEMCP_G_DI(di)	$/MWh	G	DI	11	Final Energy Market Clearing Price for Dispatch Interval di	I
SF(d)	{}	G	D	11	Set of Scheduled Facilities in Trading Day d	(13)
SSF(d)	{}	G	D	11	Set of Semi-Scheduled Facilities in Trading Day d	(15)

4.7.17.3 RoCoF Control Service Enablement Losses

$$ELRCS\_F\_DI(f,di) = \begin{cases} max\Big(0, ELRCSFactor\_F\_DI(f,di) \times TLF\_F\_D(f,di) \times DLF\_F\_D(f,di) \\ \times \frac{5}{60h} \times max(0, EMRCS\_F\_DI(f,di)) \times EPRCS\_F\_DI(f,di)\Big) & \text{for } f \in SF(d) \cup SSF(d) \\ 0 & \text{otherwise} \end{cases} \quad (274)$$

$$ELRCSFactor\_F\_DI(f,di) = \begin{cases} 1 & \text{if } RoCoFquantity\_F\_DI(f,di) > 0 \text{ and } MISPRICE\_F\_DI(f,di) = 0 \\ 0 & \text{otherwise} \end{cases} \quad (275)$$

$$EPRCS\_F\_DI(f,di) = LFAOPRCS\_F\_DI(f,di) - FEMCP\_G\_DI(di) \quad (276)$$

Variable	Units	SC	GR	Rule	Description	Ref
ELRCS_F_DI(f, di)	$	F	DI	9.10.3D	Enablement Losses in respect of RoCoF Control Service for Facility f for Dispatch Interval di	(274)
ELRCSFactor_F_DI(f, di)	Flag	F	DI	9.10.3D	Flag that is 1 when Facility f was enabled to provide, and provided, RoCoF Control Service in Dispatch Interval di	(275)
EPRCS_F_DI(f, di)	$/MWh	F	DI	9.10.3D	Enablement price for RoCoF Control Service for Facility f for Dispatch Interval di	(276)
TLF_F_D(f, d)		F	D		Transmission Loss Factor for Facility f for Trading Day d	I
DLF_F_D(f, d)		F	D		Distribution Loss Factor for Facility f for Trading Day d	I

Variable	Units	SC	GR	Rule	Description	Ref
EMRCS_F_DI(f, di)	MW	F	DI	11	Enablement Minimum for RoCoF Control Service for Facility f in Dispatch Interval di	I
RoCoFquantity_F_DI(f, di)	MW	F	DI	9.10.14(c)	RoCoF Control Service enablement quantity for Facility f for Dispatch Interval di	(193)
MISPRICE_F_DI(f, di)	Flag	F	DI	9.9.9	Mispricing trigger for Facility f in Dispatch Interval di	(85)
LFAOPRCS_F_DI(f, di)	$/MWh	F	DI	11	Loss Factor Adjusted Price in the Price-Quantity Pair for energy in the Real-Time Market Submission for Facility f for Dispatch Interval di which corresponds to its Enablement Minimum for RoCoF Control Service	I
FEMCP_G_DI(di)	$/MWh	G	DI	11	Final Energy Market Clearing Price for Dispatch Interval di	I
SF(d)	{}	G	D	11	Set of Scheduled Facilities in Trading Day d	(13)
SSF(d)	{}	G	D	11	Set of Semi-Scheduled Facilities in Trading Day d	(15)

4.7.17.4 Regulation Raise Enablement Losses

$$ELRR\_F\_DI(f, di) = \begin{cases} max\Big(0, ELRRFactor\_F\_DI(f, di) \times TLF\_F\_D(f, di) \times DLF\_F\_D(f, di) \\ \times \frac{5}{60h} \times max(0, EMRR\_F\_DI(f, di)) \times EPRR\_F\_DI(f, di)\Big) & \text{for } f \in SF(d) \cup SSF(d) \\ 0 & \text{otherwise} \end{cases} \quad (277)$$

$$ELRRFactor\_F\_DI(f, di) = \begin{cases} 1 & \text{if } RRquantity\_F\_DI(f, di) > 0 \text{ and } MISPRICE\_F\_DI(f, di) = 0 \\ 0 & \text{otherwise} \end{cases} \quad (278)$$

$$EPRR\_F\_DI(f, di) = LFAOPRR\_F\_DI(f, di) - FEMCP\_G\_DI(di) \quad (279)$$

Variable	Units	SC	GR	Rule	Description	Ref
ELRR_F_DI(f, di)	$	F	DI	9.10.3F	Enablement Losses in respect of Regulation Raise for Facility f for Dispatch Interval di	(277)
ELRRFactor_F_DI(f, di)	Flag	F	DI	9.10.3F	Flag that is 1 when Facility f was enabled to provide, and provided, Regulation Raise in Dispatch Interval di	(278)
EPRR_F_DI(f, di)	$/MWh	F	DI	9.10.3F	Enablement price for Regulation Raise for Facility f for Dispatch Interval di	(279)
TLF_F_D(f, d)		F	D		Transmission Loss Factor for Facility f for Trading Day d	I
DLF_F_D(f, d)		F	D		Distribution Loss Factor for Facility f for Trading Day d	I
EMRR_F_DI(f, di)	MW	F	DI	11	Enablement Minimum for Regulation Raise for Facility f in Dispatch Interval di	I
RRquantity_F_DI(f, di)	MW	F	DI	9.10.22(c)	Regulation Raise enablement quantity for Facility f for Dispatch Interval di	(229)
MISPRICE_F_DI(f, di)	Flag	F	DI	9.9.9	Mispricing trigger for Facility f in Dispatch Interval di	(85)

Variable	Units	SC	GR	Rule	Description	Ref
LFAOPRR_F_DI(f, di)	$/MWh	F	DI	11	Loss Factor Adjusted Price in the Price-Quantity Pair for energy in the Real-Time Market Submission for Facility f for Dispatch Interval di which corresponds to its Enablement Minimum for Regulation Raise	I
FEMCP_G_DI(di)	$/MWh	G	DI	11	Final Energy Market Clearing Price for Dispatch Interval di	I
SF(d)	{}	G	D	11	Set of Scheduled Facilities in Trading Day d	(13)
SSF(d)	{}	G	D	11	Set of Semi-Scheduled Facilities in Trading Day d	(15)

4.7.17.5 Regulation Lower Enablement Losses

$$ELRL\_F\_DI(f,di) = \begin{cases} max\Big(0, ELRLFactor\_F\_DI(f,di) \times TLF\_F\_D(f,di) \times DLF\_F\_D(f,di) \\ \times \frac{5}{60h} \times max(0, EMRL\_F\_DI(f,di)) \times EPRL\_F\_DI(f,di)\Big) & \text{for } f \in SF(d) \cup SSF(d) \\ 0 & \text{otherwise} \end{cases} \quad (280)$$

$$ELRLFactor\_F\_DI(f,di) = \begin{cases} 1 & \text{if } RLquantity\_F\_DI(f,di) > 0 \text{ and } MISPRICE\_F\_DI(f,di) = 0 \\ 0 & \text{otherwise} \end{cases} \quad (281)$$

$$EPRL\_F\_DI(f,di) = LFAOPRL\_F\_DI(f,di) - FEMCP\_G\_DI(di) \quad (282)$$

Variable	Units	SC	GR	Rule	Description	Ref
ELRL_F_DI(f, di)	$	F	DI	9.10.3G	Enablement Losses in respect of Regulation Lower for Facility f for Dispatch Interval di	(280)
ELRLFactor_F_DI(f, di)	Flag	F	DI	9.10.3G	Flag that is 1 when Facility f was enabled to provide, and provided, Regulation Lower in Dispatch Interval di	(281)
EPRL_F_DI(f, di)	$/MWh	F	DI	9.10.3G	Enablement price for Regulation Lower for Facility f for Dispatch Interval di	(282)
TLF_F_D(f, d)		F	D		Transmission Loss Factor for Facility f for Trading Day d	I
DLF_F_D(f, d)		F	D		Distribution Loss Factor for Facility f for Trading Day d	I
EMRL_F_DI(f, di)	MW	F	DI	11	Enablement Minimum for Regulation Lower for Facility f in Dispatch Interval di	I
RLquantity_F_DI(f, di)	MW	F	DI	9.10.23(c)	Regulation Lower enablement quantity for Facility f for Dispatch Interval di	(245)
MISPRICE_F_DI(f, di)	Flag	F	DI	9.9.9	Mispricing trigger for Facility f in Dispatch Interval di	(85)
LFAOPRL_F_DI(f, di)	$/MWh	F	DI	11	Loss Factor Adjusted Price in the Price-Quantity Pair for energy in the Real-Time Market Submission for Facility f for Dispatch Interval di which corresponds to its Enablement Minimum for Regulation Lower	I
FEMCP_G_DI(di)	$/MWh	G	DI	11	Final Energy Market Clearing Price for Dispatch Interval di	I
SF(d)	{}	G	D	11	Set of Scheduled Facilities in Trading Day d	(13)

Variable	Units	SC	GR	Rule	Description	Ref
SSF(d)	{}	G	D	11	Set of Semi-Scheduled Facilities in Trading Day d	(15)

4.7.18 FCESS Uplift Shares

For cost recovery purposes, the FCESS Uplift Payment for a Registered Facility in a Dispatch Interval is divided evenly between the different FCESS that were provided by the Registered Facility.

$$FCESSCount\_F\_DI(f,di) = \begin{cases} ELCRFactor\_F\_DI(f,di) + ELCLFactor\_F\_DI(f,di) \\ +ELRCSFactor\_F\_DI(f,di) + ELRRFactor\_F\_DI(f,di) \\ +ELRLFactor\_F\_DI(f,di) & \text{for } f \in SF(d) \cup SSF(d) \\ 0 & \text{otherwise} \end{cases} \quad (283)$$

$$FCESSUShare\_F\_DI(f,di) = \begin{cases} \dfrac{FCESSUpayment\_F\_DI(f,di)}{FCESSCount\_F\_DI(f,di)} & \text{for } FCESSCount\_F\_DI(f,di) > 0 \\ 0 & \text{otherwise} \end{cases} \quad (284)$$

$$FCESSUShareCR\_F\_DI(f,di) = \begin{cases} FCESSUShare\_F\_DI(f,di) \times ELCRFactor\_F\_DI(f,di) & \text{for } f \in SF(d) \cup SSF(d) \\ & \text{and } RTMSuspFlag\_G\_DI(di) = 0 \\ 0 & \text{otherwise} \end{cases} \quad (285)$$

$$FCESSUShareCL\_F\_DI(f,di) = \begin{cases} FCESSUShare\_F\_DI(f,di) \times ELCLFactor\_F\_DI(f,di) & \text{for } f \in SF(d) \cup SSF(d) \\ & \text{and } RTMSuspFlag\_G\_DI(di) = 0 \\ 0 & \text{otherwise} \end{cases} \quad (286)$$

$$FCESSUShareRCS\_F\_DI(f,di) = \begin{cases} FCESSUShare\_F\_DI(f,di) \times ELRCSFactor\_F\_DI(f,di) & \text{for } f \in SF(d) \cup SSF(d) \\ & \text{and } RTMSuspFlag\_G\_DI(di) = 0 \\ 0 & \text{otherwise} \end{cases} \quad (287)$$

$$FCESSUShareRR\_F\_DI(f,di) = \begin{cases} FCESSUShare\_F\_DI(f,di) \times ELRRFactor\_F\_DI(f,di) & \text{for } f \in SF(d) \cup SSF(d) \\ & \text{and } RTMSuspFlag\_G\_DI(di) = 0 \\ 0 & \text{otherwise} \end{cases} \quad (288)$$

$$FCESSUShareRL\_F\_DI(f,di) = \begin{cases} FCESSUShare\_F\_DI(f,di) \times ELRLFactor\_F\_DI(f,di) & \text{for } f \in SF(d) \cup SSF(d) \\ & \text{and } RTMSuspFlag\_G\_DI(di) = 0 \\ 0 & \text{otherwise} \end{cases} \quad (289)$$

Variable	Units	SC	GR	Rule	Description	Ref
FCESSCount_F_DI(f, di)		F	DI	9.10.3I	Number of FCESS Services to be allocated a share of the FCESS Uplift Payment for Facility f for Dispatch Interval di	(283)
FCESSUShare_F_DI(f, di)	$	F	DI	9.10.3J	Share of FCESS Uplift Payments for Facility f for Dispatch Interval di	(284)

Variable	Units	SC	GR	Rule	Description	Ref
FCESSUShareCR_F_DI(f, di)	$	F	DI	9.10.3K	Share of FCESS Uplift Payments to be allocated to Contingency Reserve Raise for Facility f for Dispatch Interval di	(285)
FCESSUShareCL_F_DI(f, di)	$	F	DI	9.10.3L	Share of FCESS Uplift Payments to be allocated to Contingency Reserve Lower for Facility f for Dispatch Interval di	(286)
FCESSUShareRCS_F_DI(f, di)	$	F	DI	9.10.3M	Share of FCESS Uplift Payments to be allocated to RoCoF Control Service for Facility f for Dispatch Interval di	(287)
FCESSUShareRR_F_DI(f, di)	$	F	DI	9.10.3N	Share of FCESS Uplift Payments to be allocated to Regulation Raise for Facility f for Dispatch Interval di	(288)
FCESSUShareRL_F_DI(f, di)	$	F	DI	9.10.3O	Share of FCESS Uplift Payments to be allocated to Regulation Lower for Facility f for Dispatch Interval di	(289)
ELCRFactor_F_DI(f, di)	Flag	F	DI	9.10.3C	Flag that is 1 when Facility f was enabled to provide, and provided, Contingency Reserve Raise in Dispatch Interval di	(269)
ELCLFactor_F_DI(f, di)	Flag	F	DI	9.10.3D	Flag that is 1 when Facility f was enabled to provide, and provided, Contingency Reserve Lower in Dispatch Interval di	(272)
ELRCSFactor_F_DI(f, di)	Flag	F	DI	9.10.3D	Flag that is 1 when Facility f was enabled to provide, and provided, RoCoF Control Service in Dispatch Interval di	(275)
ELRRFactor_F_DI(f, di)	Flag	F	DI	9.10.3F	Flag that is 1 when Facility f was enabled to provide, and provided, Regulation Raise in Dispatch Interval di	(278)
ELRLFactor_F_DI(f, di)	Flag	F	DI	9.10.3G	Flag that is 1 when Facility f was enabled to provide, and provided, Regulation Lower in Dispatch Interval di	(281)
FCESSUpayment_F_DI(f, di)	$	F	DI	9.10.27L	FCESS Uplift Payment amount payable for Facility f for Dispatch Interval di	(267)
RTMSuspFlag_G_DI(di)	Flag	G	DI	9.10.3K, 9.10.3L, 9.10.3M, 9.10.3N, 9.10.3O	Flag that is 1 if the Real-Time Market was suspended in Dispatch Interval di, and 0 otherwise	I
SF(d)	{}	G	D	11	Set of Scheduled Facilities in Trading Day d	(13)
SSF(d)	{}	G	D	11	Set of Semi-Scheduled Facilities in Trading Day d	(15)

4.8 Reserve Capacity

Reserve Capacity is split into the following parts:

- Capacity Payments - Payment to Market Participants for unallocated Capacity Credits.
- Capacity Credit Over-allocations Payment - Payment to Market Participants for receiving more Capacity Credit Allocations than its IRCR.
- Supplementary Capacity Payments - Payment to Market Participants associated with a Supplementary Capacity Contract.
- TRCC Charges - Charge to Market Participants to fund the cost of Capacity up to the Reserve Capacity Requirement.
- SRCC Charges - Charge to Market Participants to fund the payment of Capacity in excess of the Reserve Capacity Requirement.

