WEM Metering, Settlement & Prudential Calculations

Australian Energy Market Operator

WEM Rules effective: 1 September 2019

Version Control

Version	Changes	Author	Approver
0.1	Draft version for Market Participants	SM	

Contents

1 Introduction

The purpose of this document is to outline WEM Metering, Settlement and Prudential calculations as equations. At times, this document also aims to provide other context to the equations to aid in understanding. It is important to note that its purpose is not to simply repeat the WEM Rules - there are fundamental differences. In many instances, the WEM Rules represent calculations with words. This document represents calculations using equations. Furthermore, this document outlines settlement equations slightly differently to the rules - for example, it splits out Synergy's Ancillary Service Provider Payment into different categories of Ancillary Services. This is useful because it can then be used to show the zero-sum nature of the calculations for each Ancillary Service grouping; as well as making analysis and reporting easier for AEMO.

This document outlines:

- Metered Schedules;
- STEM settlement calculations; and
- NSTEM settlement calculations.

Throughout this document many variables will be defined. 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, $/MW, $/MWh, Flag, °C, MW/min, min	$/MWh
Scope (SC)	Tranche (T), Channel (CH), NMI (N), Contract(C), Facility (F), Participant (P), Global (G)	G
Granularity (GR)	Trading Interval (I), Trading Day (D), Trading Week (W), Trading Month (M), Capacity Year (CY), Financial Year (FY)	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

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. These hierarchies are represented below:

- $I \in D \in M \in CY$; or
- $I \in D \in M \in FY$.

When defining a variable, it will always be defined for its granularity. For example, The variable $CS\_P\_M(p, m)$ 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 argument more fine than its defined granularity, for example $CS\_P\_M(p, i)$. When the variable is expressed like this, it is implicit that it refers to the Trading Month m, in which Trading Interval i falls.

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 Generator 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 Generators in Trading Day d is represented as $SG(d)$, rather than being named $SG\_G\_D(d)$.
- Subsets are defined by adding a scope argument. For example $SG(p, d)$ represents the subset of $SG(d)$ 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_MG(d)	{}	G	D		Set of participants with MG participant class in WEMS in Trading Day d	I
WEMS_MC(d)	{}	G	D		Set of participants with MC participant class in WEMS in Trading Day d	I
WEMS_ASP(d)	{}	G	D		Set of participants with ASP 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_SO(d)	{}	G	D		Set of participants with SO participant class (excluding System Management) in WEMS in Trading Day d	I
WEMS_PREG(d)	{}	G	D		Set of participants registered in WEMS in Trading Day d	I

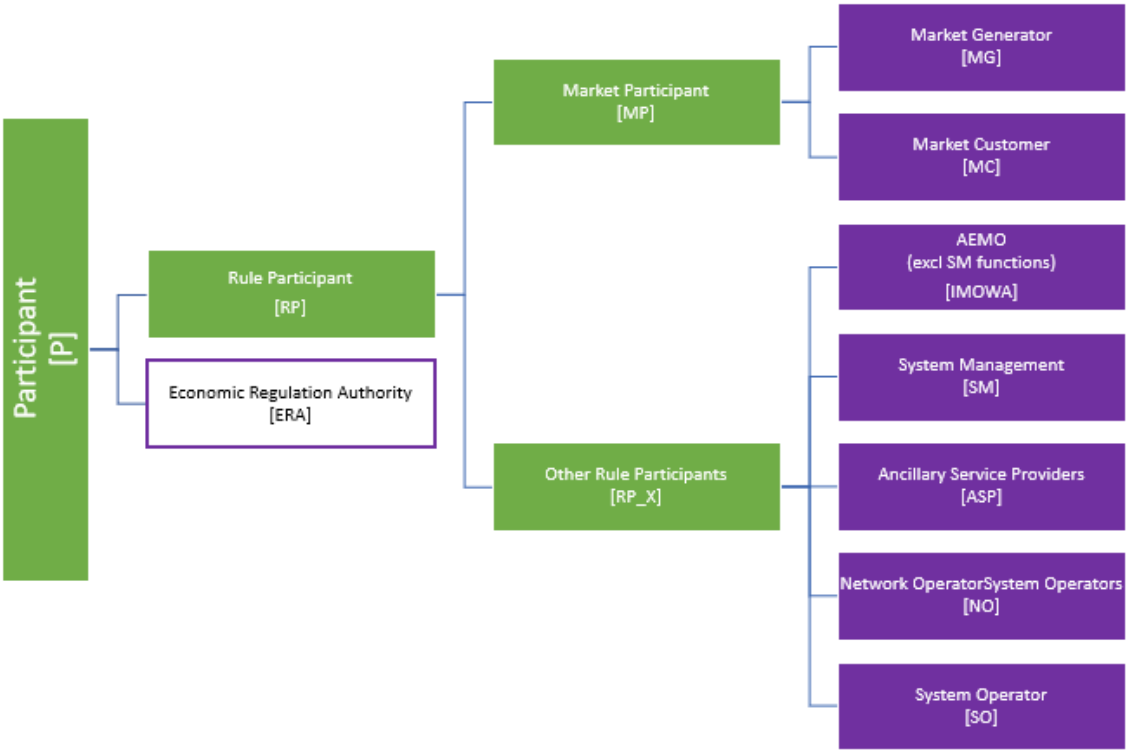
2.1.2 Sets of Rule Participant classes

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

- Network Operator (NO)
- Market Generator (MG)
- Market Customer (MC)
- Ancillary Service Provider (ASP)
- System Management (SM)
- System Operator (SO)

- 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.

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

$$P(d) = ERA(d) \cup RP(d) \tag{2}$$

$$ERA(d) = \{ERA\} \tag{3}$$

$$RP(d) = MG(d) \cup MC(d) \cup ASP(d) \cup NO(d) \cup AEMO(d) \cup SM(d) \cup SO(d) \tag{4}$$

$$MP(d) = MG(d) \cup MC(d) \tag{5}$$

$$MG(d) = WEMS\_PREG(d) \cap WEMS\_MG(d) \tag{6}$$

$$MC(d) = WEMS\_PREG(d) \cap WEMS\_MC(d) \tag{7}$$

$$AEMO(d) = \{IMOWA\} \tag{8}$$

$$SM(d) = \{SM\} \tag{9}$$

$$ASP(d) = WEMS\_PREG(d) \cap WEMS\_ASP(d) \tag{10}$$

$$NO(d) = WEMS\_PREG(d) \cap WEMS\_NO(d) \tag{11}$$

$$SO(d) = WEMS\_PREG(d) \cap WEMS\_SO(d) \tag{12}$$

$$Synergy(d) = \{WPGENER\} \tag{13}$$

$$Synergy\_M(m) = \{WPGENER\} \tag{14}$$

Variable	Units	SC	GR	Rule	Description	Ref
P_M(m)	{}	G	M		Set of participants (Rule Participants and the ERA) in Trading Month m	(1)
P(d)	{}	G	D		Set of participants (Rule Participants and the ERA) in Trading Day d	(2)
ERA(d)	{}	G	D	11	Set containing the ERA	(3)
RP(d)	{}	G	D	11	Set of Rule Participants in Trading Day d	(4)
MP(d)	{}	G	D	11	Set of Market Participants in Trading Day d	(5)
MG(d)	{}	G	D	11	Set of Market Generators in Trading Day d	(6)
MC(d)	{}	G	D	11	Set of Market Customers in Trading Day d	(7)
AEMO(d)	{}	G	D	11	Set containing the AEMO	(8)
SM(d)	{}	G	D	11	Set containing System Management	(9)
ASP(d)	{}	G	D	11	Set of Ancillary Service Providers in Trading Day d	(10)
NO(d)	{}	G	D	11	Set containing Network Operators in Trading Day d	(11)
SO(d)	{}	G	D	11	Set System Operators in Trading Day d	(12)
Synergy(d)	{}	G	D	11	Set containing Synergy	(13)
Synergy_M(m)	{}	G	M	11	Set containing Synergy	(14)
WEMS_MG(d)	{}	G	D		Set of participants with MG participant class in WEMS in Trading Day d	I
WEMS_MC(d)	{}	G	D		Set of participants with MC participant class in WEMS in Trading Day d	I
WEMS_ASP(d)	{}	G	D		Set of participants with ASP 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_SO(d)	{}	G	D		Set of participants with SO participant class (excluding System Management) in WEMS in Trading Day d	I
WEMS_PREG(d)	{}	G	D		Set of participants registered in WEMS in Trading Day d	I
D(m)	{}	G	M		Set of Trading Days in Trading Month m	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_SG(d)	{}	G	D		Set of Facilities with a SG WEMS Type in Trading Day d	I
WEMS_NSG(d)	{}	G	D		Set of Facilities with a NSG WEMS Type in Trading Day d	I
WEMS_INSG(d)	{}	G	D		Set of Facilities with a INSG 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 that are registered in WEMS in Trading Day d	I
WEMS_FCAND(d)	{}	G	D		Set of Facilities that are candidate Facilities WEMS in Trading Day d	I
WEMS_IM(d)	{}	G	D		Set of Facilities that are Intermittent Loads in WEMS in Trading Day d	I
WEMS_RLG(d)	{}	G	D		Set of Facilities in WEMS that serve an Intermittent Load in Trading Day d	I
WEMS_RG(d)	{}	G	D		Set of Facilities in WEMS that remotely 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
WEMS_SAF(d)	{}	G	D		Set of Facilities in WEMS that are Stand Alone Facilities in Trading Day d	I
MTR_AGG(d)	{}	G	D	2.30	Set of Facilities that are the aggregate of other Facilities 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
WEMS_LFAS(d)	{}	G	D		Set of Facilities in WEMS that are marked as intending to provide LFAS, and have standing data (in an accepted change request) for LFAS enablement limitations on Trading Day d	I

2.2.2 Sets of Facility Types and Facility Classes

The following are Facilities [MR 2.29.1]:

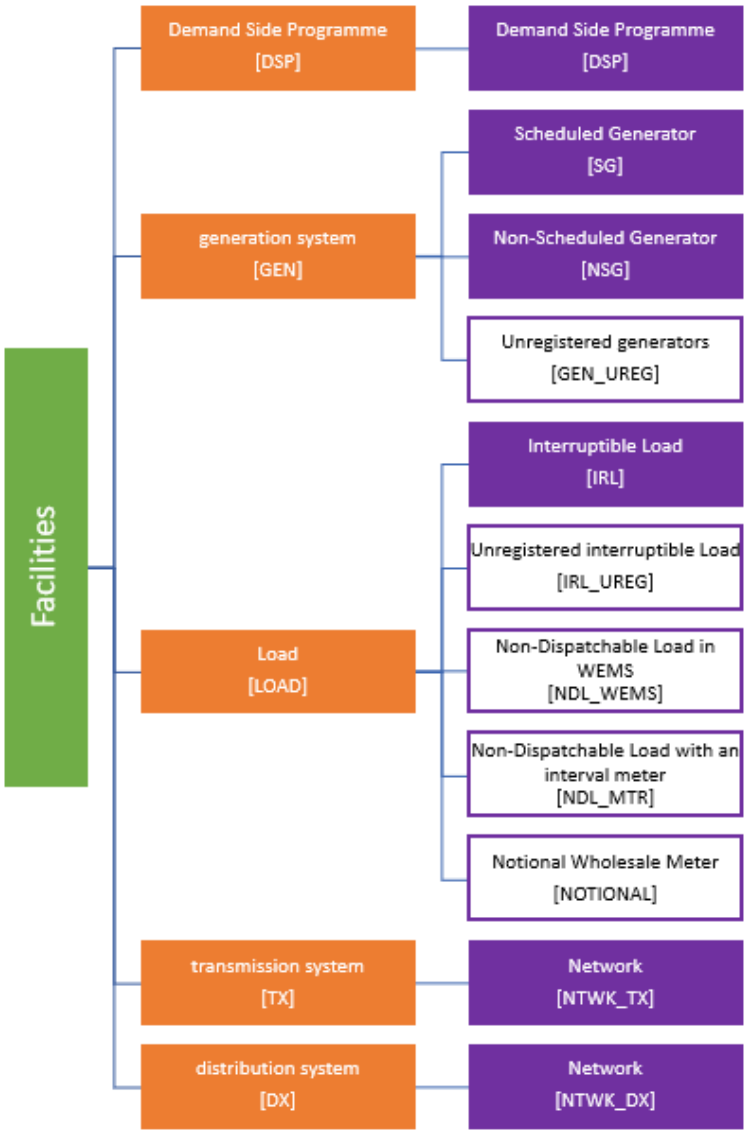
- distribution system (DX)

- transmission system (TX)
- generation system (GEN)
- Load (LOAD)
- Demand Side Programme (DSP)

The following are Facility Classes [MR 2.29.1A]:

- Network (NTWK)
- Scheduled Generator (SG)
- Non-Scheduled Generator (NSG)
- Interruptible Load (IRL)
- Demand Side Programme (DSP)

The diagram below shows the relationship between Facility types (orange) and Facility Classes (purple).