- Capacity Cost Refund - Charge to Market Participants resulting from failure to meet obligations relating to Capacity Credits.
- Intermittent Load Refunds - Charge to Market Participants for Intermittent Load Refunds.

$$RCSA\_P\_D(p,d) = CPP\_P\_D(p,d) - CPC\_P\_D(p,d) \tag{290}$$

$$\begin{aligned} CPP\_P\_D(p,d) = CCSA\_P\_D(p,d) - IMLR\_P\_D(p,d) + SUPCAPSA\_P\_D(p,d) \\ - CCR\_P\_D(p,d) + CCAOASA\_P\_D(p,d) \end{aligned} \tag{291}$$

$$CPC\_P\_D(p,d) = TRCC\_P\_D(p,d) + SRCC\_P\_D(p,d) \tag{292}$$

Variable	Units	SC	GR	Rule	Description	Ref
RCSA_P_D(p, d)	$	P	D	9.8.2	Reserve Capacity settlement amount for participant p in Trading Day d	(290)
CPP_P_D(p, d)	$	P	D	9.8.3	Capacity Provider Payment for participant p in Trading Day d	(291)
CPC_P_D(p, d)	$	P	D	9.8.4	Capacity Purchaser Charge for participant p in Trading Day d	(292)
CCSA_P_D(p, d)	$	P	D	9.8.3(b)	Payment for non-allocated Capacity Credits for participant p in Trading Day d	(293)
IMLR_P_D(p, d)	$	P	D	4.29.3(dA)	Intermittent Load Refunds for participant p in Trading Day d	(395)
SUPCAPSA_P_D(p, d)	$	P	D	9.8.3(d)	Payment to be made under Supplementary Capacity Contracts to participant p in Trading Day d	I
CCR_P_D(p, d)	$	P	D	4.26.2E	Capacity Cost Refund charged to participant p in Trading Day d	(326)
CCAOASA_P_D(p, d)	$	P	D	9.8.3(f)	Capacity Credit Allocation over-allocation Payment (when Capacity Credit Allocations exceed IRCR) for participant p in Trading Day d	(296)
TRCC_P_D(p, d)	$	P	D	9.8.4(a)	Charge to cover the Targeted Reserve Capacity Cost for participant p in Trading Day d	(300)
SRCC_P_D(p, d)	$	P	D	9.8.4(b)	Charge to cover the Shared Reserve Capacity Cost for participant p in Trading Day d	(315)

4.8.1 Capacity Payments

$$CCSA\_P\_D(p,d) = \sum_{f \in CCF(p,d)} CCSA\_F\_D(f,d) \tag{293}$$

$$CCSA\_F\_D(f,d) = (CC\_F\_D(f,d) - CCAM\_F\_D(f,d)) \times RCP\_F\_D(f,d) \tag{294}$$

$$CCAM\_F\_D(f,d) = \sum_{a \in CCAM(f,d)} CCAQ\_A\_D(a) \tag{295}$$

Variable	Units	SC	GR	Rule	Description	Ref
CCSA_P_D(p, d)	$	P	D	9.8.3(b)	Payment for non-allocated Capacity Credits for participant p in Trading Day d	(293)
CCSA_F_D(f, d)	$	F	D		Payment for non-allocated Capacity Credits for Facility f in Trading Day d	(294)

Variable	Units	SC	GR	Rule	Description	Ref
CC_F_D(f, d)	MW	F	D	11	Capacity Credits associated with Facility f on Trading Day d	I
CCAM_F_D(f, d)	MW	F	D	9.8.3(b)iii	Number of Capacity Credits allocated to another Market Participant in relation to Facility f in Trading Day d	(295)
CCAQ_A_D(a)	MW	A	D		Number of Capacity Credits associated with Capacity Credit Allocation a	I
RCP_F_D(f, d)	$/MW	F	D	11	Facility Daily Reserve Capacity Price for Facility f in Trading Day d	(391)
CCAM(f, d)	{}	F	D		Set of Capacity Credit Allocations made by Facility f in Trading Day d	I
CCF(d)	{}	G	D		Set of Facilities with Capacity Credits on Trading Day d	I

4.8.2 Capacity Credit Over-Allocations Payment

$$CCAOASA\_P\_D(p,d) = CCAOA\_P\_D(p,d) \times EAP\_P\_D(p,d) \tag{296}$$

$$CCAOA\_P\_D(p,d) = max(0, CCAR\_P\_D(p,d) - IRCR\_P\_M(p,d)) \tag{297}$$

$$EAP\_P\_D(p,d) = \begin{cases} \dfrac{\sum_{a \in CCAR(p,d)} CCAQ\_A\_D(a) \times RCP\_F\_D(A2F(a),d)}{CCAR\_P\_D(p,d)} & \text{for } CCAR\_P\_D(p,d) \neq 0 \\ 0 & \text{for } CCAR\_P\_D(p,d) = 0 \end{cases} \tag{298}$$

$$CCAR\_P\_D(p,d) = \sum_{a \in CCAR(p,d)} CCAQ\_A\_D(a) \tag{299}$$

Variable	Units	SC	GR	Rule	Description	Ref
CCAOASA_P_D(p, d)	$	P	D	9.8.3(f)	Capacity Credit Allocation over-allocation Payment (when Capacity Credit Allocations exceed IRCR) for participant p in Trading Day d	(296)
CCAOA_P_D(p, d)	MW	P	D		Number of Capacity Credit Allocations received by participant p in excess of its IRCR for Trading Day d	(297)
IRCR_P_M(p, m)	MW	P	M	4.28.7, 4.28.11A	Individual Reserve Capacity Requirement for participant p for Trading Month m	(304)
CCAR_P_D(p, d)	MW	P	D		Number of Capacity Credits received by participant p through Capacity Credit Allocations in Trading Day d	(299)
EAP_P_D(p, d)	$/MW	P	D	9.8.3(i)	Excess allocation price for participant p in Trading Day d	(298)
RCP_F_D(f, d)	$/MW	F	D	11	Facility Daily Reserve Capacity Price for Facility f in Trading Day d	(391)
CCAQ_A_D(a)	MW	A	D		Number of Capacity Credits associated with Capacity Credit Allocation a	I
CCAR(p, d)	{}	P	D		Set of Capacity Credit Allocations received by participant p (from Facility f) in Trading Day d	I

4.8.3 TRCC Charges

$$TRCC\_P\_D(p,d) = \begin{cases} SS\_P\_D(p,d) \times TRCC\_G\_D(d) & \text{for } TRCC\_G\_D(d) \neq 0 \\ 0 & \text{otherwise} \end{cases} \tag{300}$$

$$SS\_P\_D(p,d) = \frac{CCASF\_P\_D(p,d)}{CCASF\_G\_D(d)} \tag{301}$$

$$CCASF\_G\_D(d) = \sum_{p \in P(d)} CCASF\_P\_D(p,d) \tag{302}$$

$$CCASF\_P\_D(p,d) = max(0, IRCR\_P\_M(p,d) - CCAR\_P\_D(p,d)) \tag{303}$$

$$IRCR\_P\_M(p,m) = \begin{cases} IRCR3\_P\_M(p,m) & \text{if } IRCR3NullFlag\_G\_M(m) = 0 \\ IRCR2\_P\_M(p,m) & \text{if } IRCR2NullFlag\_G\_M(m) = 0 \text{ and } IRCR3NullFlag\_G\_M(m) = 1 \\ IRCR1\_P\_M(p,m) & \text{if } IRCR1NullFlag\_G\_M(m) = 0 \text{ and } IRCR3NullFlag\_G\_M(m) = 1 \\ & \text{and } IRCR2NullFlag\_G\_M(m) = 1 \\ estIRCR0\_P\_M(p,m) & \text{otherwise} \end{cases} \tag{304}$$

Variable	Units	SC	GR	Rule	Description	Ref
TRCC_P_D(p, d)	$	P	D	9.8.4(a)	Charge to cover the Targeted Reserve Capacity Cost for participant p in Trading Day d	(300)
TRCC_G_D(d)	$	G	D	4.28.1(a)	Targeted Reserve Capacity Cost in Trading Day d	(313)
SS_P_D(p, d)		P	D	9.8.4(d)	Shortfall share for participant p in Trading Day d	(301)
CCASF_G_D(d)	MW	G	D		The sum of the amount IRCR exceeds Capacity Credit Allocations received by Market Participants in Trading Day d	(302)
CCASF_P_D(p, d)	MW	P	D		The amount IRCR exceeds Capacity Credit Allocations received by participant p in Trading Day d	(303)
IRCR_P_M(p, m)	MW	P	M	4.28.7, 4.28.11A	Individual Reserve Capacity Requirement for participant p for Trading Month m	(304)
IRCR3_P_M(p, m)	MW	P	M	4.28.11A	Third adjustment of the Individual Reserve Capacity Requirement for participant p for Trading Month m	I
IRCR2_P_M(p, m)	MW	P	M	4.28.11A	Second adjustment of the Individual Reserve Capacity Requirement for participant p for Trading Month m	I
IRCR1_P_M(p, m)	MW	P	M	4.28.11A	First adjustment of the Individual Reserve Capacity Requirement for participant p for Trading Month m	I
estIRCR0_P_M(p, m)	MW	P	M	4.28.7	Individual Reserve Capacity Requirement (prior to any adjustments) (including estimation) for participant p for Trading Month m	(420)
IRCR3NullFlag_G_M(m)	Flag	G	M		Flag that is 1 when the third adjustment of the Individual Reserve Capacity Requirements have not been published for Trading Month m, and 0 otherwise	I
IRCR2NullFlag_G_M(m)	Flag	G	M		Flag that is 1 when the second adjustment of the Individual Reserve Capacity Requirements have not been published for Trading Month m, and 0 otherwise	I

Variable	Units	SC	GR	Rule	Description	Ref
IRCR1NullFlag_G_M(m)	Flag	G	M		Flag that is 1 when the first adjustment of the Individual Reserve Capacity Requirements have not been published for Trading Month m, and 0 otherwise	I
CCAR_P_D(p, d)	MW	P	D		Number of Capacity Credits received by participant p through Capacity Credit Allocations in Trading Day d	(299)
P(d)	{}	G	D		Set of participants (Rule Participants, ERA and the Coordinator) in Trading Day d	(3)

4.8.3.1 Targeted Reserve Capacity Cost

MR 4.28.1(a) outlines the Targeted Reserve Capacity Cost as the cost of Capacity Credits acquired by AEMO (not traded bilaterally through a Capacity Credit Allocation) to just meet the Reserve Capacity Requirement. To implement this the following steps are followed.

Step 1: Determine how many Capacity Credits need to be acquired by AEMO to just meet the Reserve Capacity Requirement.

$$TRCCQ\_G\_D(d) = min(RCR\_G\_CY(d), CC\_G\_D(d)) - (CCAR\_G\_D(d) - CCAOA\_G\_D(d)) \tag{305}$$

$$CC\_G\_D(d) = \sum_{f \in CCF(d)} CC\_F\_D(f, d) \tag{306}$$

$$CCAR\_G\_D(d) = \sum_{p \in P(d)} CCAR\_P\_D(p, d) \tag{307}$$

$$CCAOA\_G\_D(d) = \sum_{p \in P(d)} CCAOA\_P\_D(p, d) \tag{308}$$

Step 2: Identify the set of all Capacity Credits acquired by AEMO and order them by descending price.

$$CCTRCC\_G\_D(d) = \{t : T2P(t) \in P(d) \text{ or } T2F(t)) \in CCF(d)\}$$
$$\text{ordered by descending } CCP\_T\_D(t, d) \text{ and then alphabetically, where } t \in CCTRCC\_G\_D(d) \tag{309}$$

$$CCP\_T\_D(t, d) = \begin{cases} EAP\_P\_D(t, d) & \text{for } t \in P(d) \\ RCP\_F\_D(T2F(t), d) & \text{for } t \in CCF(d) \end{cases} \tag{310}$$

$$CCQ\_T\_D(t, d) = \begin{cases} CCAOA\_P\_D(t, d) & \text{for } t \in P(d) \\ CC\_F\_D(t, d) - CCAM\_F\_D(t, d) & \text{for } t \in CCF(d) \end{cases} \tag{311}$$

$$TRCCrank\_T\_D(t, d) = \text{Position of price-quantity pair } t \text{ in } CCTRCC\_G\_D(d) \tag{312}$$

Step 3: Determine the cost of Capacity Credits acquired by AEMO to just meet the Reserve Capacity Target.

$$TRCC\_G\_D(d) = \sum_{t \in CCTRCC\_G\_D} CCP\_T\_D(t, d) \times min\left(CCQ\_T\_D(t, d), max(0, TRCCQ\_G\_D(d) - CCCQ\_T\_D(t, d))\right) \tag{313}$$

$$CCCQ\_T\_D(t, d) = \sum_{\substack{u \in CCTRCC\_G\_D(d) \\ TRCCrank\_T\_D(u,d) < TRCCrank\_T\_D(t,d)}} CCQ\_T\_D(u, d) \tag{314}$$

Variable	Units	SC	GR	Rule	Description	Ref
TRCCQ_G_D(d)	MW	G	D	4.28.1(a)	The number of Capacity Credits acquired by AEMO to meet the Reserve Capacity Requirement after allowing for Capacity Credits traded bilaterally for Trading Day d	(305)
RCR_G_CY(cy)	MW	G	CY	4.6.1	Reserve Capacity Requirement for Capacity Year cy	I
CC_G_D(d)	MW	G	D		Bilaterally tradeable Capacity Credits for Trading Day d	(306)
CC_F_D(f, d)	MW	F	D	11	Capacity Credits associated with Facility f on Trading Day d	I
CCAR_G_D(d)	MW	G	D		Number of Capacity Credits received through Capacity Credit Allocations in Trading Day d	(307)
CCAR_P_D(p, d)	MW	P	D		Number of Capacity Credits received by participant p through Capacity Credit Allocations in Trading Day d	(299)
CCAM_F_D(f, d)	MW	F	D	9.8.3(b)iii	Number of Capacity Credits allocated to another Market Participant in relation to Facility f in Trading Day d	(295)
CCAOA_G_D(d)	MW	G	D		Sum of Capacity Credit Allocations received in excess of a Market Participant's IRCR for Trading Day d	(308)
CCAOA_P_D(p, d)	MW	P	D		Number of Capacity Credit Allocations received by participant p in excess of its IRCR for Trading Day d	(297)
CCTRCC_G_D(d)	{}	G	D		Ordered set of all price-quantity pairs associated with Capacity Credits used in the calculation of the Targeted Reserve Capacity Cost for Trading Day d (ordered by descending $TRCCrank\_T\_D(t,d)$)	(309)
CCP_T_D(t, d)	$/MW	T	D		Daily capacity price for tranche t in Trading Day d	(310)
CCQ_T_D(t, d)	MW	T	D		Capacity Credits associated with tranche t on Trading Day d	(311)
CCCQ_T_D(t, d)	MW	T	D		Sum of Capacity Credits with a lower $TRCCrank\_T\_D(t,d)$ than tranche t on Trading Day d	(314)
RCP_F_D(f, d)	$/MW	F	D	11	Facility Daily Reserve Capacity Price for Facility f in Trading Day d	(391)
EAP_P_D(p, d)	$/MW	P	D	9.8.3(i)	Excess allocation price for participant p in Trading Day d	(298)
TRCCrank_T_D(t, d)		T	D		The element number of tranche t in $CCTRCC\_G\_D(d)$ where 1 is the price-quantity pair with the highest price	(312)
TRCC_G_D(d)	$	G	D	4.28.1(a)	Targeted Reserve Capacity Cost in Trading Day d	(313)
CCF(d)	{}	G	D		Set of Facilities with Capacity Credits on Trading Day d	I
P(d)	{}	G	D		Set of participants (Rule Participants, ERA and the Coordinator) in Trading Day d	(3)

4.8.4 SRCC Charges

$$SRCC\_P\_D(p,d) = IRCRS\_P\_M(p,d) \times SRCC\_G\_D(d) \tag{315}$$

$$\begin{aligned} SRCC\_G\_D(d) = {} & ECCSA\_G\_D(d) + SUPCAPSA\_G\_D(d) - IMLR\_G\_D(d) \\ & - RCSD\_G\_D(d) - DSPRCSD\_G\_D(d) - CCR\_G\_D(d) \end{aligned} \tag{316}$$

$$ECCSA\_G\_D(d) = CCSA\_G\_D(d) + CCAOASA\_G\_D(d) - TRCC\_G\_D(d) \tag{317}$$

$$SUPCAPSA\_G\_D(d) = \sum_{p \in P(d)} SUPCAPSA\_P\_D(p,d) \tag{318}$$

$$IMLR\_G\_D(d) = \sum_{p \in P(d)} IMLR\_P\_D(p,d) \tag{319}$$

$$CCSA\_G\_D(d) = \sum_{p \in P(d)} CCSA\_P\_D(p,d) \tag{320}$$

$$CCAOASA\_G\_D(d) = \sum_{p \in P(d)} CCAOASA\_P\_D(p,d) \tag{321}$$

$$IRCRS\_P\_M(p,m) = \frac{IRCR\_P\_M(p,m)}{IRCR\_G\_M(m)} \tag{322}$$

$$IRCR\_G\_M(m) = \sum_{p \in P\_M(m)} IRCR\_P\_M(p,m) \tag{323}$$

$$CCR\_G\_D(d) = \sum_{i \in I(d)} CCR\_G\_I(i) \tag{324}$$

$$CCR\_G\_I(i) = \sum_{p \in P(i)} CCR\_P\_I(p,i) \tag{325}$$

Variable	Units	SC	GR	Rule	Description	Ref
SRCC_P_D(p, d)	$	P	D	9.8.4(b)	Charge to cover the Shared Reserve Capacity Cost for participant p in Trading Day d	(315)
SRCC_G_D(d)	$	G	D	4.28.4	Shared Reserve Capacity Cost for Trading Day d	(316)
ECCSA_G_D(d)	$	G	D	4.28.4(a)	Payments made for Capacity Credits in excess of the Reserve Capacity Requirement for Trading Day d	(317)
SUPCAPSA_G_D(d)	$	G	D	4.28.4(b)	Payment to be made under Supplementary Capacity Contracts in Trading Day d	(318)
IMLR_G_D(d)	$	G	D	4.28.4(c)	Intermittent Load Refunds for Trading Day d	(319)
CCSA_G_D(d)	$	G	D		Payment for non-allocated Capacity Credits in Trading Day d	(320)
CCAOASA_G_D(d)	$	G	D		Capacity Credit Allocation over-allocation Payment (when Capacity Credit Allocations exceed IRCR) in Trading Day d	(321)
IRCRS_P_M(p, m)		P	M	9.8.4(f)	Capacity share for participant p for Trading Month m	(322)
IRCR_G_M(m)	MW	G	M		Sum of the all Individual Reserve Capacity Requirement for Trading Month m	(323)
CCR_G_D(d)	$	G	D	4.28.4(cA)	Capacity Cost Refunds charged in Trading Day d	(324)
CCR_G_I(i)	$	G	I	4.26.6(b)	Capacity Cost Refunds charged in Trading Interval i	(325)

Variable	Units	SC	GR	Rule	Description	Ref
CCAOASA_P_D(p, d)	$	P	D	9.8.3(f)	Capacity Credit Allocation over-allocation Payment (when Capacity Credit Allocations exceed IRCR) for participant p in Trading Day d	(296)
CCR_P_I(p, i)	$	P	I	4.26.2F	Trading Interval Capacity Cost Refund charged to participant p in Trading Interval i	(327)
CCSA_P_D(p, d)	$	P	D	9.8.3(b)	Payment for non-allocated Capacity Credits for participant p in Trading Day d	(293)
DSPRCSD_G_D(d)	$	G	D	4.28.4(b), 4.28.4(d)	Total amount drawn under a DSP Reserve Capacity Security by AEMO for Trading Day d	I
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I
IMLR_P_D(p, d)	$	P	D	4.29.3(dA)	Intermittent Load Refunds for participant p in Trading Day d	(395)
IRCR_P_M(p, m)	MW	P	M	4.28.7, 4.28.11A	Individual Reserve Capacity Requirement for participant p for Trading Month m	(304)
P(d)	{}	G	D		Set of participants (Rule Participants, ERA and the Coordinator) in Trading Day d	(3)
P_M(m)	{}	G	M		Set of participants (Rule Participants, ERA and the Coordinator) in Trading Month m	(1)
RCSD_G_D(d)	$	G	D	4.28.4(b), 4.28.4(d)	Total amount drawn under a Reserve Capacity Security by AEMO for Trading Day d	I
SUPCAPSA_P_D(p, d)	$	P	D	9.8.3(d)	Payment to be made under Supplementary Capacity Contracts to participant p in Trading Day d	I
TRCC_G_D(d)	$	G	D	4.28.1(a)	Targeted Reserve Capacity Cost in Trading Day d	(313)

4.8.5 Capacity Cost Refunds

4.8.5.1 Refund Aggregations

$$CCR\_P\_D(p,d) = \sum_{i \in I(d)} CCR\_P\_I(p,i) \tag{326}$$

$$CCR\_P\_I(p,i) = GCCR\_P\_I(p,i) + DSPCCR\_P\_I(p,i) \tag{327}$$

$$GCCR\_P\_I(p,i) = min(MAXPGR\_P\_CY(p,i) - CGCCR\_P\_I(p,i), GRCDR\_P\_I(p,i) + NSR\_P\_I(p,i)) \tag{328}$$

$$CGCCR\_P\_I(p,i) = CGCCRstart\_P\_D(p,d) + \sum_{j \in PITD(i)} GCCR\_P\_I(p,j) \tag{329}$$

$$GRCDR\_P\_I(p,i) = \sum_{f \in SF(p,i) \cup SSF(p,i) \cup NSF(p,i) \cup indSF(p,i) \cup indSSF(p,i) \cup indNSF(p,i)} FRCDR\_F\_I(f,i) \tag{330}$$

$$DSPCCR\_P\_I(p,i) = \sum_{f \in DSP(p,i) \cup indDSP(p,i)} DSPCCR\_F\_I(f,i) \tag{331}$$

$$DSPCCR\_F\_I(f,i) = min(MAXFR\_F\_CY(f,i) - CDSPCCR\_F\_I(f,i), DSPCSR\_F\_I(f,i) + FRCDR\_F\_I(f,i)) \tag{332}$$

$$CDSPCCR\_F\_I(f,i) = CDSPCCRstart\_F\_D(f,i) + \sum_{j \in PITD(i)} DSPCCR\_F\_I(f,j) \quad (333)$$

Variable	Units	SC	GR	Rule	Description	Ref
CCR_P_D(p, d)	$	P	D	4.26.2E	Capacity Cost Refund charged to participant p in Trading Day d	(326)
CCR_P_I(p, i)	$	P	I	4.26.2F	Trading Interval Capacity Cost Refund charged to participant p in Trading Interval i	(327)
GCCR_P_I(p, i)	$	P	I	4.26.3	Generation Capacity Cost Refund for participant p in Trading Interval i	(328)
DSPCCR_P_I(p, i)	$	P	I	4.26.2F(b)	Sum of DSP Capacity Cost Refunds for participant p in Trading Interval i	(331)
DSPCCR_F_I(f, i)	$	F	I	4.26.3A	DSP Capacity Cost Refund for Facility f in Trading Interval i	(332)
CDSPCCR_F_I(f, i)	$	F	I	4.26.3A	Sum of DSP Capacity Cost Refund for Facility f in Trading Intervals in the same Capacity Year as, but prior to, Trading Interval i	(333)
CDSPCCRstart_F_D(f, d)	$	F	D	4.26.3A	Sum of DSP Capacity Cost Refund for Facility f in the same Capacity Year as, but prior to, Trading Day d	I
CGCCR_P_I(p, i)	$	P	I	4.26.3	Sum of Generation Capacity Cost Refund for participant p in Trading Intervals in the same Capacity Year as, but prior to, Trading Interval i	(329)
CGCCRstart_P_D(p, d)	$	P	D	4.26.3	Sum of Generation Capacity Cost Refund for participant p in the same Capacity Year as, but prior to, Trading Day d	I
MAXPGR_P_CY(p, cy)	$	P	CY	11	Maximum Participant Generation Refund for participant p in Capacity Year cy	(334)
GRCDR_P_I(p, i)	$	P	I	4.26.1I	Generation Reserve Capacity Deficit Refund for participant p in Trading Interval i	(330)
FRCDR_F_I(f, i)	$	F	I	4.26.1A	Facility Reserve Capacity Deficit Refund for Facility f in Trading Interval i	(352)
DSPCSR_F_I(f, i)	$	F	I	4.26.3A(b)i	DSP capacity shortfall refund for Facility f in Trading Interval i	(350)
NSR_P_I(p, i)	$	P	I	4.26.3(b)	Net STEM Refund for participant p in Trading Interval i	(338)
MAXFR_F_CY(f, cy)	$	F	CY	11	Maximum Facility Refund for Facility f in Capacity Year cy	(336)
SF(d)	{}	G	D	11	Set of Scheduled Facilities in Trading Day d	(13)
SSF(d)	{}	G	D	11	Set of Semi-Scheduled Facilities in Trading Day d	(15)
NSF(d)	{}	G	D	11	Set of Non-Scheduled Facilities in Trading Day d	(17)
DSP(d)	{}	G	D	11	Set of Demand Side Programmes in Trading Day d	(11)
PITD(i)	{}	G	I		Set of Trading Intervals in the same Trading Day as, but prior to, Trading Interval i	I
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.8.5.2 Refund Caps

The calculations of $MAXFR\_F\_CY$, $MAXGR\_P\_CY$ and $MAXPGR\_P\_CY$ require calculations for all Trading Days in the Capacity Year. This is important to note as very few other calculations require this forward-looking calculation. In order to perform this forward-looking calculation, the following assumptions are made for future Trading Days:

- $CC\_F\_D(f, d+1) = CC\_F\_D(f, d)$
- The Facility remains registered to the current Market Participant for the remainder of the Capacity Year.

$$MAXPGR\_P\_CY(p, cy) = \sum_{d \in D\_CY(cy)} MAXPGR\_P\_D(p, d) \tag{334}$$

$$MAXPGR\_P\_D(p, d) = \sum_{f \in SF(p,d) \cup SSF(p,d) \cup NSF(p,d) \cup indSF(p,d) \cup indSSF(p,d) \cup indNSF(p,d)} MAXFR\_F\_D(f, d) \tag{335}$$

$$MAXFR\_F\_CY(f, cy) = \sum_{d \in D\_CY(cy)} MAXFR\_F\_D(f, d) \tag{336}$$

$$MAXFR\_F\_D(f, d) = CC\_F\_D(f, d) \times RCP\_F\_D(f, d) \tag{337}$$

Variable	Units	SC	GR	Rule	Description	Ref
MAXPGR_P_CY(p, cy)	$	P	CY	11	Maximum Participant Generation Refund for participant p in Capacity Year cy	(334)
MAXPGR_P_D(p, d)	$	P	D	11	Maximum Participant Generation Refund for participant p contributed by Trading Day d	(335)
MAXFR_F_CY(f, cy)	$	F	CY	11	Maximum Facility Refund for Facility f in Capacity Year cy	(336)
MAXFR_F_D(f, d)	$	F	D	11	Maximum Facility Refund for Facility f contributed by Trading Day d	(337)
CC_F_D(f, d)	MW	F	D	11	Capacity Credits associated with Facility f on Trading Day d	I
RCP_F_D(f, d)	$/MW	F	D	11	Facility Daily Reserve Capacity Price for Facility f in Trading Day d	(391)
SF(d)	{}	G	D	11	Set of Scheduled Facilities in Trading Day d	(13)
SSF(d)	{}	G	D	11	Set of Semi-Scheduled Facilities in Trading Day d	(15)
NSF(d)	{}	G	D	11	Set of Non-Scheduled Facilities in Trading Day d	(17)
CCF(d)	{}	G	D		Set of Facilities with Capacity Credits on Trading Day d	I
D_CY(cy)	{}	G	CY		Set of Trading Days in Capacity Year cy	I