These sets are defined as follows.

$$DSP(d) = WEMS\_FREG(d) \cap WEMS\_DSP(d) \tag{15}$$

$$GEN(d) = SG(d) \cup NSG(d) \cup GEN\_UREG(d) \tag{16}$$

$$SG(d) = WEMS\_FREG(d) \cap WEMS\_SG(d) \tag{17}$$

$$NSG(d) = WEMS\_FREG(d) \cap (WEMS\_NSG(d) \cup WEMS\_INSG(d)) \tag{18}$$

$$GEN\_UREG(d) = WEMS\_FCAND(d) \cap (WEMS\_SG(d) \cup WEMS\_NSG(d) \cup WEMS\_INSG(d)) \tag{19}$$

$$LOAD(d) = IRL(d) \cup IRL\_UREG(d) \cup NDL\_WEMS(d) \cup NDL\_MTR(d) \cup NOTIONAL(d) \tag{20}$$

$$IRL(d) = WEMS\_FREG(d) \cap WEMS\_IL(d) \tag{21}$$

$$IRL\_UREG(d) = WEMS\_FCAND(d) \cap WEMS\_IL(d) \tag{22}$$

$$NDL\_WEMS(d) = WEMS\_FREG(d) \cap WEMS\_NDL(d) \tag{23}$$

$$NOTIONAL(d) = \{NOTIONAL\} \tag{24}$$

$$NTWK(d) = WEMS\_FREG(d) \cap WEMS\_N(d) \tag{25}$$

$NTWK(d)$ is represented as $NTWK\_TX \cup NTWK\_DX$ in the diagram above showing the relationship between Facility types and Facility Classes.

Variable	Units	SC	GR	Rule	Description	Ref
DSP(d)	{}	G	D	11	Set of Demand Side Programmes in Trading Day d	(15)
GEN(d)	{}	G	D	2.29.1(c)	Set of generation systems in Trading Day d	(16)
SG(d)	{}	G	D	11	Set of Scheduled Generators in Trading Day d	(17)
NSG(d)	{}	G	D	11	Set of Non-Scheduled Generators in Trading Day d	(18)
GEN_UREG(d)	{}	G	D		Set of unregistered generation systems in Trading Day d	(19)
LOAD(d)	{}	G	D	11	Set of Loads in Trading Day d	(20)
IRL(d)	{}	G	D	11	Set of Interruptible Loads in Trading Day d	(21)
IRL_UREG(d)	{}	G	D		Set of unregistered Loads that can be interrupted upon request in Trading Day d	(22)
NDL_WEMS(d)	{}	G	D		Set of Non-Dispatchable Loads in WEMS registration in Trading Day d	(23)
NDL_MTR(d)	{}	G	D		Set of Non-Dispatchable Loads with interval meters that are not in WEMS in Trading Day d	I
NOTIONAL(d)	{}	G	D	11	Set containing the Notional Wholesale Meter	(24)
NTWK(d)	{}	G	D	11	Set of Networks in Trading Day d.	(25)
WEMS_DSP(d)	{}	G	D		Set of Facilities with a DSP WEMS Type in Trading Day d	I
WEMS_SG(d)	{}	G	D		Set of Facilities with a SG WEMS Type in Trading Day d	I
WEMS_NSG(d)	{}	G	D		Set of Facilities with a NSG WEMS Type in Trading Day d	I

Variable	Units	SC	GR	Rule	Description	Ref
WEMS_INSG(d)	{}	G	D		Set of Facilities with a INSG 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
WEMS_FREG(d)	{}	G	D		Set of Facilities that are registered in WEMS in Trading Day d	I
WEMS_FCAND(d)	{}	G	D		Set of Facilities that are candidate Facilities 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.

$$REG\_F(d) = DSP(d) \cup SG(d) \cup NSG(d) \cup IRL(d) \cup NTWK(d) \tag{26}$$

$$NDL(d) = NDL\_WEMS(d) \cup NDL\_MTR(d) \cup NOTIONAL(d) \tag{27}$$

$$IML(d) = (IRL(d) \cup NDL\_WEMS(d)) \cap WEMS\_IM(d) \tag{28}$$

$$IG(d) = WEMS\_FREG(d) \cap WEMS\_INSG(d) \tag{29}$$

$$RG(d) = WEMS\_FREG(d) \cap WEMS\_RG(d) \tag{30}$$

$$EG(d) = WEMS\_FREG(d) \cap WEMS\_RLG(d) \cap \overline{WEMS\_RG(d)} \tag{31}$$

$$BALPF(d) = REG\_F(p,d) \cap \overline{SAF(d) \cup DSP(d) \cup IRL(d)} \text{ where } p \in Synergy(d) \tag{32}$$

$$BALF(d) = SG(p,d) \cup NSG(p,d) \cup SAF(d) \text{ where } p \notin Synergy(d) \tag{33}$$

$$LFASF(d) = (BALF(d) \cap WEMS\_LFAS(d)) \cup PORTFOLIO(d) \tag{34}$$

$$SAF(d) = (SG(d) \cup NSG(d)) \cap WEMS\_SAF(d) \tag{35}$$

$$AF(d) = \left(SG(d) \cap \overline{AGG(d)}\right) \cup SGpreAGG(d) \cup NSG(d) \cup GEN\_UREG\_L(d) \cup EG(d) \tag{36}$$

$$GEN\_UREG\_L(d) = GEN\_UREG(d) \cap WEMS\_RLG(d) \cap \overline{WEMS\_RG(d)} \tag{37}$$

$$AGG(d) = REG\_F(d) \cap MTR\_AGG(d) \tag{38}$$

$$SGpreAGG(d) = \bigcup_{f \in SG(d) \cap AGG(d)} NMI(f,d) \tag{39}$$

$$PORTFOLIO(d) = \{PORTFOLIO\} \tag{40}$$

$$AF\_M(m) = \bigcup_{d \in D(m)} AF(d) \tag{41}$$

$$IG\_M(m) = \bigcup_{d \in D(m)} IG(d) \tag{42}$$

$$NSG\_M(m) = \bigcup_{d \in D(m)} NSG(d) \tag{43}$$

Variable	Units	SC	GR	Rule	Description	Ref
REG_F(d)	{}	G	D	11	Set of Registered Facilities in Trading Day d	(26)
NDL(d)	{}	G	D	11	Set of Non-Dispatchable Loads in Trading Day d	(27)
IML(d)	{}	G	D	2.30B.1	Set of Loads which have an Intermittent Load component in Trading Day d	(28)
IG(d)	{}	G	D	11	Set of Intermittent Generators in Trading Day d	(29)
RG(d)	{}	G	D	2.30B.2(a)	Set of Scheduled Generators that serve an Intermittent Load remotely in Trading Day d	(30)
EG(d)	{}	G	D	2.30B.2(a)	Set of Scheduled Generators that serve an Intermittent Load locally in Trading Day d	(31)
BALPF(d)	{}	G	D	11	Set of Facilities in the Balancing Portfolio in Trading Day d	(32)
BALF(d)	{}	G	D	11	Set of Balancing Facilities in Trading Day d	(33)
LFASF(d)	{}	G	D	11	Set of LFAS Facilities in Trading Day d	(34)
SAF(d)	{}	G	D	11	Set of Stand Alone Facilities in Trading Day d	(35)
AF(d)	{}	G	D	Appendix 2	Set of applicable facilities (including any exempt under 2.30A.2) in Trading Day d	(36)
GEN_UREG_L(d)	{}	G	D		Set of unregistered generation system serving an Intermittent Load in Trading Day d	(37)
AGG(d)	{}	G	D	2.30	Set of accepted aggregated Facilities in Trading Day d	(38)
SGpreAGG(d)	{}	G	D	2.30	Set of Facilities which comprise an aggregated Scheduled Generator on Trading Day d	(39)
PORTFOLIO(d)	{}	G	D	11	Set containing the Balancing Portfolio	(40)
NMI(d)	{}	G	D		Set of all connection points in Trading Day d	I
DSP(d)	{}	G	D	11	Set of Demand Side Programmes in Trading Day d	(15)
SG(d)	{}	G	D	11	Set of Scheduled Generators in Trading Day d	(17)
NSG(d)	{}	G	D	11	Set of Non-Scheduled Generators in Trading Day d	(18)
NDL_WEMS(d)	{}	G	D		Set of Non-Dispatchable Loads in WEMS registration in Trading Day d	(23)
NDL_MTR(d)	{}	G	D		Set of Non-Dispatchable Loads with interval meters that are not in WEMS in Trading Day d	I
NOTIONAL(d)	{}	G	D	11	Set containing the Notional Wholesale Meter	(24)

Variable	Units	SC	GR	Rule	Description	Ref
IRL(d)	{}	G	D	11	Set of Interruptible Loads in Trading Day d	(21)
Synergy(d)	{}	G	D	11	Set containing Synergy	(13)
WEMS_IM(d)	{}	G	D		Set of Facilities that are Intermittent Loads in WEMS in Trading Day d	I
WEMS_FREG(d)	{}	G	D		Set of Facilities that are registered in WEMS in Trading Day d	I
WEMS_INSG(d)	{}	G	D		Set of Facilities with a INSG WEMS Type in Trading Day d	I
WEMS_RG(d)	{}	G	D		Set of Facilities in WEMS that remotely serve an Intermittent Load in Trading Day d	I
WEMS_SAF(d)	{}	G	D		Set of Facilities in WEMS that are Stand Alone Facilities in Trading Day d	I
GEN_UREG(d)	{}	G	D		Set of unregistered generation systems in Trading Day d	(19)
WEMS_RLG(d)	{}	G	D		Set of Facilities in WEMS that serve an Intermittent Load in Trading Day d	I
MTR_AGG(d)	{}	G	D	2.30	Set of Facilities that are the aggregate of other Facilities in Trading Day d	I
WEMS_LFAS(d)	{}	G	D		Set of Facilities in WEMS that are marked as intending to provide LFAS, and have standing data (in an accepted change request) for LFAS enablement limitations on Trading Day d	I
AF_M(m)	{}	G	M	Appendix 2	Set of applicable facilities (including any exempt under 2.30A.2) in Trading Month m	(41)
IG_M(m)	{}	G	M	11	Set of Intermittent Generators in Trading Month m	(42)
NSG_M(m)	{}	G	M	11	Set of Non-Scheduled Generators in Trading Month m	(43)
NTWK(d)	{}	G	D	11	Set of Networks in Trading Day d.	(25)
D(m)	{}	G	M		Set of Trading Days in Trading Month m	I

2.3 Other Sets

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 separately metered connection points (NMIs) that are also measured by another connection point in Trading Day d	I

Variable	Units	SC	GR	Rule	Description	Ref
BPQP(i)	{}	G	I	11	Set of Balancing Price-Quantity Pairs in Trading Interval i	I
SUP(m)	{}	G	M		Set of Supplementary Capacity contracts in Trading Month m	I
CC(d)	{}	G	D		Ordered set of all price-quantity pairs (to 0.001MW granularity) associated with Capacity Credits (excluding DSM, including SPA) for Trading Day d (ordered by ascending price)	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_M(m)	{}	G	M		Set of Trading Intervals in Trading Month m	I
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I
IY(cy)	{}	G	CY		Set of Trading Intervals in Capacity Year cy	I
PI4320(i)	{}	G	I		Set of previous 4320 Trading Intervals up to and including Trading Interval i	I
PI1440(i)	{}	G	I		Set of Trading Intervals prior to and including Trading Interval i	I
PI(i)	{}	G	I		Set of Trading Intervals in the same Capacity Year as, but prior to, Trading Interval i	I
INTDAYS(d)	{}	G	D	9.1.3	Set of days from (and including) the settlement day associated with the original NSTEM Settlement Statement up to (but excluding) settlement day associated with the most recently published NSTEM Settlement Statement for Trading Day d	I
D_W(w)	{}	G	W		Set of Trading Days in Trading Week w	I
EXPDAYS(d)	{}	G	D		Set of Trading Days that have not yet had the final Settlement Statement issued, up to and including Trading Day d-1	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
I_M(m)	{}	G	M		Set of Trading Intervals in Trading Month m	I
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I
IY(cy)	{}	G	CY		Set of Trading Intervals in Capacity Year cy	I
PI4320(i)	{}	G	I		Set of previous 4320 Trading Intervals up to and including Trading Interval i	I
PI1440(i)	{}	G	I		Set of Trading Intervals prior to and including Trading Interval i	I
PI(i)	{}	G	I		Set of Trading Intervals in the same Capacity Year as, but prior to, Trading Interval i	I
INTDAYS(d)	{}	G	D	9.1.3	Set of days from (and including) the settlement day associated with the original NSTEM Settlement Statement up to (but excluding) settlement day associated with the most recently published NSTEM Settlement Statement for Trading Day d	I
D_W(w)	{}	G	W		Set of Trading Days in Trading Week w	I
EXPDAYS(d)	{}	G	D		Set of Trading Days that have not yet had the final Settlement Statement issued, up to and including Trading Day d-1	I

2.4 Associations

***** THIS SECTION IS TO BE DEVELOPED BY AEMO TO DOCUMENT THE ASSOCIATIONS BETWEEN DIFFERENT ENTITIES. E.G. NMIS ASSOCIATED WITH A FACILITY. FACILITIES ASSOCIATED WITH A PARTICIPANT *****

3 Metering

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.

3.1 Invocation

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

Variable	Scope Set
$SOMS\_N\_I(n,i)$	$\forall n \in NMI(i)$
$SOMS\_F\_I(f,i)$	$\forall f \in NDL(i) \cup IRL(i) \cup SG(i) \cup NSG(i)$
$ABSNDL\_P\_I(p,i)$	$\forall p \in P\_M(i)$
$CQ\_P\_M(p,m)$	$\forall p \in P\_M(m)$
$LFCQ\_P\_M(p,m)$	$\forall p \in P\_M(m)$
$SOMSAV\_F\_M(f,m)$	$\forall f \in AF\_M(m) \cap IG\_M(m)$
$MAX2\_F\_M(f,m)$	$\forall f \in NSG\_M(m)$
$MAX1\_F\_M(f,m)$	$\forall f \in NSG\_M(m)$
$SOMS\_G\_I(i)$	N/A

Variable	Units	SC	GR	Rule	Description	Ref
SOMS_N_I(n, i)	MWh	N	I		Sent Out Metered Schedule for NMI n in Trading Interval i	(44)
SOMS_F_I(f, i)	MWh	F	I		Sent Out Metered Schedule for Facility f in Trading Interval i	(45)
ABSNDL_P_I(p, i)	MWh	P	I	9.13.1	Sum of the absolute values of the Non-Dispatchable Load Metered Schedules for Market Participant p in Trading Interval i	(69)
CQ_P_M(p, m)	MWh	P	M	9.3.7(a)	Contributing quantity for Market Participant p in Trading Month m	(70)
LFCQ_P_M(p, m)	MWh	P	M	3.14.1(a)	Load following contributing quantity for Market Participant p in Trading Month m	(71)
SOMSAV_F_M(f, m)	MWh	F	M		Average Sent Out Metered Schedule for Facility f in Trading Month m	(72)
MAX2_F_M(f, m)	MWh	F	M	4.26.1A (a)(ii).3	2nd highest Sent Out Metered Schedule of Facility f up to and including Trading Month m	(74)
MAX1_F_M(f, m)	MWh	F	M		Highest Sent Out Metered Schedule of Facility f up to and including Trading Month m	(73)
SOMS_G_I(i)	MWh	G	I	11	Total Sent Out Generation in Trading Interval i	(77)
NMI(d)	{}	G	D		Set of all connection points in Trading Day d	I
NDL(d)	{}	G	D	11	Set of Non-Dispatchable Loads in Trading Day d	(27)
IRL(d)	{}	G	D	11	Set of Interruptible Loads in Trading Day d	(21)

Variable	Units	SC	GR	Rule	Description	Ref
SG(d)	{}	G	D	11	Set of Scheduled Generators in Trading Day d	(17)
NSG(d)	{}	G	D	11	Set of Non-Scheduled Generators in Trading Day d	(18)
P_M(m)	{}	G	M		Set of participants (Rule Participants and the ERA) in Trading Month m	(1)
AF_M(m)	{}	G	M	Appendix 2	Set of applicable facilities (including any exempt under 2.30A.2) in Trading Month m	(41)
IG_M(m)	{}	G	M	11	Set of Intermittent Generators in Trading Month m	(42)
NSG_M(m)	{}	G	M	11	Set of Non-Scheduled Generators in Trading Month m	(43)

3.2 Metered Schedules

Metered Schedules are calculated for:

- Non-Dispatchable Loads (excluding those represented by the Notional Wholesale Meter)
- Interruptible Loads
- Scheduled Generators
- Non-Scheduled Generators
- Notional Wholesale Meter

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

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

3.2.1 Connection point energy quantities

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

- Energy data (kWh); and
- Standing data (Participant, TLF, DLF).

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

For any single interval, a NMI may have multiple meter channels that measure and store data. The type of data varies; however, the channels containing 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.

$$SOMS\_N\_I(n,i) = \begin{cases} \sum_{ch \in B(n,i)} MQ\_CH\_I(ch,i) - \sum_{ch \in E(n,i)} MQ\_CH\_I(ch,i) & \text{for } n \notin NOINTMETER(i) \\ SCADA\_F\_I(n,i) & \text{for } n \in NOINTMETER(i) \end{cases} \quad (44)$$

Variable	Units	SC	GR	Rule	Description	Ref
SOMS_N_I(n, i)	MWh	N	I		Sent Out Metered Schedule for NMI n in Trading Interval i	(44)
SCADA_F_I(f, i)	MWh	F	I		Net generation measured by SCADA for Facility f in Trading Interval i, non-loss adjusted	I
MQ_CH_I(ch, i)	MWh	CH	I		Energy measured by metering channel ch in Trading Interval i, non-loss adjusted	I
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
NOINTMETER(d)	{}	G	D		Set of Facilities in WEMS for which no Interval meter exists in Trading Day d	I

3.2.2 Metered Schedule Calculations

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. Unregistered NDLs' Metered Schedules and Sent Out Metered Schedules 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 below incorporate the concept of aggregated facilities [MR 2.30], which is a Registered Facility with more than one connection point.

3.2.2.1 Metered Schedules

$$SOMS\_F\_I(f,i) = \begin{cases} \sum_{n \in NMI(f,i)} SOMS\_N\_I(n,i) & \text{for } f \in NDL\_WEMS(i) \cup IRL(i) \cup SG(i) \cup NSG(i) \\ & \text{and } f \notin IML(i) \cup EG(i) \cup RG(i) \\ SOMS\_N\_I(f,i) & \text{for } f \in NDL\_MTR(i) \\ SOMSIL\_F\_I(f,i) + SOMSEL\_F\_I(f,i) & \text{for } f \in IML(i) \\ SOMSEG\_F\_I(IML(f,i),i) & \text{for } f \in EG(i) \\ 0 & \text{for } f \in RG(i) \\ -1 \times \sum_{f \notin NOTIONAL(i)} SOMS\_F\_I(f,i) & \text{for } f \in NOTIONAL(i) \\ 0 & \text{otherwise} \end{cases} \quad (45)$$

$$MS\_F\_I(f,i)$$

$$= \begin{cases} SOMS\_F\_I(f,i) \times TLF\_F\_D(f,i) \times DLF\_F\_D(f,i) & \text{for } f \in NDL\_WEMS(i) \cup IRL(i) \cup SG(i) \cup NSG(i) \\ & \text{and } f \notin IML(i) \cup EG(i) \cup RG(i) \\ SOMS\_N\_I(f,i) \times TLF\_N\_D(f,i) \times DLF\_N\_D(f,i) & \text{for } f \in NDL\_MTR(i) \\ MSIL\_F\_I(f,i) + MSEL\_F\_I(f,i) & \text{for } f \in IML(i) \\ MSEG\_F\_I(IML(f,i),i) & \text{for } f \in EG(i) \\ 0 & \text{for } f \in RG(i) \\ -1 \times \sum_{f \notin NOTIONAL(i)} MS\_F\_I(f,i) & \text{for } f \in NOTIONAL(i) \\ 0 & \text{otherwise} \end{cases} \quad (46)$$

Variable	Units	SC	GR	Rule	Description	Ref
SOMS_F_I(f, i)	MWh	F	I		Sent Out Metered Schedule for Facility f in Trading Interval i	(45)
MS_F_I(f, i)	MWh	F	I	9.3.4, 2.30B.10(c), 2.30B.12	Metered Schedule for Facility f in Trading Interval i	(46)
SOMS_N_I(n, i)	MWh	N	I		Sent Out Metered Schedule for NMI n in Trading Interval i	(44)
MSIL_F_I(f, i)	MWh	F	I	9.3.4, 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	(63)
SOMSIL_F_I(f, i)	MWh	F	I		Sent Out Metered Schedule for the intermittent load associated with Facility f in Trading Interval i	(66)
MSEL_F_I(f, i)	MWh	F	I	9.3.4, 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	(61)
SOMSEL_F_I(f, i)	MWh	F	I		Sent Out Metered Schedule for the embedded load associated with Facility f in Trading Interval i	(64)
MSEG_F_I(f, i)	MWh	F	I	9.3.4, 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	(62)
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	(65)
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
TLF_N_D(n, d)		N	D		Transmission Loss Factor for NMI n for Trading Day d	I
DLF_N_D(n, d)		N	D		Distribution Loss Factor for NMI n for Trading Day d	I
NMI(d)	{}	G	D		Set of all connection points in Trading Day d	I

Variable	Units	SC	GR	Rule	Description	Ref
NDL_WEMS(d)	{}	G	D		Set of Non-Dispatchable Loads in WEMS registration in Trading Day d	(23)
NDL_MTR(d)	{}	G	D		Set of Non-Dispatchable Loads with interval meters that are not in WEMS in Trading Day d	I
IRL(d)	{}	G	D	11	Set of Interruptible Loads in Trading Day d	(21)
SG(d)	{}	G	D	11	Set of Scheduled Generators in Trading Day d	(17)
NSG(d)	{}	G	D	11	Set of Non-Scheduled Generators in Trading Day d	(18)
IML(d)	{}	G	D	2.30B.1	Set of Loads which have an Intermittent Load component in Trading Day d	(28)
EG(d)	{}	G	D	2.30B.2(a)	Set of Scheduled Generators that serve an Intermittent Load locally in Trading Day d	(31)
RG(d)	{}	G	D	2.30B.2(a)	Set of Scheduled Generators that serve an Intermittent Load remotely in Trading Day d	(30)
NOTIONAL(d)	{}	G	D	11	Set containing the Notional Wholesale Meter	(24)

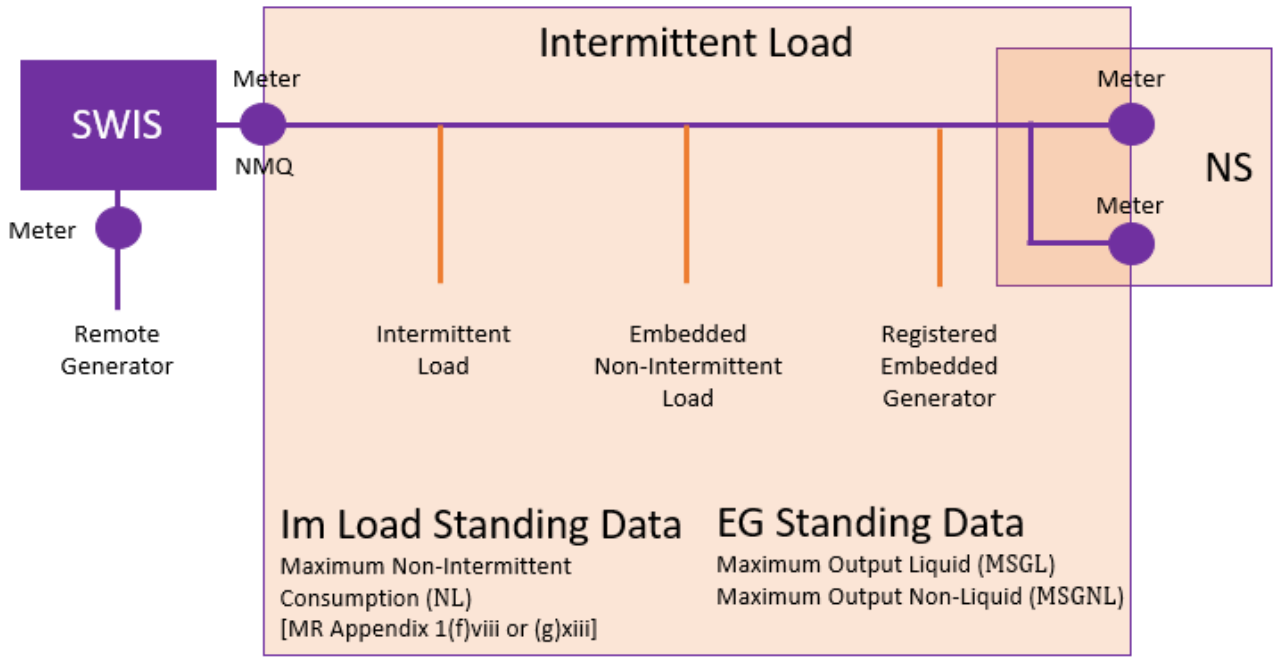
3.2.2.2 Intermittent Load Metered Schedules

An Intermittent Load comprises 4 components. The first 3 components are measured by the single connection point associated with the Intermittent Load, the 4th component is located at a different connection point:

- Intermittent load associated with Load f
- Embedded Load (non-Intermittent Load) that is non-Intermittent Load f
- Embedded generation associated with embedded generator $EG(f, d)$
- Remote generation associated with remote generator $RG(f, d)$

MR 2.30B.10(c)(i)3 requires the generation to be from a Registered Scheduled Generator at the connection point.

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.

If there is a remote generator $RG(f,d)$ associated with Intermittent Load f, its Metered Schedule for the purposes of Appendix 2 is defined below, for all other settlement calculations the Metered Schedule is not to be used. [MR 2.30B.12(b)]

$$SOMSRG\_F\_I(f,i) = \sum_{n \in NMI(RG(f,i),i)} SOMS\_N\_I(n,i) \tag{47}$$

$$MSRG\_F\_I(f,i) = SOMSRG\_F\_I(f,i) \times TLF\_F\_D(RG(f,i),i) \times DLF\_F\_D(RG(f,i),i) \tag{48}$$

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

$$NNMQ\_F\_I(f,i) = \sum_{n \in NMI(f,i)} SOMS\_N\_I(n,i) \tag{49}$$

$$NMQ\_F\_I(f,i) = NNMQ\_F\_I(f,i) \times TLF\_F\_D(f,i) \times DLF\_F\_D(f,i) \tag{50}$$

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

$$NS\_F\_I(f,i) = \sum_{n \in NS(f,i)} SOMS\_N\_I(n,i) \times TLF\_N\_D(n,i) \times DLF\_N\_D(n,i) \tag{51}$$