4.8.5.3 Net STEM Refund

$$NSR\_P\_I(p, i) = TIRRW\_P\_I(p, i) \times NSSF\_P\_I(p, i) \tag{338}$$

$$NSSF\_P\_I(p, i) = max(0, STEMREQ\_P\_I(p, i) - CAPASTEM\_P\_I(p, i) - RTCR\_P\_I(p, i)) \tag{339}$$

$$RTCR\_P\_I(p, i) = \sum_{f \in (SF(p,i) \cup SSF(p,i)) \cap COP(i)} RTCR\_F\_I(f, i) \tag{340}$$

$$\begin{aligned} RTCR\_F\_I(f, i) = {} & CAFO\_F\_I(f, i) + NISCRQ\_F\_I(f, i) + ESRCSF\_F\_I(f, i) + RTMOSF\_F\_I(f, i) \\ & + max(0, NIMGRPPO\_F\_I(f, i) + ESRRPPO\_F\_I(f, i) - STEMCAPO\_F\_I(f, i)) \end{aligned} \tag{341}$$

$$STEMREQ\_P\_I(p,i) = \frac{\sum_{di \in DI(i)} STEMREQ\_P\_DI(p,di)}{6} \tag{342}$$

$$STEMREQ\_P\_DI(p,di) = \sum_{f \in (SF(di) \cup SSF(di)) \cap COP(di)} STEMFREQ\_F\_DI(f,di) \tag{343}$$

$$STEMFREQ\_F\_DI(f,di) = STEMRCOQ\_F\_DI(f,di) - max(0, STEMCAFO\_F\_DI(f,di) - CAFO\_F\_DI(f,di) \tag{344}$$

$$CAPASTEM\_P\_I(p,i) = \begin{cases} STEMREQ\_P\_I(p,i) & \text{if } SSF\_G\_D(i) = 0 \text{ or } STEMREQ\_P\_I(p,i) = 0 \\ \dfrac{NCP\_P\_I(p,i) + STEMNSOQ\_P\_I(p,i) + STEMDQ\_P\_I(p,i)}{0.5h \times LF\_P\_I(p,i)} & \text{otherwise} \end{cases} \tag{345}$$

$$STEMNSOQ\_P\_I(p,i) = STEMOQ\_P\_I(p,i) - STEMSQ\_P\_I(p,i) \tag{346}$$

$$LF\_P\_I(p,i) = \frac{\sum_{di \in DI(i)} LF\_P\_DI(p,di)}{6} \tag{347}$$

$$LF\_P\_DI(p,di) = \frac{\sum_{f \in (SF(p,di) \cup SSF(p,di)) \cap COP(di)} (LF\_F\_D(f,di) \times STEMRCOQ\_F\_DI(f,di))}{\sum_{f \in (SF(p,di) \cup SSF(p,di)) \cap COP(di)} STEMRCOQ\_F\_DI(f,di)} \tag{348}$$

$$LF\_F\_D(f,d) = TLF\_F\_D(f,d) \times DLF\_F\_D(f,d) \tag{349}$$

Variable	Units	SC	GR	Rule	Description	Ref
NSR_P_I(p, i)	$	P	I	4.26.3(b)	Net STEM Refund for participant p in Trading Interval i	(338)
TIRRW_P_I(p, i)	$/MW	P	I	4.26.3(b)ii	Weighted average Trading Interval refund rate for participant p in Trading Interval i	(377)
NSSF_P_I(p, i)	MW	P	I	4.26.2AA	Net STEM Shortfall for participant p in Trading Interval i	(339)
STEMREQ_P_I(p, i)	MW	P	I	4.26.2AB	STEM requirement for participant p in Trading Interval i	(342)
STEMREQ_P_DI(p, di)	MW	P	DI	4.26.2AC	STEM requirement for participant p in Dispatch Interval di	(343)
STEMFREQ_F_DI(f, di)	MW	F	DI	4.26.2AD	STEM requirement for Facility f in Dispatch Interval di	(344)
CAPASTEM_P_I(p, i)	MW	P	I	4.26.2AE	Capacity made available bilaterally and through STEM by participant p in Trading Interval i	(345)
RTCR_P_I(p, i)	MW	P	I	4.26.2AH	Capacity subject to Facility Reserve Capacity Deficit Refunds for participant p in Trading Interval i	(340)
RTCR_F_I(f, i)	MW	F	I		Capacity subject to Facility Reserve Capacity Deficit Refunds for Facility f in Trading Interval i	(341)
CAFO_F_I(f, i)	MW	F	I	3.21.7B	Capacity Adjusted Forced Outage Quantity for Facility f in Trading Interval i	I

Variable	Units	SC	GR	Rule	Description	Ref
CAFO_F_DI(f, di)	MW	F	DI	3.21.7C	Capacity Adjusted Forced Outage Quantity for Facility f in Dispatch Interval di	I
NISCRQ_F_I(f, i)	MW	F	I	4.26.1D	Not In-Service Capacity Refund Quantity for Facility f in Trading Interval i	(362)
ESRCSF_F_I(f, i)	MW	F	I	4.26.1E	ESR Charge Shortfall for Facility f in Trading Interval i	(364)
RTMOSF_F_I(f, i)	MW	F	I	4.26.1G	Real-Time Market Offer Shortfall for Facility f in Trading Interval i	(367)
NIMGRPPO_F_I(f, i)	MW	F	I	4.26.1C	Refund Payable Planned Outage associated with Non-Intermittent Generating Systems for Facility f in Trading Interval i	(357)
ESRRPPO_F_I(f, i)	MW	F	I	4.26.1CA	Refund Payable Planned Outage associated with an Electric Storage Resource for Facility f in Trading Interval i	(358)
STEMCAPO_F_I(f, i)	MW	F	I	4.26.2AH	Capacity Adjusted Planned Outage Quantity determined on the Scheduling Day for Facility f in Trading Interval i	I
STEMCAFO_F_DI(f, di)	MW	F	DI	4.26.2AD	Capacity Adjusted Forced Outage Quantity determined on the Scheduling Day for Facility f in Dispatch Interval di	I
STEMRCOQ_F_DI(f, di)	MW	F	DI	11	STEM Reserve Capacity Obligation Quantity at the time of the Bilateral Submission Cutoff for Facility f in Dispatch Interval di	I
NCP_P_I(p, i)	MWh	P	I	6.9.13	Net Contract Position for participant p in Trading Interval i	(80)
LF_P_I(p, i)		P	I	4.26.2A	Loss Factor for participant p for Trading Interval i	(347)
LF_P_DI(p, di)		P	DI	4.26.2AG	Loss Factor for participant p for Dispatch Interval di	(348)
LF_F_D(f, d)		F	D	11	Loss Factor for Facility f for Trading Day d	(349)
TLF_F_D(f, d)		F	D		Transmission Loss Factor for Facility f for Trading Day d	I
DLF_F_D(f, d)		F	D		Distribution Loss Factor for Facility f for Trading Day d	I
STEMSQ_P_I(p, i)	MWh	P	I	6.9.13(c)	Energy sold in STEM by participant p in Trading Interval i	(70)
STEMDQ_P_I(p, i)	MWh	P	I	6.9.13(b)	Energy bought in STEM by participant p in Trading Interval i	(71)
STEMNSOQ_P_I(p, i)	MWh	P	I		Energy offered (but not scheduled) in STEM by participant p in Trading Interval i	(346)
STEMOQ_P_I(p, i)	MWh	P	I	App 6 (e)	Energy offered in STEM by participant p in Trading Interval i	I
SSF_G_D(d)	Flag	G	D	6.21.1(a)	0 if STEM was suspended in Trading Day d, and 1 otherwise	I
SF(d)	{}	G	D	11	Set of Scheduled Facilities in Trading Day d	(13)
SSF(d)	{}	G	D	11	Set of Semi-Scheduled Facilities in Trading Day d	(15)
COP(d)	{}	G	D		Set of Facilities that are in Commercial Operation in Trading Day d	I
DI(i)	{}	G	I		Set of Dispatch Intervals in Trading Interval i	I

4.8.5.4 DSP Capacity Shortfall Refund

$$DSPCSR\_F\_I(f,i) = \begin{cases} TIRR\_F\_I(f,i) \times DSPSF\_F\_I(f,i) & \text{if } f \in REG\_F(i) \\ 0 & \text{otherwise} \end{cases} \tag{350}$$

$$\begin{aligned} DSPSF\_F\_I(f,i) = max\Bigg(0, min\Bigg(estRCOQ\_F\_I(f,i), DIMW\_F\_I(f,i)\Bigg) \\ - max\Bigg(0, RD\_F\_D(f,i) - \frac{DSPL\_F\_I(f,i)}{0.5h}\Bigg)\Bigg) \end{aligned} \tag{351}$$

Variable	Units	SC	GR	Rule	Description	Ref
DSPCSR_F_I(f, i)	$	F	I	4.26.3A(b)i	DSP capacity shortfall refund for Facility f in Trading Interval i	(350)
TIRR_F_I(f, i)	$/MW	F	I	4.26.1(a), 4.28A.1A	Trading Interval Refund Rate for Facility f in Trading Interval i	(378)
DSPSF_F_I(f, i)	MW	F	I	4.26.2D	DSP Capacity Shortfall for Facility f for Trading Interval i	(351)
estRCOQ_F_I(f, i)	MW	F	I	11	Reserve Capacity Obligation Quantity (including estimation) of Facility f in Trading Interval i	(421)
RD_F_D(f, d)	MW	F	D	4.26.2CA	Relevant Demand of Facility f in Trading Day d	I
DSPL_F_I(f, i)	MWh	F	I	9.5.4	Demand Side Programme Load for Facility f in Trading Interval i	(60)
DIMW_F_I(f, i)	MW	F	I	4.26.2D(a)	The MW quantity by which Facility f was instructed by AEMO to curtail the absolute value of its Withdrawal in Trading Interval i	I
DSP(d)	{}	G	D	11	Set of Demand Side Programmes in Trading Day d	(13)

4.8.5.5 Facility Reserve Capacity Deficit Refund

$$FRCDR\_F\_I(f,i) = min(RCD\_F\_I(f,i) \times TIRR\_F\_I(f,i), MAXFR\_F\_CY(f,i) - CFRCDR\_F\_I(f,i)) \tag{352}$$

$$CFRCDR\_F\_I(f,i) = CFRCDRstart\_F\_D(f,i) + \sum_{j \in PITD(i)} FRCDR\_F\_I(f,j) \tag{353}$$

$$RCD\_F\_I(f,i) = \begin{cases} CC\_F\_D(f,i) & \text{for } f \in \overline{REG\_F(i)} \cup (\overline{COP(i)} \cap (SF(i) \cup SSF(i) \cup NSF(i))) \\ min(CCIG\_F\_D(f,i), RLRCD\_F\_D(f,i)) + RTMRCD\_F\_I(f,i) & \text{for } f \in COP(i) \cap (SF(i) \cup SSF(i)) \\ min(CC\_F\_D(f,i), RLRCD\_F\_D(f,i)) & \text{for } f \in COP(i) \cap NSF(i) \\ max(0, estRCOQ\_F\_I(f,i) - max(0, RD\_F\_D(f,i) - MINL\_F\_D(f,i))) & \text{for } f \in DSP(i) \\ 0 & \text{otherwise} \end{cases} \tag{354}$$

$$\begin{aligned} RLRCD\_F\_D(f,i) = \\ max\Bigg(0, min\Bigg(REQLA\_F\_D(f,i) \\ - \frac{MAX2\_F\_D(f,i)}{0.5h}, REQLA\_F\_D(f,i) - ESTSOC\_F\_D(f,i)\Bigg)\Bigg) \end{aligned} \tag{355}$$

$$\begin{aligned} RTMRCD\_F\_I(f,i) = NIMGRPPO\_F\_I(f,i) + ESRRPPO\_F\_I(f,i) + min(estRCOQ\_F\_I(f,i), \\ CAFO\_F\_I(f,i) + NISCRQ\_F\_I(f,i) + ESRCSF\_F\_I(f,i) + RTMOSF\_F\_I(f,i)) \end{aligned} \tag{356}$$

$$NIMGRPPO\_F\_I(f,i) = \sum_{scc \in NIMG(f,i)} NIMGRPPO\_SCC\_I(scc,i) \tag{357}$$

$$ESRRPPO\_F\_I(f,i) = \sum_{scc \in ESR(f,i)} ESRRPPO\_SCC\_I(scc,i) \tag{358}$$

$$NIMGRPPO\_SCC\_I(scc,i) = \begin{cases} NIMGPO\_SCC\_I(scc,i) & \text{for } REPOC1000\_SCC\_D(scc,i) \geq 8400 \\ 0 & \text{otherwise} \end{cases} \tag{359}$$

$$ESRRPPO\_SCC\_I(scc,i) = \begin{cases} ESRPO\_SCC\_I(scc,i) & \text{for } REPOC1000\_SCC\_D(scc,i) \geq 1400 \\ 0 & \text{otherwise} \end{cases} \tag{360}$$

$$REPOC1000\_SCC\_D(scc,d) = \sum_{i \in PD1000(d)} REPOC\_SCC\_D(scc,i) \tag{361}$$

$$NISCRQ\_F\_I(f,i) = \frac{\sum_{di \in DI(i)} NISCRQ\_F\_DI(f,di)}{6} \tag{362}$$

$$NISCRQ\_F\_DI(f,di) = \begin{cases} 0 & \text{if } RTMSuspFlag\_G\_DI(di) = 1 \\ min(estRCOQ\_F\_DI(f,di) - CAFO\_F\_DI(f,di), NISCap\_F\_DI(f,di)) & \text{otherwise} \end{cases} \tag{363}$$

$$ESRCSF\_F\_I(f,i) = \frac{\sum_{di \in DI(i)} ESRCSF\_F\_DI(f,di)}{6} \tag{364}$$

$$ESRCSF\_F\_DI(f,di) = \sum_{scc \in ESR(f,di)} CSF\_SCC\_DI(scc,di) \tag{365}$$

$$CSF\_SCC\_DI(scc,di) = \begin{cases} 0 & \text{if } RTMSuspFlag\_G\_DI(di) = 1 \\ max\Big(0, estRCOQ\_SCC\_DI(scc,di) - CAFO\_SCC\_DI(scc,di) & \\ -\frac{max(0, ChargeLevel\_SCC\_DI(scc,di) - MinChargeLevel\_SCC\_D(scc,di))}{5/60h}\Big) & \text{otherwise} \end{cases} \tag{366}$$

$$RTMOSF\_F\_I(f,i) = max\Bigg(0, \frac{\sum_{di \in DI(i)} RTMOSF\_F\_DI(f,di)}{6} - CAFO\_F\_I(f,di) - NISCRQ\_F\_I(f,i) - ESRCSF\_F\_I(f,i)\Bigg) \tag{367}$$

$$RTMOSF\_F\_DI(f,di) = \begin{cases} 0 & \text{if } RTMSuspFlag\_G\_DI(di) = 1 \\ max(0, estRCOQ\_F\_DI(f,di) - OfferAvail\_F\_DI(f,di)) & \text{otherwise} \end{cases} \tag{368}$$