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

$$AMQnoRG\_F\_I(f,i) = NMQ\_F\_I(f,i) - NS\_F\_I(f,i) \tag{52}$$

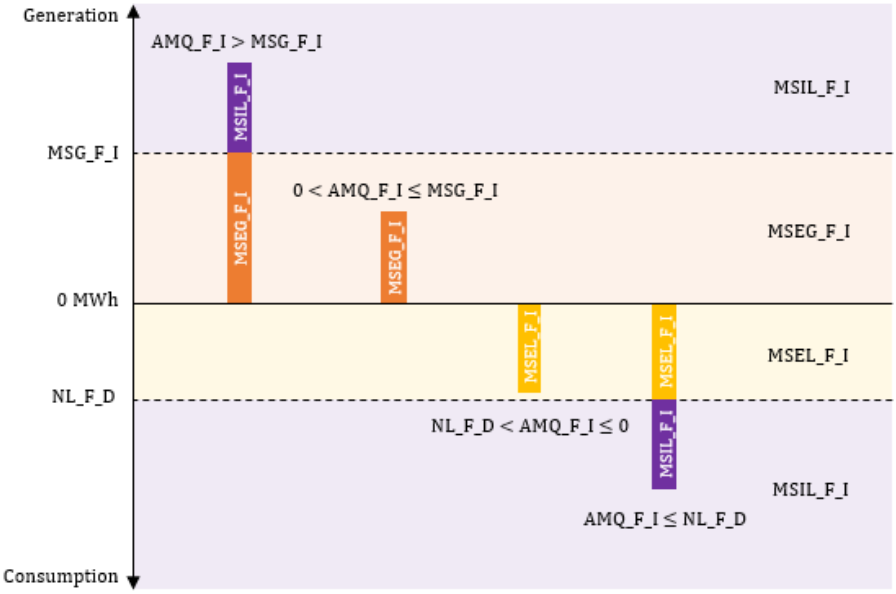
Any remote generator is accounted for to determine AMQ:

$$AMQ\_F\_I(f,i) = AMQnoRG\_F\_I(f,i) + MSRG\_F\_I(f,i) \tag{53}$$

Variable	Units	SC	GR	Rule	Description	Ref
AMQ_F_I(f, i)	MWh	F	I	2.30B.10 (a)vi, 2.30B.12(a)	Adjusted meter quantity (including Remote Generators) for Facility f in Trading Interval i	(53)

Variable	Units	SC	GR	Rule	Description	Ref
AMQnoRG_F_I(f, i)	MWh	F	I	2.30B.10(a)vi	Adjusted meter quantity (except Remote Generators) for Facility f in Trading Interval i	(52)
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	(50)
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	(51)
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	(49)
SOMSRG_F_I(f, i)	MWh	F	I		Non-loss adjusted energy output of remote generators associated with Intermittent Load Facility f in Trading Interval i	(47)
MSRG_F_I(f, i)	MWh	F	I		Loss-adjusted energy output of remote generators associated with Intermittent Load Facility f in Trading Interval i	(48)
SOMS_N_I(n, i)	MWh	N	I		Sent Out Metered Schedule for NMI n in Trading Interval i	(44)
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
TLF_N_D(n, d)		N	D		Transmission Loss Factor for NMI n for Trading Day d	I
DLF_N_D(n, d)		N	D		Distribution Loss Factor for NMI n for Trading Day d	I
NMI(d)	{}	G	D		Set of all connection points in Trading Day d	I
RG(d)	{}	G	D	2.30B.2(a)	Set of Scheduled Generators that serve an Intermittent Load remotely in Trading Day d	(30)
EG(d)	{}	G	D	2.30B.2(a)	Set of Scheduled Generators that serve an Intermittent Load locally in Trading Day d	(31)
NS(d)	{}	G	D	2.30B.10(a)ii	Set of all separately metered connection points (NMIs) that are also measured by another connection point in Trading Day d	I

Then the AMQ_F_I value is split into three components based on the standing data of the Intermittent Load or its associated embedded generator. If AMQ_F_I is positive (generating) 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. Similarly, if AMQ_F_I is negative (consuming) 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. 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:

$$NL\_F\_D(f,d) = -NLstanding\_F\_D(f,d) \tag{54}$$

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

$$MSGEG\_F\_D(f,d) = MSG\_F\_D(EG(f,d),d) \tag{55}$$

$$MSG\_F\_D(f,d) = 0.5h \times SOC\_F\_D(f,d) \tag{56}$$

$$SOC\_F\_D(f,d) = \begin{cases} \sum_{g \in BALPF(d)} SOC\_F\_D(g,d) & \text{for } f \in PORTFOLIO(d) \\ max(0, MSGL\_F\_D(f,d), MSGNL\_F\_D(f,d)) & \text{for } f \notin PORTFOLIO(d) \end{cases} \tag{57}$$

The Metered Schedule for the three components: Embedded Load, Intermittent Load and Embedded Generation of facility f are shown by the four equations below which is the mathematical representation of the image above.

$$MSEL\_F\_I(f,i) = \begin{cases} NL\_F\_D(f,i) & \text{for } AMQ\_F\_I(f,i) \le NL\_F\_D(f,i) \\ AMQ\_F\_I(f,i) & \text{for } NL\_F\_D(f,i) < AMQ\_F\_I(f,i) \le 0 \\ 0 & \text{for } 0 < AMQ\_F\_I(f,i) \le MSGEG\_F\_D(f,i) \\ 0 & \text{for } AMQ\_F\_I(f,i) > MSGEG\_F\_D(f,i) \end{cases} \tag{58}$$

$$MSEG\_F\_I(f,i) = \begin{cases} 0 & \text{for } AMQ\_F\_I(f,i) \le NL\_F\_D(f,i) \\ 0 & \text{for } NL\_F\_D(f,i) < AMQ\_F\_I(f,i) \le 0 \\ AMQ\_F\_I(f,i) & \text{for } 0 < AMQ\_F\_I(f,i) \le MSGEG\_F\_D(f,i) \\ MSGEG\_F\_D(f,i) & \text{for } AMQ\_F\_I(f,i) > MSGEG\_F\_D(f,i) \end{cases} \tag{59}$$

$$MSIL\_F\_I(f,i) = \begin{cases} AMQ\_F\_I(f,i) - NL\_F\_D(f,i) & \text{for } AMQ\_F\_I(f,i) \le NL\_F\_D(f,i) \\ 0 & \text{for } NL\_F\_D(f,i) < AMQ\_F\_I(f,i) \le 0 \\ 0 & \text{for } 0 < AMQ\_F\_I(f,i) \le MSGEG\_F\_D(f,i) \\ AMQ\_F\_I(f,i) - MSGEG\_F\_D(f,i) & \text{for } AMQ\_F\_I(f,i) > MSGEG\_F\_D(f,i) \end{cases} \tag{60}$$

These equations are mathematically equivalent to:

$$MSEL\_F\_I(f,i) = min(0, max(NL\_F\_D(f,i), AMQ\_F\_I(f,i))) \tag{61}$$

$$MSEG\_F\_I(f,i) = max(0, min(MSGEG\_F\_D(f,i), AMQ\_F\_I(f,i))) \tag{62}$$

$$MSIL\_F\_I(f,i) = AMQ\_F\_I(f,i) - MSEL\_F\_I(f,i) - MSEG\_F\_I(f,i) \tag{63}$$

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

$$SOMSEL\_F\_I(f,i) = \frac{MSEL\_F\_I(f,i)}{TLF\_F\_D(f,i) \times DLF\_F\_D(f,i)} \tag{64}$$

$$SOMSEG\_F\_I(f,i) = \frac{MSEG\_F\_I(f,i)}{TLF\_F\_D(f,i) \times DLF\_F\_D(f,i)} \tag{65}$$

$$SOMSIL\_F\_I(f,i) = \frac{MSIL\_F\_I(f,i)}{TLF\_F\_D(f,i) \times DLF\_F\_D(f,i)} \tag{66}$$

Variable	Units	SC	GR	Rule	Description	Ref
MSIL_F_I(f, i)	MWh	F	I	9.3.4, 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	(63)
SOMSIL_F_I(f, i)	MWh	F	I		Sent Out Metered Schedule for the intermittent load associated with Facility f in Trading Interval i	(66)
MSEL_F_I(f, i)	MWh	F	I	9.3.4, 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	(61)
SOMSEL_F_I(f, i)	MWh	F	I		Sent Out Metered Schedule for the embedded load associated with Facility f in Trading Interval i	(64)
MSEG_F_I(f, i)	MWh	F	I	9.3.4, 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	(62)
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	(65)
AMQ_F_I(f, i)	MWh	F	I	2.30B.10 (a)vi, 2.30B.12(a)	Adjusted meter quantity (including Remote Generators) for Facility f in Trading Interval i	(53)
MSGL_F_D(f, d)	MW	F	D	Appendix 1 (b)iii	Maximum sent out capacity (liquid fuel) of Facility f in Trading Day d.	I
MSGNL_F_D(f, d)	MW	F	D	Appendix 1 (b)iii, Appendix 1 (e)iiiA	Maximum sent out capacity (Non-liquid fuel) of Facility f in Trading Day d.	I
MSG_F_D(f, d)	MWh	F	D	2.30B.10(a)v	Maximum sent out generation of Facility f in Trading Day d	(56)
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	(55)
SOC_F_D(f, d)	MW	F	D	11	Sent Out Capacity of Facility f in Trading Day d	(57)

Variable	Units	SC	GR	Rule	Description	Ref
NLstanding_F_D(f, d)	MWh	F	D	Appendix 1 (f)viii or (g)xiii	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
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.	(54)
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
EG(d)	{}	G	D	2.30B.2(a)	Set of Scheduled Generators that serve an Intermittent Load locally in Trading Day d	(31)
PORTFOLIO(d)	{}	G	D	11	Set containing the Balancing Portfolio	(40)
BALPF(d)	{}	G	D	11	Set of Facilities in the Balancing Portfolio in Trading Day d	(32)

3.2.2.3 Demand Side Programme Load

The Demand Side Programme Load for a DSP is defined as:

$$DSPL\_F\_I(f,i) = \sum_{n \in NMI(f,i)} -SOMS\_N\_I(n,i) \tag{67}$$

Variable	Units	SC	GR	Rule	Description	Ref
DSPL_F_I(f, i)	MWh	F	I	6.16.2	Demand Side Programme Load for Facility f in Trading Interval i	(67)
SOMS_N_I(n, i)	MWh	N	I		Sent Out Metered Schedule for NMI n in Trading Interval i	(44)
NMI(d)	{}	G	D		Set of all connection points in Trading Day d	I

3.3 Metering Aggregations

3.3.1 Non-Dispatchable Load Quantities

$$MSNDL\_P\_I(p,i) = \sum_{f \in NDL(p,i)} MS\_F\_I(f,i) \tag{68}$$

$$ABSNDL\_P\_I(p,i) = \sum_{f \in NDL(p,i)} |MS\_F\_I(f,i)| \tag{69}$$

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	(68)

Variable	Units	SC	GR	Rule	Description	Ref
ABSNDL_P_I(p, i)	MWh	P	I	9.13.1	Sum of the absolute values of the Non-Dispatchable Load Metered Schedules for Market Participant p in Trading Interval i	(69)
MS_F_I(f, i)	MWh	F	I	9.3.4, 2.30B.10(c), 2.30B.12	Metered Schedule for Facility f in Trading Interval i	(46)
NDL(d)	{}	G	D	11	Set of Non-Dispatchable Loads in Trading Day d	(27)

3.3.2 Metering Calculations Spanning Multiple Trading Days

3.3.2.1 Monthly Consumption Share Contributing Quantity

$$CQ\_P\_M(p,m) = \sum_{i \in I\_M(m)} \left(MSNDL\_P\_I(p,i) + \sum_{f \in IRL(p,i)} MS\_F\_I(f,i) \right) \tag{70}$$

Variable	Units	SC	GR	Rule	Description	Ref
CQ_P_M(p, m)	MWh	P	M	9.3.7(a)	Contributing quantity for Market Participant p in Trading Month m	(70)
MS_F_I(f, i)	MWh	F	I	9.3.4, 2.30B.10(c), 2.30B.12	Metered Schedule for Facility f in Trading Interval i	(46)
MSNDL_P_I(p, i)	MWh	P	I		Sum of all Non-Dispatchable Load Metered Schedules for Market Participant p in Trading Interval i	(68)
IRL(d)	{}	G	D	11	Set of Interruptible Loads in Trading Day d	(21)
I_M(m)	{}	G	M		Set of Trading Intervals in Trading Month m	I

3.3.2.2 Monthly Load Following Share Contributing Quantity

$$LFCQ\_P\_M(p,m) = \sum_{i \in I\_M(m)} \left(\sum_{f \in NSG(p,i)} MS\_F\_I(f,i) \right) + |CQ\_P\_M(p,m)| \tag{71}$$

Variable	Units	SC	GR	Rule	Description	Ref
LFCQ_P_M(p, m)	MWh	P	M	3.14.1(a)	Load following contributing quantity for Market Participant p in Trading Month m	(71)
MS_F_I(f, i)	MWh	F	I	9.3.4, 2.30B.10(c), 2.30B.12	Metered Schedule for Facility f in Trading Interval i	(46)
NSG(d)	{}	G	D	11	Set of Non-Scheduled Generators in Trading Day d	(18)
CQ_P_M(p, m)	MWh	P	M	9.3.7(a)	Contributing quantity for Market Participant p in Trading Month m	(70)
I_M(m)	{}	G	M		Set of Trading Intervals in Trading Month m	I

3.3.2.3 Monthly Average Sent Out Metered Schedule

$$SOMSAV\_F\_M(f,m) = \begin{cases} 0 & \text{for } REGTITM\_F\_M(f,m) = 0 \\ \dfrac{\sum_{i \in I\_M(m)} SOMS\_F\_I(f,i)}{REGTITM\_F\_M(f,m)} & \text{otherwise} \end{cases} \quad (72)$$

Variable	Units	SC	GR	Rule	Description	Ref
SOMSAV_F_M(f, m)	MWh	F	M		Average Sent Out Metered Schedule for Facility f in Trading Month m	(72)
SOMS_F_I(f, i)	MWh	F	I		Sent Out Metered Schedule for Facility f in Trading Interval i	(45)
REGTITM_F_M(f, m)		F	M		Number of Trading Intervals for which Facility f is registered in Trading Month m	I
I_M(m)	{}	G	M		Set of Trading Intervals in Trading Month m	I

3.3.2.4 2nd Highest Sent Out Metered Schedule

$$MAX1\_F\_M(f,m) = max(MAX1CM\_F\_M(f,m), MAX1\_F\_M(f,m-1)) \quad (73)$$

$$MAX2\_F\_M(f,m) = \begin{cases} max(MAX2\_F\_M(f,m-1), \\ MAX1CM\_F\_M(f,m)) & \text{for } MAX1CM\_F\_M(f,m) \leq MAX1\_F\_M(f,m-1) \\ max(MAX1\_F\_M(f,m-1), \\ MAX2CM\_F\_M(f,m)) & \text{for } MAX1CM\_F\_M(f,m) > MAX1\_F\_M(f,m-1) \end{cases} \quad (74)$$

$$MAX1CM\_F\_M(f,m) = \text{Highest value of } \{SOMS\_F\_I(f,i) \times COP\_F\_D(f,i) : i \in I\_M(m)\} \quad (75)$$

$$MAX2CM\_F\_M(f,m) = \text{2nd highest value of } \{SOMS\_F\_I(f,i) \times COP\_F\_D(f,i) : i \in I\_M(m)\} \quad (76)$$

Variable	Units	SC	GR	Rule	Description	Ref
MAX2_F_M(f, m)	MWh	F	M	4.26.1A (a)(ii).3	2nd highest Sent Out Metered Schedule of Facility f up to and including Trading Month m	(74)
MAX1_F_M(f, m)	MWh	F	M		Highest Sent Out Metered Schedule of Facility f up to and including Trading Month m	(73)
MAX2CM_F_M(f, m)	MWh	F	M		2nd highest Sent Out Metered Schedule of Facility f in the current month, Trading Month m	(76)
MAX1CM_F_M(f, m)	MWh	F	M		Highest Sent Out Metered Schedule of Facility f in the current month, Trading Month m	(75)
SOMS_F_I(f, i)	MWh	F	I		Sent Out Metered Schedule for Facility f in Trading Interval i	(45)
COP_F_D(f, d)	Flag	F	D	4.13.10B	Flag that is 1 if Facility f is in Commercial Operations in Trading Day d, and 0 otherwise	I
I_M(m)	{}	G	M		Set of Trading Intervals in Trading Month m	I

3.3.3 Other Metering Aggregations

3.3.3.1 Total Sent Out Generation

Total Sent Out Generation is defined as:

$$SOMS\_G\_I(i) = \sum_{f \in SG(i) \cup NSG(i)} max(0, SOMS\_F\_I(f, i)) \tag{77}$$

Variable	Units	SC	GR	Rule	Description	Ref
SOMS_G_I(i)	MWh	G	I	11	Total Sent Out Generation in Trading Interval i	(77)
SOMS_F_I(f, i)	MWh	F	I		Sent Out Metered Schedule for Facility f in Trading Interval i	(45)
SG(d)	{}	G	D	11	Set of Scheduled Generators in Trading Day d	(17)
NSG(d)	{}	G	D	11	Set of Non-Scheduled Generators in Trading Day d	(18)

4 Calculation Engine

AEMO uses the same calculation engine for both settlement and prudentials. Settlement calculations are determined for either a Trading Week (STEM) or Trading Month (NSTEM); 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.

Variable	Scope Set
$SA\_P\_D(p,d)$	$\forall p \in P\_M(d)$
$GSTSA\_P\_D(p,d)$	$\forall p \in P\_M(d)$
$LFPDNQ\_G\_I(i)$	N/A
$LFBDNQ\_G\_I(i)$	N/A
$UASLR\_G\_I(i)$	N/A

Variable	Units	SC	GR	Rule	Description	Ref
SA_P_D(p, d)	$	P	D		Settlement amount for Market Participant p in Trading Day d	(78)
GSTSA_P_D(p, d)	$	P	D	9.1.2	Net GST paid to Market Participant p in Trading Day d	(388)
LFPDNQ_G_I(i)	MW	G	I	7.13.1(eC)	Sum of any Ex-post Downwards LFAS Enablement quantities in Trading Interval i	(208)
LFBDNQ_G_I(i)	MW	G	I	7.13.1(eB)	Sum of any Backup Downwards LFAS Enablement quantities in Trading Interval i	(209)
UASLR_G_I(i)	$	G	I	9.9.1	Amount paid for un-contracted Load Rejection and System Restart Services in Trading Interval i	(180)
P_M(m)	{}	G	M		Set of participants (Rule Participants and the ERA) in Trading Month m	(1)

4.2 Daily Aggregations

$$SA\_P\_D(p,d) = NSTEMSA\_P\_D(p,d) + STEMSA\_P\_D(p,d) + RRSA\_P\_D(p,d) \tag{78}$$

Variable	Units	SC	GR	Rule	Description	Ref
SA_P_D(p, d)	$	P	D		Settlement amount for Market Participant p in Trading Day d	(78)
NSTEMSA_P_D(p, d)	$	P	D	9.14.1	Net NSTEM Settlement amount for Market Participant p in Trading Day d	(79)
STEMSA_P_D(p, d)	$	P	D	9.6.1	Settlement amount for energy cleared in STEM for Market Participant p in Trading Day d	(80)
RRSA_P_D(p, d)	$	P	D	9.15.1	Service Fee Settlement Amount paid to Rule Participant p for Trading Day d	(379)

4.2.1 NSTEM

These equations are based on the equations stated in MR 9.14. They have been modified to attribute a monthly calculation to an interval calculation and then aggregate to a Trading Day.

$$NSTEMSA\_P\_D(p,d) = RCSA\_P\_D(p,d) + BSA\_P\_D(p,d) + ASSA\_P\_D(p,d) + COCSA\_P\_D(p,d) + RSA\_P\_D(p,d) + MPFSA\_P\_D(p,d) \tag{79}$$

Variable	Units	SC	GR	Rule	Description	Ref
NSTEMSA_P_D(p, d)	$	P	D	9.14.1	Net NSTEM Settlement amount for Market Participant p in Trading Day d	(79)
RCSA_P_D(p, d)	$	P	D	9.7.1	Reserve Capacity settlement amount for Market Participant p in Trading Day d	(244)
BSA_P_D(p, d)	$	P	D	9.8.1	Balancing settlement amount for Market Participant p in Trading Day d	(87)
ASSA_P_D(p, d)	$	P	D	9.9.1	Ancillary Services settlement amount for Market Participant p in Trading Day d	(166)
COCSA_P_D(p, d)	$	P	D	9.10.1	Outage compensation settlement amount for Market Participant p in Trading Day d	(159)
RSA_P_D(p, d)	$	P	D	9.11.1	Reconciliation Settlement amount for Market Participant p in Trading Day d	(147)
MPFSA_P_D(p, d)	$	P	D	9.13.1	Market Participant Fee Settlement Amount charged to Market Participant p for Trading Day d	(370)

4.3 STEM

$$STEMSA\_P\_D(p,d) = STEMSAS\_P\_D(p,d) - STEMSAD\_P\_D(p,d) \tag{80}$$

Variable	Units	SC	GR	Rule	Description	Ref
STEMSA_P_D(p, d)	$	P	D	9.6.1	Settlement amount for energy cleared in STEM for Market Participant p in Trading Day d	(80)
STEMSAS_P_D(p, d)	$	P	D	9.6.1	Settlement amount for energy sold in STEM for Market Participant p in Trading Day d	(81)
STEMSAD_P_D(p, d)	$	P	D	9.6.1	Settlement amount for energy purchased in STEM for Market Participant p in Trading Day d	(82)

4.3.1 STEM Payments and Charges

These equations are based on the equations stated in 9.6.1. They have been modified to aggregate to a Trading Day and to separate quantities into supply and demand.

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

$$STEMSAD\_P\_D(p,d) = \sum_{i \in I(d)} STEMSAD\_P\_I(p,i) \tag{82}$$

$$STEMSAS\_P\_I(p,i) = SSF\_G\_D\,(i) \times STEMP\_G\_I\,(i) \times STEMSQ\_P\_I\,(p,i) \tag{83}$$

$$STEMSAD\_P\_I(p,i) = SSF\_G\_D\,(i) \times STEMP\_G\_I\,(i) \times STEMDQ\_P\_I\,(p,i) \tag{84}$$

$$STEMSQ\_P\_I(p,i) = max(0, STEMQ\_P\_I(p,i)) \tag{85}$$

$$STEMDQ\_P\_I(p,i) = -min(0, STEMQ\_P\_I(p,i)) \tag{86}$$

Variable	Units	SC	GR	Rule	Description	Ref
STEMSAS_P_D(p, d)	$	P	D	9.6.1	Settlement amount for energy sold in STEM for Market Participant p in Trading Day d	(81)
STEMSAD_P_D(p, d)	$	P	D	9.6.1	Settlement amount for energy purchased in STEM for Market Participant p in Trading Day d	(82)
STEMSAS_P_I(p, i)	$	P	I	9.6.1	Settlement amount for energy sold in STEM for Market Participant p in Trading Interval i	(83)
STEMSAD_P_I(p, i)	$	P	I	9.6.1	Settlement amount for energy purchased in STEM for Market Participant p in Trading Interval i	(84)
STEMSQ_P_I(p, i)	MWh	P	I		Energy sold in STEM by Market Participant p in Trading Interval i	(85)
STEMDQ_P_I(p, i)	MWh	P	I		Energy bought in STEM by Market Participant p in Trading Interval i	(86)
STEMQ_P_I(p, i)	MWh	P	I	6.9.13(b), 6.9.13(c), 6.10.2	Energy purchased (sold) in STEM by Market Participant p in Trading Interval i	I
SSF_G_D(d)	Flag	G	D		0 if STEM was suspended in Trading Day d, and 1 otherwise	I
STEMP_G_I(i)	$/MWh	G	I	6.9.7, 6.10.2	STEM Clearing Price declared for Trading Interval i	I
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.4 Balancing

Balancing is split into three parts:

- Balancing Market - Market Participants are paid and charged for selling and buying energy in the Balancing Market.
- Constrained Compensation - Market Participants are paid for being constrained on or off
- T3 DSM Dispatch Payments - Market Participants are paid when Non-Balancing Facilities are Dispatched.

The funding of constrained compensation and non-Balancing Facility Dispatch Instruction Payments is recovered as part of the reconciliation settlement calculations.

$$BSA\_P\_D(p,d) = BSAS\_P\_D(p,d) - BSAD\_P\_D(p,d) + CONC\_P\_D(p,d) + COFFC\_P\_D(p,d) + DIPT3\_P\_D(p,d) \tag{87}$$

Variable	Units	SC	GR	Rule	Description	Ref
BSA_P_D(p, d)	$	P	D	9.8.1	Balancing settlement amount for Market Participant p in Trading Day d	(87)

Variable	Units	SC	GR	Rule	Description	Ref
BSAS_P_D(p, d)	$	P	D	9.8.1	Settlement amount for energy sold in the Balancing Market for Market Participant p in Trading Day d	(88)
BSAD_P_D(p, d)	$	P	D	9.8.1	Settlement amount for energy purchased in the Balancing Market for Market Participant p in Trading Day d	(89)
CONC_P_D(p, d)	$	P	D	9.8.1	Constrained On Compensation for Market Participant p in Trading Day d	(97)
COFFC_P_D(p, d)	$	P	D	9.8.1	Constrained Off Compensation for Market Participant p in Trading Day d	(98)
DIPT3_P_D(p, d)	$	P	D	6.17.6C(c)	Tranche 3 DSM Dispatch Payments for Market Participant p in Trading Day d	(143)

4.4.1 Balancing Market Payments and Charges

$$BSAS\_P\_D(p,d) = \sum_{i \in I(d)} BSAS\_P\_I(p,i) \tag{88}$$

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

$$BSAS\_P\_I(p,i) = BP\_G\_I(i) \times MBSQ\_P\_I(p,i) \tag{90}$$

$$BSAD\_P\_I(p,i) = BP\_G\_I(i) \times MBDQ\_P\_I(p,i) \tag{91}$$

$$MBSQ\_P\_I(p,i) = max(0, MBQ\_P\_I(p,i)) \tag{92}$$

$$MBDQ\_P\_I(p,i) = -min(0, MBQ\_P\_I(p,i)) \tag{93}$$

$$MBQ\_P\_I(p,i) = MS\_P\_I(p,i) - NCP\_P\_I(p,i) \tag{94}$$

$$MS\_P\_I(p,i) = MSNDL\_P\_I(p,i) + \sum_{f \in REG\_F(p,i)} MS\_F\_I(f,i) \tag{95}$$

$$NCP\_P\_I(p,i) = NBP\_P\_I(p,i) + STEMQ\_P\_I(p,i) \tag{96}$$

Variable	Units	SC	GR	Rule	Description	Ref
BSAS_P_D(p, d)	$	P	D	9.8.1	Settlement amount for energy sold in the Balancing Market for Market Participant p in Trading Day d	(88)
BSAD_P_D(p, d)	$	P	D	9.8.1	Settlement amount for energy purchased in the Balancing Market for Market Participant p in Trading Day d	(89)
BSAS_P_I(p, i)	$	P	I	9.8.1	Settlement amount for energy sold in the Balancing Market for Market Participant p in Trading Interval i	(90)