$$MINL\_F\_D(f,d) = \sum_{n \in DSPNMI(f,d)} MINL\_N\_D(n,d) \tag{369}$$

Variable	Units	SC	GR	Rule	Description	Ref
FRCDR_F_I(f, i)	$	F	I	4.26.1A	Facility Reserve Capacity Deficit Refund for Facility f in Trading Interval i	(352)
CFRCDR_F_I(f, i)	$	F	I	4.26.1A(b)	Sum of Facility Reserve Capacity Deficit Refunds for Facility f in Trading Intervals in the same Capacity Year as, but prior to, Trading Interval i	(353)
RCD_F_I(f, i)	MW	F	I	4.26.1A	Reserve Capacity Deficit for Facility f for Trading Interval i	(354)
RLRCD_F_D(f, d)	MW	F	D		Reserve Capacity Deficit (related to Required Level) for Facility f for Trading Day d	(355)
RTMRCD_F_I(f, i)	MW	F	I	4.26.1B	Real-Time Market Reserve Capacity Deficit for Facility f for Trading Interval i	(356)
NIMGRPPO_F_I(f, i)	MW	F	I	4.26.1B	Total Refund Payable Planned Outage Quantity for all Separately Certified Components which are Non-Intermittent Generating Systems for Facility f in Trading Interval i	(357)
ESRRPPO_F_I(f, i)	MW	F	I	4.26.1B	Total Refund Payable Planned Outage Quantity for all Separately Certified Components which are Electric Storage Resources for Facility f in Trading Interval i	(358)
NIMGRPPO_SCC_I(scc, i)	MW	SCC	I	4.26.1C	Refund Payable Planned Outage Quantity for Separately Certified Component scc which is a Non-Intermittent Generating System in Trading Interval i	(359)
ESRRPPO_SCC_I(scc, i)	MW	SCC	I	4.26.1CA	Refund Payable Planned Outage Quantity for Separately Certified Component scc which is an Electric Storage Resource in Trading Interval i	(360)
REPOC1000_SCC_D(scc, d)		SCC	D	4.26.1C, 4.26.1CA	Refund Exempt Planned Outage Count for Separately Certified Component scc over the preceding 1000 Trading Days prior to (and excluding) Trading Day d	(361)
NISCRQ_F_I(f, i)	MW	F	I	4.26.1D	Not In-Service Capacity Refund Quantity for Facility f in Trading Interval i	(362)
NISCRQ_F_DI(f, di)	MW	F	DI		Not In-Service Capacity Refund Quantity for Facility f in Dispatch Interval di	(363)
ESRCSF_F_I(f, i)	MW	F	I	4.26.1E	ESR Charge Shortfall for Facility f in Trading Interval i	(364)
ESRCSF_F_DI(f, di)	MW	F	DI	4.26.1E	ESR Charge Shortfall for Facility f in Dispatch Interval di	(365)
RTMOSF_F_I(f, i)	MW	F	I	4.26.1G	Real-Time Market Offer Shortfall for Facility f in Trading Interval i	(367)
RTMOSF_F_DI(f, di)	MW	F	DI	4.26.1H	Shortfall in Reserve Capacity offered into the Real-Time Market for Facility f in Dispatch Interval di	(368)
MINL_F_D(f, d)	MW	F	D	4.26.1(e)iii.4	Minimum load of Facility f for Trading Day d	(369)
CAFO_F_I(f, i)	MW	F	I	3.21.7B	Capacity Adjusted Forced Outage Quantity for Facility f in Trading Interval i	I
CAFO_F_DI(f, di)	MW	F	DI	3.21.7C	Capacity Adjusted Forced Outage Quantity for Facility f in Dispatch Interval di	I

Variable	Units	SC	GR	Rule	Description	Ref
CAFO_SCC_DI(scc, di)	MW	SCC	DI	3.21.7	Capacity Adjusted Forced Outage Quantity for Separately Certified Component scc in Dispatch Interval di	I
CC_F_D(f, d)	MW	F	D	11	Capacity Credits associated with Facility f on Trading Day d	I
CCIG_F_D(f, d)	MW	F	D		Capacity Credits associated with an Intermittent Generating System for Facility f on Trading Day d	I
CFRCDRstart_F_D(f, d)	$	F	D	4.26.1A(b)	Sum of Facility Reserve Capacity Deficit Refunds for Facility f in the same Capacity Year as, but prior to, Trading Day d	I
ChargeLevel_SCC_DI	MWh	SCC	DI	4.26.1F(c)	Charge Level (or alternative estimate from AEMO where the Charge Level is not available) of Separately Certified Component scc at the start of Dispatch Interval di	I
COP(d)	{}	G	D		Set of Facilities that are in Commercial Operation in Trading Day d	I
CSF_SCC_DI(scc, di)	MW	SCC	DI	4.26.1F	Capacity shortfall for Separately Certified Component scc in Dispatch Interval di	(366)
DI(i)	{}	G	I		Set of Dispatch Intervals in Trading Interval i	I
DSP(d)	{}	G	D	11	Set of Demand Side Programmes in Trading Day d	(11)
DSPNMI(d)	{}	G	D		Set of connection points which comprise a Demand Side Programme on Trading Day d	I
ESR(d)	{}	G	D		Set of Electric Storage Resources in Trading Day d	I
ESRPO_SCC_I(scc, i)	MW	SCC	I	4.26.1CA	Capacity Adjusted Planned Outage Quantity for Separately Certified Component scc which is an Electric Storage Resource in Trading Interval i	I
ESTSOC_F_D(f, d)	MW	F	D	4.13.10C	Independent expert's estimate of the sent out capacity of Facility f applicable for Trading Day d	I
MAX2_F_D(f, d)	MWh	F	D	4.26.1A (a)ii.3.iii	2nd highest Sent Out Metered Schedule of Facility f up to and including Trading Day d	(370)
MAXFR_F_CY(f, cy)	$	F	CY	11	Maximum Facility Refund for Facility f in Capacity Year cy	(336)
MinChargeLevel_SCC_D	MWh	SCC	D	4.26.1F(d)	Minimum Charge Level capability of Separately Certified Component scc in Trading Day d	I
MINL_N_D(n, d)	MW	N	D	2.29.5B(c)	Minimum load of NMI n for Trading Day d	I
NIMGPO_SCC_I(scc, i)	MW	SCC	I	4.26.1C	Capacity Adjusted Planned Outage Quantity for Separately Certified Component scc which is a Non-Intermittent Generating System in Trading Interval i	I
NISCap_F_DI(f, di)	MW	F	DI	7.13A.1	Not In-Service Capacity quantity for Facility f in Dispatch Interval di	I
NSF(d)	{}	G	D	11	Set of Non-Scheduled Facilities in Trading Day d	(17)

Variable	Units	SC	GR	Rule	Description	Ref
OfferAvail_F_DI(f, di)	MW	F	DI	4.26.1H(b)	MW quantity included in Real-Time Market Offers for energy for Facility f in Dispatch Interval di (whether offered as Available Capacity or In-Service Capacity) that were used to calculate Dispatch Instructions and Market Clearing Prices	I
PITD(i)	{}	G	I		Set of Trading Intervals in the same Trading Day as, but prior to, Trading Interval i	I
PD1000(d)	{}	G	D		Set of 1000 Trading Days preceding (and excluding) Trading Day d	I
estRCOQ_F_I(f, i)	MW	F	I	11	Reserve Capacity Obligation Quantity (including estimation) of Facility f in Trading Interval i	(421)
estRCOQ_F_DI(f, di)	MW	F	DI	4.26.1H(a)	Reserve Capacity Obligation Quantity (including estimation) of Facility f in Dispatch Interval di	(423)
estRCOQ_SCC_DI(scc, di)	MW	SCC	DI		Reserve Capacity Obligation Quantity (including estimation) for Separately Certified Component scc in Dispatch Interval di	(422)
RD_F_D(f, d)	MW	F	D	4.26.2CA	Relevant Demand of Facility f in Trading Day d	I
REG_F(d)	{}	G	D	11	Set of Registered Facilities in Trading Day d	(23)
REPOC_SCC_D(scc, d)		F	D	11	Refund Exempt Planned Outage Count for Separately Certified Component scc on Trading Day d	I
REQLA_F_D(f, d)	MW	F	D		Required Level adjusted to current level of Capacity Credits for Facility f for Trading Day d	I
RTMSuspFlag_G_DI(di)	Flag	G	DI	4.26.1D(d), 4.26.1F(e), 4.26.1H(c)	Flag that is 1 if the Real-Time Market was suspended in Dispatch Interval di, and 0 otherwise	I
SF(d)	{}	G	D	11	Set of Scheduled Facilities in Trading Day d	(13)
SSF(d)	{}	G	D	11	Set of Semi-Scheduled Facilities in Trading Day d	(15)
TIRR_F_I(f, i)	$/MW	F	I	4.26.1(a), 4.28A.1A	Trading Interval Refund Rate for Facility f in Trading Interval i	(378)

4.8.5.6 MAX2_F_D

$$\begin{aligned} MAX2\_F\_D(f,d) = \text{2nd highest value of} \\ &\{MAX1CD\_F\_D(f,j) : n < j \leq d\} \cup \\ &\{MAX2CD\_F\_D(f,j) : n < j \leq d\} \cup \\ &\{MAX1Start\_F\_D(f,n)\} \cup \\ &\{MAX2Start\_F\_D(f,n)\} \end{aligned} \tag{370}$$

where n is the Trading Day applicable to $MAX1Start\_F\_D$ and $MAX2Start\_F\_D$ and n is represented in three components (year, month and day) by variables $MAXStartYear\_G\_D$ and $MAXStartMonth\_G\_D$ and $MAXStartDay\_G\_D$.

$$MAX1CD\_F\_D(f,d) = \text{Highest value of } \{SOMS\_F\_I(f,i) \times COP\_F\_D(f,i) : i \in I(d)\} \tag{371}$$

$$MAX2CD\_F\_D(f,d) = \text{2nd highest value of } \{SOMS\_F\_I(f,i) \times COP\_F\_D(f,i) : i \in I(d)\} \tag{372}$$

Variable	Units	SC	GR	Rule	Description	Ref
MAX2_F_D(f, d)	MWh	F	D	4.26.1A (a)ii.3.iii	2nd highest Sent Out Metered Schedule of Facility f up to and including Trading Day d	(370)
COP_F_D(f, d)	Flag	F	D	4.13.10B	Flag that is 1 when Facility f is in Commercial Operations in Trading Day d, and 0 otherwise	I
MAX2CD_F_D(f, d)	MWh	F	D		2nd highest Sent Out Metered Schedule (after Commercial Operation) of Facility f in the current day, Trading Day d	(372)
MAX1CD_F_D(f, d)	MWh	F	D		Highest Sent Out Metered Schedule (after Commercial Operation) of Facility f in the current day, Trading Day d	(371)
MAX2Start_F_D(f, d)	MWh	F	D		2nd highest Sent Out Metered Schedule (after Commercial Operation) of Facility f up to and including Trading Day d	I
MAX1Start_F_D(f, d)	MWh	F	D		Highest Sent Out Metered Schedule (after Commercial Operation) of Facility f up to and including Trading Day d	I
MAXStartYear_G_D(d)		G	D		A number representing the year associated with the Trading Day applicable to $MAX1Start\_F\_D$ and $MAX2Start\_F\_D$	I
MAXStartMonth_G_D(d)		G	D		A number representing the month associated with the Trading Day applicable to $MAX1Start\_F\_D$ and $MAX2Start\_F\_D$	I
MAXStartDay_G_D(d)		G	D		A number representing the day associated with the Trading Day applicable to $MAX1Start\_F\_D$ and $MAX2Start\_F\_D$	I
SOMS_F_I(f, i)	MWh	F	I		Sent Out Metered Schedule for Facility f in Trading Interval i	(32)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.8.5.7 Intermittent Load Refunds

$$IMLR\_F\_I(f,i) = IMLSF\_F\_I(f,i) \times TIRR\_F\_I(f,i) \tag{373}$$

$$IMLSF\_F\_I(f,i) \tag{374}$$

$$= \begin{cases} max\left(0, \frac{-SOMSIL\_F\_I(f,i)}{0.5h} - 1.03 \times NC\_F\_D(f,i)\right) & \text{for } IMLEPSPOFlag\_F\_I(f,i) = 1 \\ max\left(0, \frac{-SOMSIL\_F\_I(f,i)}{0.5h} - 0.03 \times NC\_F\_D(f,i) - ACR\_F\_D(f,i)\right) & \text{for } IMLEPSPOFlag\_F\_I(f,i) = 0 \\ & \text{and } IMLEPSFOFlag\_F\_I(f,i) = 0 \\ & \text{and } estMAXTEMP\_F\_D(f,i) > 41°C \\ max\left(0, \frac{-SOMSIL\_F\_I(f,i)}{0.5h} - 0.03 \times NC\_F\_D(f,i)\right) & \text{otherwise} \end{cases}$$

$$IMLEPSPOFlag\_F\_I(f,i) = \begin{cases} 1 & \text{if } \exists di \in DI(i) : IMLEPSPOFlag\_F\_DI(f,di) = 1 \\ 0 & \text{otherwise} \end{cases} \tag{375}$$

$$IMLEPSFOFlag\_F\_I(f,i) = \begin{cases} 1 & \text{if } \exists di \in DI(i) : IMLEPSFOFlag\_F\_DI(f,di) = 1 \\ 0 & \text{otherwise} \end{cases} \tag{376}$$

Variable	Units	SC	GR	Rule	Description	Ref
IMLR_F_I(f, i)	$	F	I		Intermittent Load Refunds for Facility f in Trading Interval i	(373)
IMLSF_F_I(f, i)	MW	F	I	4.28A.1(c)	Intermittent Load capacity shortfall for Facility f for Trading Interval i	(374)
TIRR_F_I(f, i)	$/MW	F	I	4.26.1(a), 4.28A.1A	Trading Interval Refund Rate for Facility f in Trading Interval i	(378)
SOMSIL_F_I(f, i)	MWh	F	I		Sent Out Metered Schedule for the intermittent load associated with Facility f in Trading Interval i	(51)
IMLEPSPOFlag_F_I(f, i)	Flag	F	I	4.28A.1(c)	Flag that is 1 when the Energy Producing System associated with Facility f is subject to a Planned Outage that would affect the energy production capability of the Energy Producing System in Trading Interval i, and 0 otherwise	(375)
IMLEPSPOFlag_F_DI(f, di)	Flag	F	DI	4.28A.1(c)	Flag that is 1 when the Energy Producing System associated with Facility f is subject to a Planned Outage that would affect the energy production capability of the Energy Producing System in Dispatch Interval di, and 0 otherwise	I
IMLEPSFOFlag_F_I(f, i)	Flag	F	I	4.28A.1(c)	Flag that is 1 when the Energy Producing System associated with Facility f is subject to a Forced Outage that would affect the energy capability of the Energy Producing System in Trading Interval i, and 0 otherwise	(376)
IMLEPSFOFlag_F_DI(f, di)	Flag	F	DI	4.28A.1(c)	Flag that is 1 when the Energy Producing System associated with Facility f is subject to a Forced Outage that would affect the energy capability of the Energy Producing System in Dispatch Interval di, and 0 otherwise	I
estMAXTEMP_F_D(f, d)	°C	F	D	2.30B.3(b)ii	Daily maximum temperature (including estimation) of the Energy Producing System associated with Facility f for Trading Day d	(419)
NC_F_D(f, d)	MW	F	D	4.28.8(c)	Nominated capacity for Facility f for Trading Day d	I
ACR_F_D(f, d)	MW	F	D	2.30B.3(b)i	Anticipated capacity reduction at 45°C associated with Facility f for Trading Day d	I