Variable	Units	SC	GR	Rule	Description	Ref
BSAD_P_I(p, i)	$	P	I	9.8.1	Settlement amount for energy purchased in the Balancing Market for Market Participant p in Trading Interval i	(91)
BP_G_I(i)	$/MWh	G	I	7A.3.10	Balancing Price for Trading Interval i	I
MBSQ_P_I(p, i)	MWh	P	I		Energy sold in the Balancing Market by Market Participant p in Trading Interval i	(92)
MBDQ_P_I(p, i)	MWh	P	I		Energy purchased in the Balancing Market by Market Participant p in Trading Interval i	(93)
MBQ_P_I(p, i)	MWh	P	I	6.17.2	Metered Balancing Quantity for Market Participant p in Trading Interval i	(94)
MS_P_I(p, i)	MWh	P	I		Sum of all Metered Schedules for Market Participant p in Trading Interval i	(95)
NCP_P_I(p, i)	MWh	P	I	6.9.13	Net Contract Position for Market Participant p in Trading Interval i	(96)
NBP_P_I(p, i)	MWh	P	I	6.9.2	Net Bilateral Position for Market Participant p in Trading Interval i	I
STEMQ_P_I(p, i)	MWh	P	I	6.9.13(b), 6.9.13(c), 6.10.2	Energy purchased (sold) in STEM by Market Participant p in Trading Interval i	I
MSNDL_P_I(p, i)	MWh	P	I		Sum of all Non-Dispatchable Load Metered Schedules for Market Participant p in Trading Interval i	(68)
MS_F_I(f, i)	MWh	F	I	9.3.4, 2.30B.10(c), 2.30B.12	Metered Schedule for Facility f in Trading Interval i	(46)
REG_F(d)	{}	G	D	11	Set of Registered Facilities in Trading Day d	(26)

4.4.2 Constrained Compensation

For implementation purposes the Balancing Portfolio is considered a Facility. Any Facilities that are members of the Balancing Portfolio are not considered individually, but only as a contribution to the Balancing Portfolio.

$$CONC\_P\_D(p,d) = \sum_{i \in I(d)} CONC\_P\_I(p,i) \tag{97}$$

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

$$CONC\_P\_I(p,i) = \sum_{f \in BALF(p,i) \cup PORTFOLIO(p,i)} CONC\_F\_I(f,i) \tag{99}$$

$$COFFC\_P\_I(p,i) = \sum_{f \in BALF(p,i) \cup PORTFOLIO(p,i)} COFFC\_F\_I(f,i) \tag{100}$$

$$CONC\_F\_I(f,i) = \sum_{t \in BPQP(f,i)} CONC\_T\_I(t,i) \tag{101}$$

$$COFFC\_F\_I(f,i) = \sum_{t \in BPQP(f,i)} COFFC\_T\_I(t,i) \tag{102}$$

$$CONC\_T\_I(t,i) = CONQLA\_T\_I(t,i) \times CONP\_T\_I(t,i) \tag{103}$$

$$COFFC\_T\_I(t,i) = COFFQLA\_T\_I(t,i) \times COFFP\_T\_I(t,i) \tag{104}$$

$$CONQLA\_T\_I(t,i) = \begin{cases} LF\_F\_D(f,i) \times CONQ\_T\_I(t,i) & \text{for } f \notin PORTFOLIO(i) \\ LFBP\_F\_I(f,i) \times CONQ\_T\_I(t,i) & \text{for } f \in PORTFOLIO(i) \end{cases} \tag{105}$$

$$COFFQLA\_T\_I(t,i) = \begin{cases} LF\_F\_D(f,i) \times COFFQ\_T\_I(t,i) & \text{for } f \notin PORTFOLIO(i) \\ LFBP\_F\_I(f,i) \times COFFQ\_T\_I(t,i) & \text{for } f \in PORTFOLIO(i) \end{cases} \tag{106}$$

$$LFBP\_F\_I(f,i) = \begin{cases} \dfrac{\sum\limits_{g \in BALPF(i)} MS\_F\_I(g,i)}{SOMSBP\_F\_I(f,i)} & \text{for } SOMSBP\_F\_I(f,i) \neq 0 \\ 1 & \text{otherwise} \end{cases} \tag{107}$$

$$SOMSBP\_F\_I(f,i) = \sum_{g \in BALPF(i)} SOMS\_F\_I(g,i) \tag{108}$$

Variable	Units	SC	GR	Rule	Description	Ref
CONC_P_D(p, d)	$	P	D	9.8.1	Constrained On Compensation for Market Participant p in Trading Day d	(97)
COFFC_P_D(p, d)	$	P	D	9.8.1	Constrained Off Compensation for Market Participant p in Trading Day d	(98)
CONC_P_I(p, i)	$	P	I	9.8.1	Constrained On Compensation for Market Participant p in Trading Interval i	(99)
COFFC_P_I(p, i)	$	P	I	9.8.1	Constrained Off Compensation for Market Participant p in Trading Interval i	(100)
CONC_F_I(f, i)	$	F	I	9.8.1	Constrained On Compensation relating to Facility f in Trading Interval i	(101)
COFFC_F_I(f, i)	$	F	I	9.8.1	Constrained Off Compensation relating to Facility f in Trading Interval i	(102)
CONC_T_I(t, i)	$	T	I	9.8.1	Constrained On Compensation relating to tranche t in Trading Interval i	(103)
COFFC_T_I(t, i)	$	T	I	9.8.1	Constrained Off Compensation relating to tranche t in Trading Interval i	(104)
CONP_T_I(t, i)	$/MWh	T	I	6.17.3(b), 6.17.3(c)ii, 6.17.3(d), 6.17.3A(b), 6.17.5(b), 6.17.5(c)ii, 6.17.5(d)	Constrained On Compensation Price for tranche t in Trading Interval i	(139)
COFFP_T_I(t, i)	$/MWh	T	I	6.17.4(b), 6.17.4(c)ii, 6.17.4(d), 6.17.4A(b), 6.17.5A(b), 6.17.5A(c)ii, 6.17.5A(d)	Constrained Off Compensation Price for tranche t in Trading Interval i	(140)

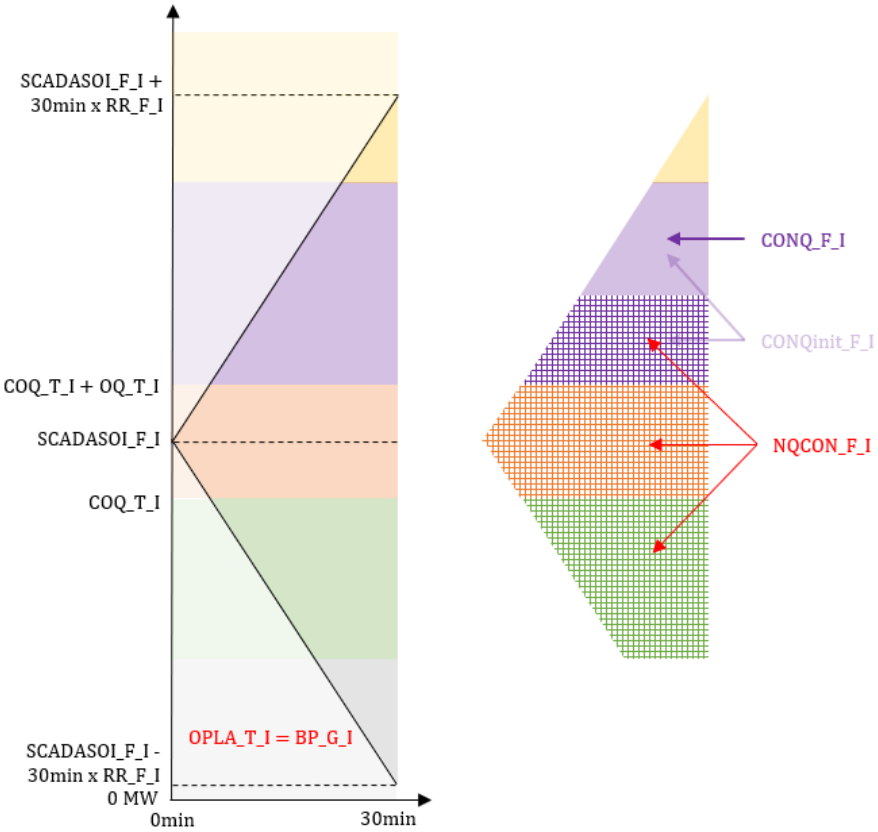
Variable	Units	SC	GR	Rule	Description	Ref
CONQ_T_I(t, i)	MWh	T	I	6.17.3(f), 6.17.3(g), 6.17.3A(a), 6.17.5(f), 6.17.5(g)	Constrained On Quantity for tranche t in Trading Interval i	(109)
COFFQ_T_I(t, i)	MWh	T	I	6.17.4(f), 6.17.4(g), 6.17.4A(a), 6.17.5A(f), 6.17.5A(g)	Constrained Off Quantity for tranche t in Trading Interval i	(110)
CONQLA_T_I(t, i)	MWh	T	I	6.17.3(h), 6.17.3A(a), 6.17.5(h)	Loss adjusted Constrained On Quantity for tranche t in Trading Interval i	(105)
COFFQLA_T_I(t, i)	MWh	T	I	6.17.4(h), 6.17.4A(a), 6.17.5A(h)	Loss adjusted Constrained Off Quantity for tranche t in Trading Interval i	(106)
MS_F_I(f, i)	MWh	F	I	9.3.4, 2.30B.10(c), 2.30B.12	Metered Schedule for Facility f in Trading Interval i	(46)
SOMS_F_I(f, i)	MWh	F	I		Sent Out Metered Schedule for Facility f in Trading Interval i	(45)
SOMSBP_F_I(f, i)	MWh	F	I	6.16B.1(a)	Sum of Sent Out Metered Schedules for Facilities in the Balancing Portfolio for Facility f in Trading Interval i	(108)
LF_F_D(f, d)		F	D		Loss Factor for Facility f for Trading Day d	(142)
LFBP_F_I(f, i)		F	I	11	Portfolio Loss Factor for Facility f for Trading Interval i	(107)
BPQP(i)	{}	G	I	11	Set of Balancing Price-Quantity Pairs in Trading Interval i	I
BALF(d)	{}	G	D	11	Set of Balancing Facilities in Trading Day d	(33)
BALPF(d)	{}	G	D	11	Set of Facilities in the Balancing Portfolio in Trading Day d	(32)
PORTFOLIO(d)	{}	G	D	11	Set containing the Balancing Portfolio	(40)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.4.2.1 Constrained Compensation Quantities

The rules manipulate the constrained compensation quantities for Scheduled Generators and the Balancing Portfolio in two stages as follows:

- Initial calculation which attributes a Facility's Out of Merit generation to each tranche
- Adjustment of this quantity to remove any non-qualifying generation

This is illustrated in the figure below.



$$CONQ\_T\_I(t,i) = \begin{cases} UOOM\_F\_I(t,i) & \text{for } t \in NSG(i) \\ max(0, CONQinit\_T\_I(t,i) - max(0, NQCONMAX\_F\_I(t,i) - CCONQinit\_T\_I(t,i))) & \text{for } t \notin NSG(i) \end{cases} \quad (109)$$

$$COFFQ\_T\_I(t,i) = \begin{cases} DOOM\_F\_I(t,i) & \text{for } t \in NSG(i) \\ max(0, COFFQinit\_T\_I(t,i) - max(0, NQCOFFMAX\_F\_I(t,i) - CCOFFQinit\_T\_I(t,i))) & \text{for } t \notin NSG(i) \end{cases} \quad (110)$$

$$CONQinit\_T\_I(t,i) = \begin{cases} min(TES\_T\_I(t,i), UOOM\_F\_I(t,i) - CCONQinit\_T\_I(t,i)) & \text{for } OPLA\_T\_I(t,i) > BP\_G\_I(i) \\ 0 & \text{for } OPLA\_T\_I(t,i) \leq BP\_G\_I(i) \end{cases} \quad (111)$$

$$COFFQinit\_T\_I(t,i) = \begin{cases} min(TES\_T\_I(t,i), DOOM\_F\_I(t,i) - CCOFFQinit\_T\_I(t,i)) & \text{for } OPLA\_T\_I(t,i) \\ & < min(BP\_G\_I(i), ACAPP\_F\_I(t,i)) \\ 0 & \text{for } OPLA\_T\_I(t,i) \\ & \geq min(BP\_G\_I(i), ACAPP\_F\_I(t,i)) \end{cases} \quad (112)$$

$$CCONQinit\_T\_I(t,i) = \sum_{u \in BPQP(f,i), OPLA\_T\_I(u,i) < OPLA\_T\_I(t,i)} CONQinit\_T\_I(u,i) \quad (113)$$

$$CCOFFQinit\_T\_I(t,i) = \sum_{u \in BPQP(f,i), OPLA\_T\_I(u,i) > OPLA\_T\_I(t,i)} COFFQinit\_T\_I(u,i) \quad (114)$$

$$ACAPP\_F\_I(f,i) = \begin{cases} OPLA\_T\_I(t,i) & \text{where } t \text{ exists such that} \\ & COQ\_T\_I(t,i) < ACAPQ\_F\_I(t,i) \leq COQ\_T\_I(t,i) + OQ\_T\_I(t,i) \\ MINSTEMP\_G\_D(i) & \text{otherwise} \end{cases} \tag{115}$$

$$ACAPQ\_F\_I(f,i) = \begin{cases} \sum_{g \in BALPF(i)} ACAPQ\_F\_I(g,i) & \text{for } f \in PORTFOLIO(i) \\ SOC\_F\_D(f,i) & \text{for } f \notin PORTFOLIO(i) \\ -EXPPO\_F\_I(f,i) - EXPCO\_F\_I(f,i) - EXPFO\_F\_I(f,i) & \end{cases} \tag{116}$$

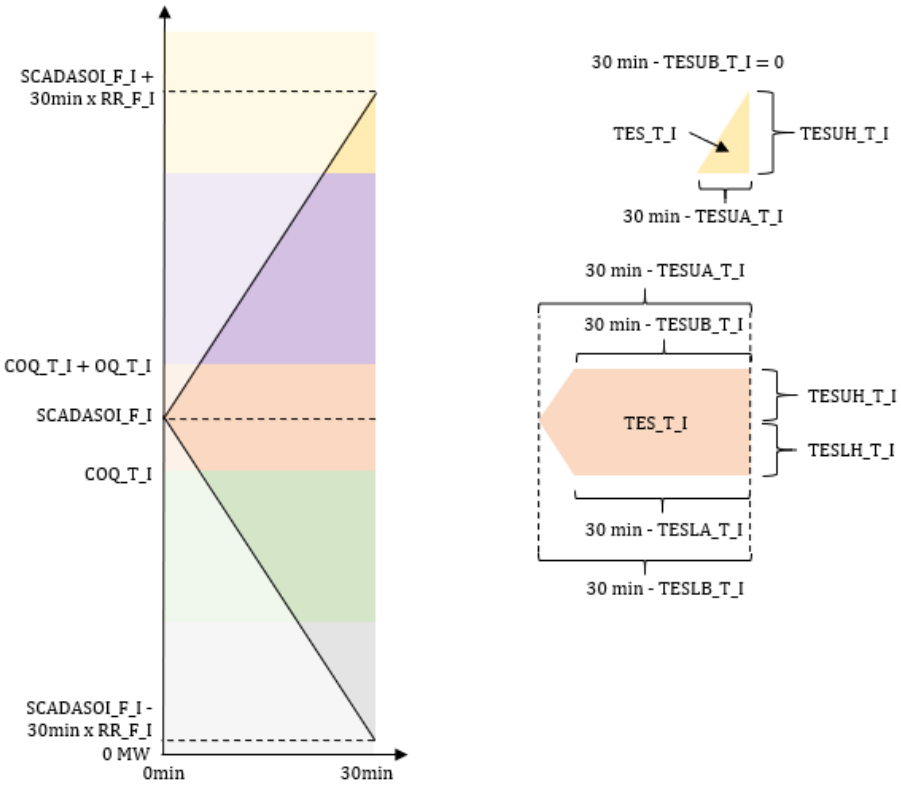
Variable	Units	SC	GR	Rule	Description	Ref
CONQ_T_I(t, i)	MWh	T	I	6.17.3(f), 6.17.3(g), 6.17.3A(a), 6.17.5(f), 6.17.5(g)	Constrained On Quantity for tranche t in Trading Interval i	(109)
COFFQ_T_I(t, i)	MWh	T	I	6.17.4(f), 6.17.4(g), 6.17.4A(a), 6.17.5A(f), 6.17.5A(g)	Constrained Off Quantity for tranche t in Trading Interval i	(110)
CONQinit_T_I(t, i)	MWh	T	I	6.17.3(a), 6.17.3(c)i, 6.17.3(d), 6.17.3A(a), 6.17.5(a), 6.17.5(c)i, 6.17.5(d)	Constrained On Quantity prior to removing Non-Qualifying Constrained On Generation for tranche t in Trading Interval i	(111)
COFFQinit_T_I(t, i)	MWh	T	I	6.17.4(a), 6.17.4(c)i, 6.17.4(d), 6.17.4A(a), 6.17.5A(a), 6.17.5A(c)i, 6.17.5A(d)	Constrained Off Quantity prior to removing Non-Qualifying Constrained Off Generation for tranche t in Trading Interval i	(112)
CCONQinit_T_I(t, i)	MWh	T	I		Sum of CONQinit quantities for the Facility's tranches with a lower price than tranche t in Trading Interval i	(113)
CCOFFQinit_T_I(t, i)	MWh	T	I		Sum of COFFQinit quantities for the Facility's tranches with a higher price than tranche t in Trading Interval i	(114)
TES_T_I(t, i)	MWh	T	I	6.17.3(a)i, 6.17.3(c)i.1, 6.17.4(a)i, 6.17.4(c)i.1, 6.17.5(a)i, 6.17.5(c)i.1, 6.17.5A(a)i, 6.17.5A(c)i.1	Maximum energy less the minimum energy which could have been dispatched from tranche t in Trading Interval i	(117)
UOOM_F_I(f, i)	MWh	F	I	6.16A.1, 6.16B.1	Upwards Out of Merit Generation for Facility f in Trading Interval i	(126)

Variable	Units	SC	GR	Rule	Description	Ref
DOOM_F_I(f, i)	MWh	F	I	6.16A.2, 6.16B.2	Downwards Out of Merit Generation for Facility f in Trading Interval i	(127)
NQCONMAX_F_I(f, i)	MWh	F	I	6.17.3(e), 6.17.5(e)	Maximum Non-Qualifying Constrained On Generation for Facility f in Trading Interval i	(135)
NQCOFFMAX_F_I(f, i)	MWh	F	I	6.17.4(e), 6.17.5A(e)	Maximum Non-Qualifying Constrained Off Generation for Facility f in Trading Interval i	(136)
OPLA_T_I(t, i)	$/MWh	T	I		Loss Factor Adjusted (offer) Price for tranche t in Trading Interval i	(141)
BP_G_I(i)	$/MWh	G	I	7A.3.10	Balancing Price for Trading Interval i	I
ACAPP_F_I(f, i)	$/MWh	F	I	6.17.4(a)i.1, 6.17.5A(a)i.1	Loss-adjusted price associated with the Available Capacity of Facility f in Trading Interval i	(115)
ACAPQ_F_I(f, i)	MW	F	I	11	Available Capacity of Facility f in Trading Interval i	(116)
COQ_T_I(t, i)	MW	T	I		Sum of offer quantities associated with the same facility and with a lower price than tranche t in Trading Interval i	(124)
OQ_T_I(t, i)	MW	T	I	11	Offer quantity of the Balancing Price-Quantity Pair for tranche t in Trading Interval i	I
SOC_F_D(f, d)	MW	F	D	11	Sent Out Capacity of Facility f in Trading Day d	(57)
EXPPO_F_I(f, i)	MW	F	I	7.13.1A(b)	Ex-post Planned Outage for Facility f in Trading Interval i	I
EXPFO_F_I(f, i)	MW	F	I	7.13.1A(b)	Ex-post Forced Outage for Facility f in Trading Interval i	I
EXPCO_F_I(f, i)	MW	F	I	7.13.1A(b)	Ex-post Consequential Outage for Facility f in Trading Interval i	I
MINSTEMP_G_D(d)	$/MWh	G	D	11	Minimum STEM Price for Trading Day d	I
BALPF(d)	{}	G	D	11	Set of Facilities in the Balancing Portfolio in Trading Day d	(32)
BPQP(i)	{}	G	I	11	Set of Balancing Price-Quantity Pairs in Trading Interval i	I
NSG(d)	{}	G	D	11	Set of Non-Scheduled Generators in Trading Day d	(18)
PORTFOLIO(d)	{}	G	D	11	Set containing the Balancing Portfolio	(40)

4.4.2.2 Tranche TES

This section calculates the maximum energy less the minimum energy that could have been dispatched from a single tranche, which will be referred to as the tranche's theoretical energy schedule (TES). Only some tranches are considered for constrained on compensation (above the Balancing Price), and others are considered for constrained off compensation (below the Balancing Price); however, this section only calculates each tranche's TES and subsequent calculations will determine which tranches are considered or excluded.

The picture below illustrates that each tranche's TES is represented by an area, and the corresponding variables which are used to calculate this area. In general, the area is calculated as the sum of an 'upper' trapezium and a 'lower' trapezium. In most instances only one of the trapeziums exists, and in some instances the trapezium reduces to a triangle.



$$TES\_T\_I(t,i) = \begin{cases} 0 & \text{for } RR\_F\_I(t,i) = 0 \\ TESUH\_T\_I(t,i) \times \dfrac{(30min - TESUA\_T\_I(t,i)) + (30min - TESUB\_T\_I(t,i))}{2 \times 60min/h} & \text{otherwise} \\ +TESLH\_T\_I(t,i) \times \dfrac{(30min - TESLA\_T\_I(t,i)) + (30min - TESLB\_T\_I(t,i))}{2 \times 60min/h} & \end{cases} \quad (117)$$

$$TESUH\_T\_I(t,i) = max\,(0, min\,(COQ\_T\_I(t,i) + OQ\_T\_I(t,i), SCADASOI\_F\_I(t,i) + 30min \times RR\_F\_I(t,i)) - max\,(COQ\_T\_I(t,i), SCADASOI\_F\_I(t,i))) \quad (118)$$

$$TESLH\_T\_I(t,i) = max\,(0, min\,(COQ\_T\_I(t,i) + OQ\_T\_I(t,i), SCADASOI\_F\_I(t,i)) - max\,(COQ\_T\_I(t,i), SCADASOI\_F\_I(t,i) - 30min \times RR\_F\_I(t,i))) \quad (119)$$

$$TESUA\_T\_I(t,i) = max\left(0, min\left(30min, \frac{COQ\_T\_I(t,i) - SCADASOI\_F\_I(t,i)}{RR\_F\_I(t,i)}\right)\right) \quad (120)$$

$$TESLA\_T\_I(t,i) = max\left(0, min\left(30min, \frac{SCADASOI\_F\_I(t,i) - COQ\_T\_I(t,i)}{RR\_F\_I(t,i)}\right)\right) \quad (121)$$

$$TESUB\_T\_I(t,i) = max\left(0, min\left(30min, \frac{(COQ\_T\_I(t,i) + OQ\_T\_I(t,i)) - SCADASOI\_F\_I(t,i)}{RR\_F\_I(t,i)}\right)\right) \quad (122)$$

$$TESLB\_T\_I(t,i) = max\left(0, min\left(30min, \frac{SCADASOI\_F\_I(t,i) - (COQ\_T\_I(t,i) + OQ\_T\_I(t,i))}{RR\_F\_I(t,i)}\right)\right) \quad (123)$$

$$COQ\_T\_I(t,i) = \sum_{u \in BPQP(f,i), OP\_T\_I(u,i) < OP\_T\_I(t,i)} OQ\_T\_I(u,i) \quad (124)$$

$$SCADASOI\_F\_I(f,i) = SCADAEOI\_F\_I(f,i-1) \quad (125)$$

Variable	Units	SC	GR	Rule	Description	Ref
TES_T_I(t, i)	MWh	T	I	6.17.3(a)i, 6.17.3(c)i.1, 6.17.4(a)i, 6.17.4(c)i.1, 6.17.5(a)i, 6.17.5(c)i.1, 6.17.5A(a)i, 6.17.5A(c)i.1	Maximum energy less the minimum energy which could have been dispatched from tranche t in Trading Interval i	(117)
TESUH_T_I(t, i)	MW	T	I		The height of the upper trapezium for tranche t in Trading Interval i	(118)
TESLH_T_I(t, i)	MW	T	I		The height of the lower trapezium for tranche t in Trading Interval i	(119)
TESUA_T_I(t, i)	min	T	I		Measurement A associated with the upper trapezium for tranche t in Trading Interval i	(120)
TESLA_T_I(t, i)	min	T	I		Measurement A associated with the lower trapezium for tranche t in Trading Interval i	(121)
TESUB_T_I(t, i)	min	T	I		Measurement B associated with the upper trapezium for tranche t in Trading Interval i	(122)
TESLB_T_I(t, i)	min	T	I		Measurement B associated with the lower trapezium for tranche t in Trading Interval i	(123)
COQ_T_I(t, i)	MW	T	I		Sum of offer quantities associated with the same facility and with a lower price than tranche t in Trading Interval i	(124)
OQ_T_I(t, i)	MW	T	I	11	Offer quantity of the Balancing Price-Quantity Pair for tranche t in Trading Interval i	I
OP_T_I(t, i)	$/MWh	T	I		Offer price of the Balancing Price-Quantity Pair for tranche t (before any applicable ramp-rate adjustments) in Trading Interval i	I
SCADASOI_F_I(f, i)	MW	F	I		The start of interval output of Facility f for Trading Interval i	(125)
SCADAEOI_F_I(f, i)	MW	F	I		The end of interval output of Facility f for Trading Interval i	I
RR_F_I(f, i)	MW/min	F	I	7A.2.4(e)	Ramp Rate Limit or Portfolio Ramp Rate Limit associated with Facility f in Trading Interval i	I
BPQP(i)	{}	G	I	11	Set of Balancing Price-Quantity Pairs in Trading Interval i	I

4.4.2.3 Facility Out of Merit Generation

$$UOOM\_F\_I(f,i) = ABOVEMAXTES\_F\_I(f,i) \times UOOMEFlag\_F\_I(f,i) \tag{126}$$

$$DOOM\_F\_I(f,i) = BELOWMINTES\_F\_I(f,i) \times DOOMEFlag\_F\_I(f,i) \tag{127}$$

The variables $ABOVEMAXTES\_F\_I$ and $BELOWMINTES\_F\_I$ are not within the rules; however, they have been included here to assist with understanding and analysis. These values are the possible energy that could be considered for

out of merit compensation. The variables $UOOM\_F\_I$ and $DOOM\_F\_I$ then filter out any intervals where the generation does not meet the threshold relating to settlement tolerance and non-qualifying generation.