4.8.5.8 Refund Rates

$$TIRRW\_P\_I(p,i) = \begin{cases} 0 & \text{for } \sum_{f \in REG\_F(p,i) \cap \overline{DSP(p,i)}} CC\_F\_D(f,i) = 0 \\ \dfrac{\sum_{f \in REG\_F(p,i) \cap \overline{DSP(p,i)}} TIRR\_F\_I(f,i) \times CC\_F\_D(f,i)}{\sum_{f \in REG\_F(p,i) \cap \overline{DSP(p,i)}} CC\_F\_D(f,i)} & \text{otherwise} \end{cases} \quad (377)$$

$$TIRR\_F\_I(f,i) = RF\_F\_I(f,i) \times Y\_F\_I(f,i) \quad (378)$$

$$RF\_F\_I(f,i) = min(6, max(RFdyn\_G\_I(i), RFfloor\_F\_I(f,i))) \quad (379)$$

$$RFdyn\_G\_I(i) = 11.75 - \frac{5.75}{750MW} \times SPARE\_G\_I(i) \quad (380)$$

$$SPARE\_G\_I(i) = \sum_{f \in CCF(i) \cap REG\_F(i)} SPARE\_F\_I(f,i) \tag{381}$$

$$SPARE\_F\_I(f,i) = \begin{cases} max\left(0, estRCOQ\_F\_I(f,i) - CAFO\_F\_I(f,i) - \dfrac{SOMS\_F\_I(f,i)}{0.5h}\right) & \text{for } f \in SF(i) \cup SSF(i) \\ max\left(0, min\left(estRCOQ\_F\_I(f,i), \dfrac{DSPL\_F\_I(f,i)}{0.5h} - MINL\_F\_D(f,i)\right)\right) & \text{for } f \in DSP(i) \\ 0 & \text{otherwise} \end{cases} \tag{382}$$

$$RFfloor\_F\_I(f,i) = \begin{cases} 1 & \text{for } f \in DSP(i) \cup \overline{COP(i)} \cup \overline{REG\_F(i)} \\ 1 - 0.75 \times DISP\_F\_I(f,i) & \text{otherwise} \end{cases} \tag{383}$$

$$DISP\_F\_I(f,i) = \begin{cases} 0 & \text{for div by 0} \\ 1 - \dfrac{\sum\limits_{j \in PI4320a(i)} CAFO\_F\_I(f,j) + \sum\limits_{d \in PD89(i)} CAFO\_F\_D(f,d) + \sum\limits_{j \in PI4320b(i)} CAFO\_F\_I(f,j)}{\sum\limits_{j \in PI4320a(i)} CC\_F\_D(f,j) + 48 \times \sum\limits_{d \in PD89(i)} CC\_F\_D(f,d) + \sum\limits_{j \in PI4320b(i)} CC\_F\_D(f,j)} & \text{otherwise} \end{cases} \tag{384}$$

$$CAFO\_F\_D(f,d) = \sum_{i \in I(d)} CAFO\_F\_I(f,i) \tag{385}$$

$$Y\_F\_I(f,i) = \begin{cases} \dfrac{CCESR\_F\_I(f,i)}{CC\_F\_D(f,i)} \times \dfrac{RCP\_F\_D(f,i)}{8} & \\ \quad + \dfrac{CC\_F\_D(f,i) - CCESR\_F\_I(f,i)}{CC\_F\_D(f,i)} \times RCP\_F\_I(f,i) & \text{for } f \in COP(i) \cap (SF(i) \cup SSF(i)) \\ \dfrac{RCP\_F\_M(f,i) \times 12}{400} & \text{for } f \in DSP(i) \\ RCP\_G\_I(i) & \text{for } f \in IML(i) \\ RCP\_F\_I(f,i) & \text{otherwise} \end{cases} \tag{386}$$

$$CCESR\_F\_I(f,i) = \begin{cases} CCESR\_F\_D(i) & \text{for } i \in ESROI(i) \\ 0 & \text{otherwise} \end{cases} \tag{387}$$

$$RCP\_G\_I(i) = \frac{RCP\_G\_M(i)}{TITM\_G\_M(i)} \tag{388}$$

$$RCP\_G\_M(m) = \frac{RCP\_G\_CY(m)}{12} \tag{389}$$

$$RCP\_F\_I(f,i) = \frac{RCP\_F\_M(f,m)}{TITM\_G\_M(i)} \tag{390}$$

$$RCP\_F\_D(f,d) = \frac{RCP\_F\_M(f,d)}{TDTM\_G\_M(d)} \tag{391}$$

$$RCP\_F\_M(f,m) = \frac{RCP\_F\_CY(f,m)}{12} \tag{392}$$

$$TITM\_G\_M(m) = 48 \times TDTM\_G\_M(m) \tag{393}$$

$$TDTM\_G\_M(m) = \begin{cases} 28 & \text{for } m = \text{February in a non-leap year} \\ 29 & \text{for } m = \text{February in a leap year} \\ 30 & \text{for } m \in \{ \text{ April, June, September, November } \} \\ 31 & \text{for } m \in \{ \text{ January, March, May, July, August, October, December } \} \end{cases} \quad (394)$$

Variable	Units	SC	GR	Rule	Description	Ref
TIRRW_P_I(p, i)	$/MW	P	I	4.26.3(b)ii	Weighted average Trading Interval refund rate for participant p in Trading Interval i	(377)
TIRR_F_I(f, i)	$/MW	F	I	4.26.1(a), 4.28A.1A	Trading Interval Refund Rate for Facility f in Trading Interval i	(378)
RF_F_I(f, i)		F	I	4.26.1(c), 4.28A.1A(b)	Refund factor for Facility f in Trading Interval i	(379)
RFdyn_G_I(i)		G	I	4.26.1(d)	Dynamic refund factor for in Trading Interval i	(380)
SPARE_G_I(i)	MW	G	I	4.26.1(d)	Available capacity (related to Capacity Credits) which is not dispatched in Trading Interval i	(381)
SPARE_F_I(f, i)	MW	F	I	4.26.1(e)	Available capacity (related to Capacity Credits) which is not dispatched for Facility f in Trading Interval i	(382)
RFfloor_F_I(f, i)		F	I	4.26.1(f), 4.26.1(g)	Minimum refund factor for Facility f in Trading Interval i	(383)
Y_F_I(f, i)	$/MW	F	I	4.26.1(b), 4.28A.1A(c)	Per Interval Reserve Capacity Price for Facility f in Trading Interval i	(386)
RCP_G_I(i)	$/MW	G	I		Interval Reserve Capacity Price for Trading Interval i	(388)
RCP_G_M(m)	$/MW	G	M	11	Monthly Reserve Capacity Price for Trading Month m	(389)
RCP_G_CY(cy)	$/MW	G	CY	11	Reserve Capacity Price for Capacity Year cy	I
RCP_F_I(f, i)	$/MW	F	I		Interval Reserve Capacity Price for Facility f in Trading Interval i	(390)
RCP_F_D(f, d)	$/MW	F	D	11	Facility Daily Reserve Capacity Price for Facility f in Trading Day d	(391)
RCP_F_M(f, m)	$/MW	F	M	11	Facility Monthly Reserve Capacity Price for Facility f in Trading Month m	(392)
RCP_F_CY(f, cy)	$/MW	F	CY	11	Annual Reserve Capacity Price for Facility f in Capacity Year cy	I
CC_F_D(f, d)	MW	F	D	11	Capacity Credits associated with Facility f on Trading Day d	I
CCESR_F_I(f, i)	MW	F	I		Capacity Credits associated with Facility f on Trading Interval i	(387)
CCESR_F_D(f, d)	MW	F	D		Capacity Credits associated with an Electric Storage Resource for Facility f on Trading Day d	I
SOMS_F_I(f, i)	MWh	F	I		Sent Out Metered Schedule for Facility f in Trading Interval i	(32)
CAFO_F_I(f, i)	MW	F	I	3.21.7B	Capacity Adjusted Forced Outage Quantity for Facility f in Trading Interval i	I
CAFO_F_D(f, d)	MW	F	D	3.21.7B	Sum of Capacity Adjusted Forced Outage Quantity for Facility f in Trading Day d	(385)
estRCOQ_F_I(f, i)	MW	F	I	11	Reserve Capacity Obligation Quantity (including estimation) of Facility f in Trading Interval i	(421)
DSPL_F_I(f, i)	MWh	F	I	9.5.4	Demand Side Programme Load for Facility f in Trading Interval i	(60)

Variable	Units	SC	GR	Rule	Description	Ref
MINL_F_D(f, d)	MW	F	D	4.26.1(e)iii.4	Minimum load of Facility f for Trading Day d	(369)
DISP_F_I(f, i)		F	I	4.26.1(f)i	Portion of capacity which is not subject to a Forced Outage for Facility f over the previous 4320 Trading Intervals up to and including Trading Interval i	(384)
TITM_G_M(m)		G	M		Number of Trading Intervals in Trading Month m	(393)
TDTM_G_M(m)		G	M		Number of Trading Days in Trading Month m	(394)
REG_F(d)	{}	G	D	11	Set of Registered Facilities in Trading Day d	(23)
SF(d)	{}	G	D	11	Set of Scheduled Facilities in Trading Day d	(13)
SSF(d)	{}	G	D	11	Set of Semi-Scheduled Facilities in Trading Day d	(15)
DSP(d)	{}	G	D	11	Set of Demand Side Programmes in Trading Day d	(11)
IML(d)	{}	G	D	2.30B.1	Set of Loads which have an Intermittent Load component in Trading Day d	(26)
COP(d)	{}	G	D		Set of Facilities that are in Commercial Operation in Trading Day d	I
CCF(d)	{}	G	D		Set of Facilities with Capacity Credits on Trading Day d	I
ESROI(d)	{}	G	D		Set of Electric Storage Resource Obligation Intervals applicable on Trading Day d	I
PI4320a(i)	{}	G	I		Set of Trading Intervals within the 90th Trading Day prior to Trading Interval i's Trading Day that form part of the 4320 Trading Intervals prior to and including Trading Interval i	I
PI4320b(i)	{}	G	I		Set of Trading Intervals within Trading Interval i's Trading Day that form part of the 4320 Trading Intervals prior to and including Trading Interval i	I
PD89(d)	{}	G	D		Set of 89 Trading Days prior to Trading Day d	I
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.8.6 Intermittent Load Refunds

$$IMLR\_P\_D(p,d) = \sum_{f \in IML(p,d) \cap LegacyIML(p,d)} IMLR\_F\_D(f,d) \tag{395}$$

$$IMLR\_F\_D(f,d) = \sum_{i \in I(d)} IMLR\_F\_I(f,i) \tag{396}$$

Variable	Units	SC	GR	Rule	Description	Ref
IMLR_P_D(p, d)	$	P	D	4.29.3(dA)	Intermittent Load Refunds for participant p in Trading Day d	(395)
IMLR_F_D(f, d)	$	F	D	4.28A.1	Intermittent Load Refunds for Facility f in Trading Day d	(396)
IMLR_F_I(f, i)	$	F	I		Intermittent Load Refunds for Facility f in Trading Interval i	(373)
IML(d)	{}	G	D	2.30B.1	Set of Loads which have an Intermittent Load component in Trading Day d	(26)

Variable	Units	SC	GR	Rule	Description	Ref
LegacyIML(d)	{}	G	D	1.48.2	Set of Intermittent Loads that were treated by AEMO as an Intermittent Load on the day before New WEM Commencement Day, and continue to retain this status on Trading Day d	I
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.9 Market Participant Fees

Fees are split into the following parts:

- Market Fees
- Regulator Fees
- Coordinator Fees

The corresponding payment made to AEMO, the ERA and the Coordinator are included in a separate chapter titled Service Fees.
These equations are based on the equations stated in MR 9.12.

$$MPFSA\_P\_D(p,d) = -(MPMFSA\_P\_D(p,d) + MPRFSA\_P\_D(p,d) + MPCFSA\_P\_D(p,d)) \quad (397)$$

Variable	Units	SC	GR	Rule	Description	Ref
MPFSA_P_D(p, d)	$	P	D	9.12.2	Market Participant Fee Settlement Amount charged to participant p for Trading Day d	(397)
MPMFSA_P_D(p, d)	$	P	D	9.12.3	Market Participant Market Fees settlement amount charged to participant p for Trading Day d	(398)
MPRFSA_P_D(p, d)	$	P	D	9.12.4	Market Participant Regulator Fees settlement amount charged to participant p for Trading Day d	(401)
MPCFSA_P_D(p, d)	$	P	D	9.12.4A	Market Participant Coordinator Fees settlement amount charged to participant p for Trading Day d	(402)

4.9.1 Market Fees

$$MPMFSA\_P\_D(p,d) = MFRATE\_G\_FY(d) \times PC\_P\_D(p,d) \quad (398)$$

Variable	Units	SC	GR	Rule	Description	Ref
MPMFSA_P_D(p, d)	$	P	D	9.12.3	Market Participant Market Fees settlement amount charged to participant p for Trading Day d	(398)
PC_P_D(p, d)	MWh	P	D	9.12.5	Participant Contribution for participant p in Trading Day d	(399)
MFRATE_G_FY(fy)	$/MWh	G	FY	2.24.2	Market Fee rate applicable in Financial Year fy	I

4.9.2 Participant Contribution

$$PC\_P\_D(p,d) = \sum_{i \in I(d)} PC\_P\_I(p,i) \quad (399)$$

$$PC\_P\_I(p,i) = ABSNDL\_P\_I(p,i) + \sum_{f \in REG\_F(p,i)} |MS\_F\_I(f,i)| \quad (400)$$

Variable	Units	SC	GR	Rule	Description	Ref
PC_P_D(p, d)	MWh	P	D	9.12.5	Participant Contribution for participant p in Trading Day d	(399)
PC_P_I(p, i)	MWh	P	I		Metered Load for participant p in Trading Interval i	(400)
ABSNDL_P_I(p, i)	MWh	P	I		Sum of the absolute value of Metered Schedules for all Non-Dispatchable Loads for participant p in Trading Interval i	(58)
MS_F_I(f, i)	MWh	F	I	9.5.2, 2.30B.10, 2.30B.11	Metered Schedule for Facility f in Trading Interval i	(31)
REG_F(d)	{}	G	D	11	Set of Registered Facilities in Trading Day d	(23)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.9.3 Regulator Fees

$$MPRFSA\_P\_D(p,d) = RFRATE\_G\_FY(d) \times PC\_P\_D(p,d) \tag{401}$$

Variable	Units	SC	GR	Rule	Description	Ref
MPRFSA_P_D(p, d)	$	P	D	9.12.4	Market Participant Regulator Fees settlement amount charged to participant p for Trading Day d	(401)
PC_P_D(p, d)	MWh	P	D	9.12.5	Participant Contribution for participant p in Trading Day d	(399)
RFRATE_G_FY(fy)	$/MWh	G	FY	2.24.2	Regulator Fee rate applicable in Financial Year fy	I

4.9.4 Coordinator Fees

$$MPCFSA\_P\_D(p,d) = CFRATE\_G\_FY(d) \times PC\_P\_D(p,d) \tag{402}$$

Variable	Units	SC	GR	Rule	Description	Ref
MPCFSA_P_D(p, d)	$	P	D	9.12.4A	Market Participant Coordinator Fees settlement amount charged to participant p for Trading Day d	(402)
PC_P_D(p, d)	MWh	P	D	9.12.5	Participant Contribution for participant p in Trading Day d	(399)
CFRATE_G_FY(fy)	$/MWh	G	FY	2.24.2	Coordinator Fee rate applicable in Financial Year fy	I

4.10 Service Fees

Fees are split into the following parts:

- Market Fees
- Regulator Fees
- Coordinator Fees

The corresponding charges to Market Participants are included in a separate section titled Market Participant Fees. These equations are based on the equations stated in MR 9.13.

4.10.1 Market Fee Payments

$$SFMFSA\_P\_D(p,d) = \begin{cases} \sum_{p \in P(d)} MPMFSA\_P\_D(p,d) & \text{for } p \in AEMO(i) \\ 0 & \text{for } p \notin AEMO(i) \end{cases} \quad (403)$$

Variable	Units	SC	GR	Rule	Description	Ref
SFMFSA_P_D(p, d)	$	P	D	9.13.2	Service Fee Settlement Amount paid to AEMO for Trading Day d	(403)
MPMFSA_P_D(p, d)	$	P	D	9.12.3	Market Participant Market Fees settlement amount charged to participant p for Trading Day d	(398)
AEMO(d)	{}	G	D	11	Set containing the AEMO	(9)
P(d)	{}	G	D		Set of participants (Rule Participants, ERA and the Coordinator) in Trading Day d	(3)

4.10.2 Regulator Fee Payments

$$SFRFSA\_P\_D(p,d) = \begin{cases} \sum_{p \in P(d)} MPRFSA\_P\_D(p,d) & \text{for } p \in ERA(i) \\ 0 & \text{for } p \notin ERA(i) \end{cases} \quad (404)$$

Variable	Units	SC	GR	Rule	Description	Ref
SFRFSA_P_D(p, d)	$	P	D	9.13.3	Service Fee Settlement Amount paid to the ERA for Trading Day d	(404)
MPRFSA_P_D(p, d)	$	P	D	9.12.4	Market Participant Regulator Fees settlement amount charged to participant p for Trading Day d	(401)
ERA(d)	{}	G	D	11	Set containing the ERA	(5)
P(d)	{}	G	D		Set of participants (Rule Participants, ERA and the Coordinator) in Trading Day d	(3)

4.10.3 Coordinator Fee Payments

$$SFCFSA\_P\_D(p,d) = \begin{cases} \sum_{p \in P(d)} MPCFSA\_P\_D(p,d) & \text{for } p \in COORDINATOR(i) \\ 0 & \text{for } p \notin COORDINATOR(i) \end{cases} \quad (405)$$

Variable	Units	SC	GR	Rule	Description	Ref
SFCFSA_P_D(p, d)	$	P	D	9.13.4	Service Fee Settlement Amount paid to the Coordinator for Trading Day d	(405)
MPCFSA_P_D(p, d)	$	P	D	9.12.4A	Market Participant Coordinator Fees settlement amount charged to participant p for Trading Day d	(402)
COORDINATOR(d)	{}	G	D	11	Set containing the Coordinator	(4)
P(d)	{}	G	D		Set of participants (Rule Participants, ERA and the Coordinator) in Trading Day d	(3)

4.11 Default Levy Adjustment

By the end of the second month following the end of a Financial Year, AEMO must re-allocate any Default Levies raised during that Financial Year.

Default Levy Adjustment is split into two parts:

- Payment to a Participant for re-allocation of Default Levies raised during the most recently ended Financial Year.
- Charge to a Participant for re-allocation of Default Levies raised during the most recently ended Financial Year.

$$DLASA\_P\_D(p,d) = DLAP\_P\_D(p,d) - DLAC\_P\_D(p,d) \tag{406}$$

$$DLAP\_P\_D(p,d) = \frac{max(0, DLA\_P\_W(p,w))}{7} \tag{407}$$

$$DLAC\_P\_D(p,d) = \frac{-min(0, DLA\_P\_W(p,w))}{7} \tag{408}$$

Variable	Units	SC	GR	Rule	Description	Ref
DLASA_P_D(p, d)	$	P	D	9.20.11(e)	Default Levy Adjustment settlement amount for participant p in Trading Day d	(406)
DLAP_P_D(p, d)	$	P	D	9.20.11(e)	The amount participant p is paid in Trading Day d for re-allocation of Default Levies raised during the most recently ended Financial Year	(407)
DLAC_P_D(p, d)	$	P	D	9.20.11(e)	The amount participant p is charged in Trading Day d for re-allocation of Default Levies raised during the most recently ended Financial Year	(408)
DLA_P_W(p, w)	$	P	W0		The Default Levy adjustment (including GST) to put participant p in the position it would have been in had it paid the amount determined under clause 9.20.11(b) instead of the amounts actually paid under clause 9.20.8 applicable in Trading Week w	I

4.12 GST

GST is charged for the provision of eligible goods and services. The Variable Categorisation section outlines which statement summary variables (of Trading Day granularity) have GST applied and which are exempt. The interval-equivalent variables are identified in the sets used in the equations below.

$$GST\_P\_D(p,d) = GSTP\_P\_D(p,d) - GSTC\_P\_D(p,d) \tag{409}$$

$$GSTP\_P\_D(p,d) = GST\_G\_D(d) \times \sum_{v \in PGST(d)} v(p,d) \tag{410}$$

$$GSTC\_P\_D(p,d) = GST\_G\_D(d) \times \sum_{v \in CGST(d)} v(p,d) \tag{411}$$

Variable	Units	SC	GR	Rule	Description	Ref
GST_P_D(p, d)	$	P	D		Net GST paid/charged to participant p for Trading Day d	(409)
GSTP_P_D(p, d)	$	P	D	9.1.3	GST paid to participant p in Trading Day d	(410)
GSTC_P_D(p, d)	$	P	D	9.1.3	GST charged to participant p in Trading Day d	(411)

Variable	Units	SC	GR	Rule	Description	Ref
GST_G_D(d)		G	D		GST rate for Trading Day d	I
PGST(d)	{}	G	D		Set of all variables which are payments to which GST applies in Trading Day d	I
CGST(d)	{}	G	D		Set of all variables which are charges to which GST applies in Trading Day d	I
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.13 Interest

Interest is paid/charged in the WEM for two reasons:

- Interest paid/charged as part of the Adjustment Process [MR 9.1.3]
- Interest paid on security deposits [MR 2.38.5, 4.13.6, 4.13.14, 4.13A.13, and 4.13A.19]

The payment of interest on security deposits is handled separate to that outlined in this formulation.

$$NETINT\_P\_D(p,d) = INTP\_P\_D(p,d) - INTC\_P\_D(p,d) \tag{412}$$

$$INTP\_P\_D(p,d) = max(0, INT\_P\_D(p,d)) \tag{413}$$

$$INTC\_P\_D(p,d) = -min(0, INT\_P\_D(p,d)) \tag{414}$$

$$INT\_P\_D(p,d) = INT1\_P\_D(p,d) + INT2\_P\_D(p,d) + INT3\_P\_D(p,d) \tag{415}$$

$$INT1\_P\_D(p,d) = \begin{cases} (NOINT\_P\_D(p,d) - NOINT0\_P\_D(p,d)) & \text{for } Adj1NULLFlag\_G\_W(d) = 1 \\ & \text{and } Adj0NULLFlag\_G\_W(d) = 0 \\ \times \sum_{j \in INTDAYS1(d)} \frac{BBR\_G\_D(j)}{365} & \\ (NOINT1\_P\_D(p,d) - NOINT0\_P\_D(p,d)) & \text{otherwise} \\ \times \sum_{j \in INTDAYS1(d)} \frac{BBR\_G\_D(j)}{365} & \end{cases} \tag{416}$$

$$INT2\_P\_D(p,d) = \begin{cases} (NOINT\_P\_D(p,d) - NOINT1\_P\_D(p,d)) & \text{for } Adj2NULLFlag\_G\_W(d) = 1 \\ & \text{and } Adj1NULLFlag\_G\_W(d) = 0 \\ \times \sum_{j \in INTDAYS2(d)} \frac{BBR\_G\_D(j)}{365} & \\ (NOINT2\_P\_D(p,d) - NOINT1\_P\_D(p,d)) & \text{otherwise} \\ \times \sum_{j \in INTDAYS2(d)} \frac{BBR\_G\_D(j)}{365} & \end{cases} \tag{417}$$

$$INT3\_P\_D(p,d) = \begin{cases} (NOINT\_P\_D(p,d) - NOINT2\_P\_D(p,d)) & \text{for } Adj3NULLFlag\_G\_W(d) = 1 \\ & \text{and } Adj2NULLFlag\_G\_W(d) = 0 \\ \times \sum_{j \in INTDAYS3(d)} \frac{BBR\_G\_D(j)}{365} & \\ (NOINT3\_P\_D(p,d) - NOINT2\_P\_D(p,d)) & \text{otherwise} \\ \times \sum_{j \in INTDAYS3(d)} \frac{BBR\_G\_D(j)}{365} & \end{cases} \tag{418}$$

Variable	Units	SC	GR	Rule	Description	Ref
NETINT_P_D(p, d)	$	P	D		Net interest paid/charged to participant p for Trading Day d	(412)
INTP_P_D(p, d)	$	P	D		Total interest paid to participant p for Trading Day d	(413)
INTC_P_D(p, d)	$	P	D		Total interest charged to participant p for Trading Day d	(414)
INT_P_D(p, d)	$	P	D		Total interest paid/charged to participant p for Trading Day d	(415)
INT1_P_D(p, d)	$	P	D		Interest accrued due to variations between the adjustment 1 Settlement Statement and the initial Settlement Statement for participant p for Trading Day d	(416)
INT2_P_D(p, d)	$	P	D		Interest accrued due to variations between the adjustment 2 Settlement Statement and the adjustment 1 Settlement Statement for participant p for Trading Day d	(417)
INT3_P_D(p, d)	$	P	D		Interest accrued due to variations between the adjustment 3 Settlement Statement and the adjustment 2 Settlement Statement for participant p for Trading Day d	(418)
BBR_G_D(d)		G	D		Annual Bank Bill Rate applicable to Trading Day d	I
NOINT_P_D(p, d)	$	P	D		Total settlement amount (including GST, excluding interest) for participant p in Trading Day d	(63)
NOINT0_P_D(p, d)	$	P	D		Total settlement amount for (including GST, excluding interest) for participant p in Trading Day d as published in initial Non-STEM Settlement Statement	I
NOINT1_P_D(p, d)	$	P	D		Total settlement amount for (including GST, excluding interest) for participant p in Trading Day d as published in adjustment 1 Settlement Statement	I
NOINT2_P_D(p, d)	$	P	D		Total settlement amount for (including GST, excluding interest) for participant p in Trading Day d as published in adjustment 2 Settlement Statement	I
NOINT3_P_D(p, d)	$	P	D		Total settlement amount for (including GST, excluding interest) for participant p in Trading Day d as published in adjustment 3 Settlement Statement	I
INTDAYS1(w)	{}	G	W0	9.1.4	Set of days from (and including) the settlement day associated with the original Settlement Statement up to (but excluding) settlement day for adjustment 1 Settlement Statement for Trading Week w	I
INTDAYS2(w)	{}	G	W0	9.1.4	Set of days from (and including) the settlement day associated with the original Settlement Statement up to (but excluding) settlement day for adjustment 2 Settlement Statement for Trading Week w	I

Variable	Units	SC	GR	Rule	Description	Ref
INTDAYS3(w)	{}	G	W0	9.1.4	Set of days from (and including) the settlement day associated with the original Settlement Statement up to (but excluding) settlement day for adjustment 3 Settlement Statement for Trading Week w	I
Adj0NULLFlag_G_W(w)	Flag	G	W0		Flag that is 1 when settlement amounts (as published in the initial Settlement Statements) are unavailable for Trading Week w, and 0 otherwise	I
Adj1NULLFlag_G_W(w)	Flag	G	W0		Flag that is 1 when settlement amounts (as published in adjustment 1 Settlement Statements) are unavailable for Trading Week w, and 0 otherwise	I
Adj2NULLFlag_G_W(w)	Flag	G	W0		Flag that is 1 when settlement amounts (as published in adjustment 2 Settlement Statements) are unavailable for Trading Week w, and 0 otherwise	I
Adj3NULLFlag_G_W(w)	Flag	G	W0		Flag that is 1 when settlement amounts (as published in adjustment 3 Settlement Statements) are unavailable for Trading Week w, and 0 otherwise	I

4.14 Estimation

Prudential calculations require the estimation of exposure before all inputs are known.

When estimating settlement data for prudentials, AEMO does not modify settlement equations, but instead estimates inputs which are not known at the time of calculation. This section details the methodology for estimating non-metering settlement inputs (refer to Section 3.3 for the methodology for estimating metering inputs).

When undertaking a settlement run, no inputs are estimated, as required under the rules.

$$estMAXTEMP\_F\_D(f,d) = \begin{cases} MAXTEMP\_F\_D(f,d) & \text{if } ESTIMATIONFlag\_G\_W(d) = 0 \\ & \text{or } TEMPNullFlag\_G\_D(d) = 0 \\ 25°C & \text{otherwise} \end{cases} \quad (419)$$

$$estIRCR0\_P\_M(p,m) = \begin{cases} IRCR0\_P\_M(p,m) & \text{if } ESTIMATIONFlag\_G\_W(d) = 0 \\ & \text{or } IRCR0NullFlag\_G\_M(m) = 0 \\ IRCRindicative\_P\_M(p,m) & \text{otherwise} \end{cases} \quad (420)$$

$$estRCOQ\_F\_I(f,i) = \begin{cases} RCOQ\_F\_I(f,i) & \text{if } ESTIMATIONFlag\_G\_W(d) = 0 \\ & \text{or } RCOQFINullFlag\_F\_D(i) = 0 \\ STEMRCOQ\_F\_I(f,i) & \text{otherwise} \end{cases} \quad (421)$$

$$estRCOQ\_SCC\_DI(scc,di) = \begin{cases} RCOQ\_SCC\_DI(scc,di) & \text{if } ESTIMATIONFlag\_G\_W(d) = 0 \\ & \text{or } RCOQSCCDINullFlag\_SCC\_D(di) = 0 \\ STEMRCOQ\_SCC\_DI(scc,di) & \text{otherwise} \end{cases} \quad (422)$$

$$estRCOQ\_F\_DI(f,di) = \begin{cases} RCOQ\_F\_DI(f,di) & \text{if } ESTIMATIONFlag\_G\_W(d) = 0 \\ & \text{or } RCOQFDINullFlag\_F\_D(di) = 0 \\ STEMRCOQ\_F\_DI(f,di) & \text{otherwise} \end{cases} \quad (423)$$

Variable	Units	SC	GR	Rule	Description	Ref
estMAXTEMP_F_D(f, d)	°C	F	D		Daily maximum temperature (including estimation) of the Energy Producing System associated with Facility f for Trading Day d	(419)
estIRCR0_P_M(p, m)	MW	P	M		Individual Reserve Capacity Requirement (prior to any adjustments) (including estimation) for participant p for Trading Month m	(420)
estRCOQ_F_I(f, i)	MW	F	I	11	Reserve Capacity Obligation Quantity (including estimation) of Facility f in Trading Interval i	(421)
estRCOQ_SCC_DI(scc, di)	MW	SCC	DI		Reserve Capacity Obligation Quantity (including estimation) for Separately Certified Component scc in Dispatch Interval di	(422)
estRCOQ_F_DI(f, di)	MW	F	DI		Reserve Capacity Obligation Quantity (including estimation) for Facility f in Dispatch Interval di	(423)
ESTIMATIONFlag_G_W(w)	Flag	G	W0		Flag that is 1 when estimation is permitted for Trading Week w, and 0 otherwise	I
IRCR0_P_M(p, m)	MW	P	M	4.28.7	Individual Reserve Capacity Requirement (prior to any adjustments) for participant p for Trading Month m	I
IRCRindicative_P_M(p, m)	MW	P	M	4.28.6	Indicative Individual Reserve Capacity Requirement for participant p for Trading Month m	I
IRCR0NullFlag_G_M(m)	Flag	G	M		Flag that is 1 when the Individual Reserve Capacity Requirements have not been published for Trading Month m, and 0 otherwise	I
MAXTEMP_F_D(f, d)	°C	F	D	2.30B.3(b)ii	Daily maximum temperature of the Energy Producing System associated with Facility f for Trading Day d	I
RCOQ_F_I(f, i)	MW	F	I	11	Reserve Capacity Obligation Quantity of Facility f in Trading Interval i	I
RCOQFINullFlag_F_D(d)	Flag	F	D		Flag that is 1 when the RCOQ_F_I values for Facility f are unavailable for Trading Day d, and 0 otherwise	I
RCOQ_SCC_DI(scc, di)	MW	SCC	DI		Reserve Capacity Obligation Quantity for Separately Certified Component scc in Dispatch Interval di	I
RCOQSCCDINullFlag_SCC_D(d)	Flag	SCC	D		Flag that is 1 when the RCOQ_SCC_DI values for Separately Certified Component scc are unavailable for Trading Day d, and 0 otherwise	I
RCOQ_F_DI(f, di)	MW	F	DI		Reserve Capacity Obligation Quantity of Facility f in Dispatch Interval di	I
RCOQFDINullFlag_F_D(d)	Flag	F	D		Flag that is 1 when the RCOQ_F_DI values for Facility f are unavailable for Trading Day d, and 0 otherwise	I
STEMRCOQ_F_I(f, i)	MW	F	I		STEM Reserve Capacity Obligation Quantity at the time of the Bilateral Submission Cutoff for Facility f in Trading Interval i	I
STEMRCOQ_SCC_DI(scc, di)	MW	SCC	DI		STEM Reserve Capacity Obligation Quantity at the time of the Bilateral Submission Cutoff for Separately Certified Component scc in Dispatch Interval di	I

Variable	Units	SC	GR	Rule	Description	Ref
STEMRCOQ_F_DI(f, di)	MW	F	DI		STEM Reserve Capacity Obligation Quantity at the time of the Bilateral Submission Cutoff for Facility f in Dispatch Interval di	I
TEMPNullFlag_G_D(d)	Flag	G	D		Flag that is 1 when the daily maximum temperatures are unavailable for Trading Day d, and 0 otherwise	I

5 Payments and Charges

Payments refer to amounts that are paid by AEMO to the participant and charges refer to amounts that are paid by the participant to AEMO. Each of these amounts may change between positive and negative values as a result of the Adjustment Process.

5.1 Variable Categorisation

The table below outlines the variables that are payments ('P') or charges ('C'), whether GST is applicable ('Y' or 'N'), and the description of the line item as it appears on the Invoice.

Variable	P/C	GST	Rule	Ref	Invoice line item description
STEMSAS_P_D(p, d)	P	Y	9.7	(66)	Payment for STEM energy sold
STEMSAD_P_D(p, d)	C	Y	9.7	(67)	Charge for STEM energy purchased
ETSA_P_D(p, d)	P	Y		(73)	Payment for Real-Time Market energy sold
ETDA_P_D(p, d)	C	Y		(74)	Charge for Real-Time Market energy purchased
EUP_P_D(p, d)	P	Y		(81)	Payment for Energy Uplift Payments
EUR_P_D(p, d)	C	Y		(89)	Charge for Energy Uplift Payments
OCP_P_D(p, d)	P	Y	9.11.3	(96)	Payment for Outage Compensation
OCR_P_D(p, d)	C	Y	9.11.6	(98)	Charge for Outage Compensation
MPDA_P_D(p, d)	P	Y	9.11A.4	(102)	Payment for Market Participant Deficit Amount
MPEA_P_D(p, d)	C	Y	9.11A.5	(106)	Charge for Market Participant Excess Amount
MSEArebate_P_D(p, d)	P	Y	9.11A.9	(103)	Payment for market suspension excess amount
MSDAcharge_P_D(p, d)	C	Y	9.11A.6	(107)	Charge for market suspension deficit amount
CRpayment_P_D(p, d)	P	Y	9.10.4	(113)	Payment for Contingency Reserve Raise
CLpayment_P_D(p, d)	P	Y	9.10.8	(175)	Charge for Contingency Reserve Raise
RoCoFpayment_P_D(p, d)	P	Y	9.10.12	(188)	Payment for RoCoF Control Service
RRpayment_P_D(p, d)	P	Y		(224)	Payment for Regulation Raise
RLpayment_P_D(p, d)	P	Y		(240)	Payment for Regulation Lower
SRSpayment_P_D(p, d)	P	Y	9.10.25	(253)	Payment for System Restart Service
NCESSpayment_P_D(p, d)	P	Y	9.10.27A	(261)	Payment for NCESS
FCESSUpayment_P_D(p,d)	P	Y	9.10.27E	(264)	Payment for FCESS Uplift Payments
CRcharge_P_D(p, d)	C	Y	9.10.29	(136)	Charge for Contingency Reserve Raise
CLcharge_P_D(p, d)	C	Y	9.10.31	(183)	Charge for Contingency Reserve Lower
RoCoFcharge_P_D(p, d)	C	Y	9.10.33	(196)	Charge for RoCoF Control Service
RRcharge_P_D(p, d)	C	Y		(232)	Charge for Regulation Raise
RLcharge_P_D(p, d)	C	Y		(248)	Charge for Regulation Lower
SRScharge_P_D(p, d)	C	Y	9.10.40	(255)	Charge for System Restart Service
NCESScharge_P_D(p, d)	C	Y	9.10.44	(261)	Charge for NCESS
CCSA_P_D(p, d)	P	Y	9.8.3(b)	(293)	Payment for non-allocated Capacity Credits
IMLR_P_D(p, d)	C	Y	4.29.3(dA)	(395)	Charge for Intermittent Load Refunds
SUPCAPSA_P_D(p, d)	P	Y	9.8.3(d)	I	Payment for Supplementary Capacity Contracts
CCR_P_D(p, d)	C	Y	4.6.2E	(326)	Charge for Capacity Cost Refund
CCAOASA_P_D(p, d)	P	Y	9.8.3(f)	(296)	Payment for Capacity Credit Allocation over-allocation
TRCC_P_D(p, d)	C	Y	9.8.4(a)	(300)	Charge for Targeted Reserve Capacity Cost
SRCC_P_D(p, d)	C	Y	9.8.4(b)	(315)	Charge for Shared Reserve Capacity Cost
MPMFSA_P_D(p, d)	C	N	9.12.3	(398)	Charge for Market Participant Market Fees
MPRFSA_P_D(p, d)	C	N	9.12.4	(401)	Charge for Market Participant Regulator Fees
MPCFSA_P_D(p, d)	C	N	9.12.4A	(402)	Charge for Market Participant Coordinator Fees
SFMFSA_P_D(p, d)	P	N	9.13.2	(403)	Payment for Service Fee Market Fees
SFRFSA_P_D(p, d)	P	N	9.13.3	(404)	Payment for Service Fee Regulator Fees
SFCFSA_P_D(p, d)	P	N	9.13.4	(405)	Payment for Service Fee Coordinator Fees
DLAP_P_D(p, d)	P	N	9.20.11(e)	(407)	Payment for reallocation of Default Levies
DLAC_P_D(p, d)	C	N	9.20.11(e)	(408)	Charge for reallocation of Default Levies
GSTP_P_D(p, d)	P	N	9.1.3	(410)	Payment for GST
GSTC_P_D(p, d)	C	N	9.1.3	(411)	Charge for GST
INTP_P_D(p, d)	P	N		(413)	Payment for Interest
INTC_P_D(p, d)	C	N		(414)	Charge for Interest

5.2 Zero Sum Groups

The table below assists in understanding how the payments and charges are related. The only non-zero sum component within the settlement summary variables is when AEMO is required to draw down on Reserve Capacity security or DSP Reserve Capacity Security, which are represented by $RCSD\_G\_D(d)$ and $DSPRCSD\_G\_D(d)$, respectively

Category	Payments	=	Charges
STEM	STEMSAS_G_D(d)	=	STEMSAD_G_D(d)
Energy	ETSA_G_D(d)	=	ETDA_G_D(d)
Energy Uplifts	EUP_G_D(d)	=	EUR_G_D(d)
Changed Outage Compensation	OCP_G_D(d)	=	OCR_G_D(d)
Market Suspension Excess	MSEArebate_G_D(d)	=	MPEA_G_D(d)
Market Suspension Deficit	MPDA_G_D(d)	=	MSDAcharge_G_D(d)
Essential System Services	CRpayment_G_D(d) + CLpayment_G_D(d) + RRpayment_G_D(d) + RLpayment_G_D(d) + RoCoFpayment_G_D(d) + SRSpayment_G_D(d) + NCESSpayment_G_D(d) + FCESSUpayment_G_D(d)	=	CRcharge_G_D(d) + CLcharge_G_D(d) + RRcharge_G_D(d) + RLcharge_G_D(d) + RoCoFcharge_G_D(d) + SRScharge_G_D(d) + NCESScharge_G_D(d)
Reserve Capacity	CCSA_G_D(d) + CCAOASA_G_D(d) + SUPCAPSA_G_D(d)	=	TRCC_G_D(d) + SRCC_G_D(d) + IMLR_G_D(d) + RCSD_G_D(d) + DSPRCSD_G_D(d) + CCR_G_D(d)
Market Fees	SFMFSA_G_D(d)	=	MPMFSA_G_D(d)
Regulator Fees	SFRFSA_G_D(d)	=	MPRFSA_G_D(d)
Coordinator Fees	SFCFSA_G_D(d)	=	MPCFSA_G_D(d)
Default Levy Adjustments	DLAP_G_D(d)	=	DLAC_G_D(d)
GST	GSTP_G_D(d)	=	GSTC_G_D(d)
Interest	INTP_G_D(d)	=	INTC_G_D(d)

6 Settlements

Daily outputs from the common calculation engine may be aggregated by the participant to achieve the required settlement outputs.

6.1 Weekly Settlement Amount

$$TOTAL\_P\_W(p,w) = \sum_{d \in D(w)} TOTAL\_P\_D(p,d) \tag{424}$$

Variable	Units	SC	GR	Rule	Description	Ref
TOTAL_P_W(p, w)	$	P	W0		Total settlement amount (including GST and interest) for participant p in Trading Week w	(424)
TOTAL_P_D(p, d)	$	P	D		Total settlement amount (including GST and interest) for participant p in Trading Day d	(62)
D(w)	{}	G	W0		Set of Trading Days in Trading Week w	I

7 Prudentials

Trading Margin calculations are performed on a daily basis to manage prudential risk. An input to these equations are the outputs of the settlement calculations documented in previous sections.

7.1 Trading Margin

$$TM\_P\_D(p,d) = TL\_P\_D(p,d) - OA\_P\_D(p,d) \tag{425}$$

$$TL\_P\_D(p,d) = PF\_G\_D(d) \times CREDSUP\_P\_D(p,d) \tag{426}$$

$$PF\_G\_D(d) = 0.87 \tag{427}$$

$$OA\_P\_D(p,d) = CEE\_P\_D(p,d) + INP\_P\_D(p,d) - PP\_P\_D(p,d) \tag{428}$$

$$CEE\_P\_D(p,d) = \sum_{j \in EXPDAYS(d)} EE\_P\_D(p,j) \tag{429}$$

$$EE\_P\_D(p,d) = -(TOTAL\_P\_D(p,d) - TOTALprev\_P\_D(p,d)) \tag{430}$$

Variable	Units	SC	GR	Rule	Description	Ref
TM_P_D(p, d)	$	P	D	2.41.1	Trading Margin for participant p for Trading Day d	(425)
TL_P_D(p, d)	$	P	D	2.39.1	Trading Limit for participant p for Trading Day d	(426)
CREDSUP_P_D(p, d)	$	P	D	2.38	Credit Support held by AEMO on behalf of participant p on Trading Day d	I
PF_G_D(d)		G	D	2.39.2	Prudential factor on Trading Day d	(427)
OA_P_D(p, d)	$	P	D	2.40.1	Outstanding Amount for participant p on Trading Day d	(428)
INP_P_D(p, d)	$	P	D		Amount of money participant p owes for which a Settlement Statement has been issued, but payment has not been made, as calculated on Trading Day d	I
PP_P_D(p, d)	$	P	D	2.40.1(c)	Prepayments held by AEMO on behalf of participant p on Trading Day d	I
CEE_P_D(p, d)	$	P	D		Cumulative Estimated exposure for participant p as calculated on Trading Day d	(429)
EE_P_D(p, d)	$	P	D		Estimated exposure for participant p relating to Trading Day d	(430)
TOTALprev_P_D(p, d)	$	P	D		Total Settlement Statement amount (including GST and interest) for participant p in Trading Day d from most recently published Settlement Statement for Trading Day d	I
TOTAL_P_D(p, d)	$	P	D		Total settlement amount (including GST and interest) for participant p in Trading Day d	(62)
EXPDAYS(d)	{}	G	D		Set of Trading Days that have not yet had a Settlement Statement issued, up to and including Trading Day d-1	I