$$ABOVEMAXTES\_F\_I(f,i) = \begin{cases} max(0, SOMSBP\_F\_I(f,i) - MAXTES\_F\_I(f,i)) & \text{for } f \in PORTFOLIO(i) \\ max(0, SOMS\_F\_I(f,i) - MAXTES\_F\_I(f,i)) & \text{for } f \notin PORTFOLIO(i) \end{cases} \tag{128}$$

$$BELOWMINTES\_F\_I(f,i) = \begin{cases} max(0, MINTES\_F\_I(f,i) - SOMSBP\_F\_I(f,i)) & \text{for } f \in PORTFOLIO(i) \\ max(0, MINTES\_F\_I(f,i) - SOMS\_F\_I(f,i)) & \text{for } f \notin PORTFOLIO(i) \end{cases} \tag{129}$$

$$UOOMEFlag\_F\_I(f,i) = \begin{cases} 0 & \text{for } NCDFlag\_F\_I(f,i) = 1 \text{ or } TESTFlag\_F\_I(f,i) = 1 \text{ or } TOLUFlag\_F\_I(f,i) = 1 \\ 1 & \text{otherwise} \end{cases} \tag{130}$$

$$DOOMEFlag\_F\_I(f,i) = \begin{cases} 0 & \text{for } NCDFlag\_F\_I(f,i) = 1 \text{ or } TESTFlag\_F\_I(f,i) = 1 \text{ or } TOLDFlag\_F\_I(f,i) = 1 \\ & \text{ or } NSGDVFlag\_F\_I(f,i) = 0 \\ 1 & \text{otherwise} \end{cases} \tag{131}$$

$$NSGDVFlag\_F\_I(f,i) = \begin{cases} 1 & \text{for } f \in NSG(i) \text{ and } DVEST\_F\_I(f,i) \neq 0 \\ 0 & \text{otherwise} \end{cases} \tag{132}$$

$$TOLUFlag\_F\_I(f,i) = \begin{cases} 0 & f = PORTFOLIO \text{ and } SOMSBP\_F\_I(f,i) - MAXTES\_F\_I(f,i) < \\ & \quad NQCONMAX\_F\_I(f,i) + STLTOL\_F\_D(f,i) \\ 0 & f \neq PORTFOLIO \text{ and } SOMS\_F\_I(f,i) - MAXTES\_F\_I(f,i) < \\ & \quad NQCONMAX\_F\_I(f,i) + STLTOL\_F\_D(f,i) \\ 1 & \text{otherwise} \end{cases} \tag{133}$$

$$TOLDFlag\_F\_I(f,i) = \begin{cases} 0 & f = PORTFOLIO \text{ and } MINTES\_F\_I(f,i) - SOMSBP\_F\_I(f,i) < \\ & \quad NQCOFFMAX\_F\_I(f,i) + STLTOL\_F\_D(f,i) \\ 0 & f \neq PORTFOLIO \text{ and } MINTES\_F\_I(f,i) - SOMS\_F\_I(f,i) < \\ & \quad NQCOFFMAX\_F\_I(f,i) + STLTOL\_F\_D(f,i) \\ 1 & \text{otherwise} \end{cases} \tag{134}$$

$$NQCONMAX\_F\_I(f,i) = \begin{cases} max(0, DVNCSBP\_F\_I(f,i)) & \\ \quad +0.5h \times (LFPUPQ\_F\_I(f,i) + LFBUPQ\_F\_I(f,i)) + SRRQ\_F\_I(f,i) & \text{for } f \in PORTFOLIO(i) \\ 0.5h \times (LFPUPQ\_F\_I(f,i) + LFBUPQ\_F\_I(f,i)) & \text{for } f \notin PORTFOLIO(i) \end{cases} \tag{135}$$

$$NQCOFFMAX\_F\_I(f,i) = \begin{cases} max(0, -DVNCSBP\_F\_I(f,i)) & \\ \quad +0.5h \times (LFPDNQ\_F\_I(f,i) + LFBDNQ\_F\_I(f,i)) + LRQ\_F\_I(f,i) & \text{for } f \in PORTFOLIO(i) \\ 0.5h \times (LFPDNQ\_F\_I(f,i) + LFBDNQ\_F\_I(f,i)) & \text{for } f \notin PORTFOLIO(i) \end{cases} \tag{136}$$

$$DVNCSBP\_F\_I(f,i) = \begin{cases} \sum_{g \in BALPF(i)} DVNCS\_F\_I(g,i) & \text{for } f \in PORTFOLIO(i) \\ 0 & \text{for } f \notin PORTFOLIO(i) \end{cases} \tag{137}$$

$$STLTOL\_F\_D(f,d) = \begin{cases} 0.5h \times TOL\_F\_D(f,d) & f \in SG(d) \text{ and } TOL\_F\_D(f,d) \neq 0 \\ min(3MWh, 3\% \times 0.5h \times SOC\_F\_D(f,d)) & f = PORTFOLIO \\ min(3MWh, max(0.5MWh, 3\% \times 0.5h \times SOC\_F\_D(f,d))) & \text{otherwise} \end{cases} \quad (138)$$

Variable	Units	SC	GR	Rule	Description	Ref
UOOM_F_I(f, i)	MWh	F	I	6.16A.1, 6.16B.1	Upwards Out of Merit Generation for Facility f in Trading Interval i	(126)
DOOM_F_I(f, i)	MWh	F	I	6.16A.2, 6.16B.2	Downwards Out of Merit Generation for Facility f in Trading Interval i	(127)
ABOVEMAXTES_F_I(f, i)	MWh	F	I	6.16A.1, 6.16B.1	Generation in excess of Maximum TES for Facility f in Trading Interval i	(128)
BELOWMINTES_F_I(f, i)	MWh	F	I	6.16A.2, 6.16B.2	Generation less than Minimum TES for Facility f in Trading Interval i	(129)
UOOMEFlag_F_I(f, i)	Flag	F	I	6.16A.1(b), 6.16B.1(b)	Flag that is 0 if Facility f is ineligible for receiving compensation for Upwards Out of Merit Generation in Trading Interval i and 1 otherwise	(130)
DOOMEFlag_F_I(f, i)	Flag	F	I	6.16A.2(b), 6.16B.2(b)	Flag that is 0 if Facility f is ineligible for receiving compensation for Downwards Out of Merit Generation in Trading Interval i and 1 otherwise	(131)
SOMS_F_I(f, i)	MWh	F	I		Sent Out Metered Schedule for Facility f in Trading Interval i	(45)
SOMSBP_F_I(f, i)	MWh	F	I	6.16B.1(a)	Sum of Sent Out Metered Schedules for Facilities in the Balancing Portfolio for Facility f in Trading Interval i	(108)
MINTES_F_I(f, i)	MWh	F	I		Minimum Theoretical Energy Schedule for Facility f in Trading Interval i	I
MAXTES_F_I(f, i)	MWh	F	I		Maximum Theoretical Energy Schedule for Facility f in Trading Interval i	I
NCDFlag_F_I(f, i)	Flag	F	I	6.16A.1(b)i, 6.16A.2(b)i, 6.16B.1(b)i, 6.16B.2(b)i	Flag that is 1 if the ERA has determined that Facility f is non-compliant with a Dispatch Instruction (or Dispatch Order) in Trading Interval i and 0 otherwise	I
TESTFlag_F_I(f, i)	Flag	F	I	6.16A.1(b)ii, 6.16A.2(b)ii	Flag that is 1 if Facility f was undergoing a Commissioning Test or complying with an Operating Instruction in Trading Interval i and 0 otherwise	I
TOLUFlag_F_I(f, i)	Flag	F	I	6.16A.1(b)iii, 6.16B.1(b)ii	Flag that is 0 if Facility f is within a tolerance for Upwards Out of Merit Generation in Trading Interval i and 1 otherwise	(133)
TOLDFlag_F_I(f, i)	Flag	F	I	6.16A.2(b)iii, 6.16B.2(b)ii	Flag that is 0 if Facility f is within a tolerance for Downwards Out of Merit Generation in Trading Interval i and 1 otherwise	(134)
SOC_F_D(f, d)	MW	F	D	11	Sent Out Capacity of Facility f in Trading Day d	(57)

Variable	Units	SC	GR	Rule	Description	Ref
NSGDVFlag_F_I(f, i)	Flag	F	I	6.16A.2(b)iv	Flag that is 1 if Facility f is an NSG and System Management estimated its maximum sent out energy in Trading Interval i and 0 otherwise	(132)
DVEST_F_I(f, i)	MWh	F	I	7.13.1(eF)	The maximum sent out energy Facility f would have generated in Trading Interval i, had a Dispatch Instruction not been issued	I
DVNCSBP_F_I(f, i)	MWh	F	I	6.16B.1 (b)ii.1, 6.16B.2 (b)ii.1	Change in the Balancing Portfolio sent out energy due to a Network Control Service Contract for Facility f in Trading Interval i (positive is increase in energy, negative is reduction in energy)	(137)
DVNCS_F_I(f, i)	MWh	F	I	6.16B.1 (b)ii.1, 6.16B.2(b)ii.1	Change in sent out energy due to a Network Control Service Contract for Facility f in Trading Interval i (positive is increase in energy, negative is reduction in energy)	I
NQCONMAX_F_I(f, i)	MWh	F	I	6.17.3(e), 6.17.5(e)	Maximum Non-Qualifying Constrained On Generation for Facility f in Trading Interval i	(135)
NQCOFFMAX_F_I(f, i)	MWh	F	I	6.17.4(e), 6.17.5A(e)	Maximum Non-Qualifying Constrained Off Generation for Facility f in Trading Interval i	(136)
LFPDNQ_F_I(f, i)	MW	F	I	7.13.1(eC)	Ex-post Downwards LFAS Enablement quantity for Facility f in Trading Interval i	I
LFBDNQ_F_I(f, i)	MW	F	I	7.13.1(eB)	Backup Downwards LFAS Enablement quantity for Facility f in Trading Interval i	I
LFPUPQ_F_I(f, i)	MW	F	I	7.13.1(e)	Ex-post Upwards LFAS Enablement quantity for Facility f in Trading Interval i	I
LFBUPQ_F_I(f, i)	MW	F	I	7.13.1(eA)	Backup Upwards LFAS Enablement quantity for Facility f in Trading Interval i	I
SRRQ_F_I(f, i)	MWh	F	I	6.16B.1 (b)ii.3	Spinning Reserve Response Quantity for Facility f in Trading Interval i	I
LRQ_F_I(f, i)	MWh	F	I	6.16B.2(b)ii.3	Load Rejection Reserve Response Quantity for Facility f in Trading Interval i	I
STLTOL_F_D(f, d)	MWh	F	D	6.17.9, 6.17.10	(Portfolio) Settlement Tolerance for Facility f in Trading Day d	(138)
TOL_F_D(f, d)	MW	F	D	6.17.9(a)	Tolerance Range or Facility Tolerance Range as determined by System Management for Facility f in Trading Day d	I
BALPF(d)	{}	G	D	11	Set of Facilities in the Balancing Portfolio in Trading Day d	(32)
SG(d)	{}	G	D	11	Set of Scheduled Generators in Trading Day d	(17)
NSG(d)	{}	G	D	11	Set of Non-Scheduled Generators in Trading Day d	(18)

Variable	Units	SC	GR	Rule	Description	Ref
PORTFOLIO(d)	{}	G	D	11	Set containing the Balancing Portfolio	(40)

4.4.2.4 Constrained Compensation Prices

$$CONP\_T\_I(t,i) = OPLA\_T\_I(t,i) - BP\_G\_I(i) \tag{139}$$

$$COFFP\_T\_I(t,i) = BP\_G\_I(i) - OPLA\_T\_I(t,i) \tag{140}$$

$$OPLA\_T\_I(t,i) = \begin{cases} max\left(MINSTEMP\_G\_D(i), min\left(MAXSTEMP\_G\_D(i), \frac{OP\_T\_I(t,i)}{LF\_F\_D(f,i)}\right)\right) & \text{for } t \notin PORTFOLIO(i) \\ & \text{and } FUELFlag\_T\_I(t,i) = 1 \\ max\left(MINSTEMP\_G\_D(i), min\left(AMAXSTEMP\_G\_D(i), \frac{OP\_T\_I(t,i)}{LF\_F\_D(f,i)}\right)\right) & \text{for } t \notin PORTFOLIO(i) \\ & \text{and } FUELFlag\_T\_I(t,i) = 0 \\ OP\_T\_I(t,i) & \text{for } t \in PORTFOLIO(i) \end{cases} \tag{141}$$

$$LF\_F\_D(f,d) = TLF\_F\_D(f,d) \times DLF\_F\_D(f,d) \tag{142}$$

Variable	Units	SC	GR	Rule	Description	Ref
CONP_T_I(t, i)	$/MWh	T	I	6.17.3(b), 6.17.3(c)ii, 6.17.3(d), 6.17.3A(b), 6.17.5(b), 6.17.5(c)ii, 6.17.5(d)	Constrained On Compensation Price for tranche t in Trading Interval i	(139)
COFFP_T_I(t, i)	$/MWh	T	I	6.17.4(b), 6.17.4(c)ii, 6.17.4(d), 6.17.4A(b), 6.17.5A(b), 6.17.5A(c)ii, 6.17.5A(d)	Constrained Off Compensation Price for tranche t in Trading Interval i	(140)
OP_T_I(t, i)	$/MWh	T	I		Offer price of the Balancing Price-Quantity Pair for tranche t (before any applicable ramp-rate adjustments) in Trading Interval i	I
OPLA_T_I(t, i)	$/MWh	T	I		Loss Factor Adjusted (offer) Price for tranche t in Trading Interval i	(141)
BP_G_I(i)	$/MWh	G	I	7A.3.10	Balancing Price for Trading Interval i	I
LF_F_D(f, d)		F	D		Loss Factor for Facility f for Trading Day d	(142)
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
FUELFlag_T_I(t, i)	Flag	T	I		Flag that is 1 if Non-Liquid Fuel applies to tranche t in Trading Interval i and 0 otherwise	I

Variable	Units	SC	GR	Rule	Description	Ref
AMAXSTEMP_G_D(d)	$/MWh	G	D	6.20.3	Alternative Maximum STEM Price for Trading Day d	I
MAXSTEMP_G_D(d)	$/MWh	G	D	6.20.2	Maximum STEM Price for Trading Day d	I
MINSTEMP_G_D(d)	$/MWh	G	D	11	Minimum STEM Price for Trading Day d	I
PORTFOLIO(d)	{}	G	D	11	Set containing the Balancing Portfolio	(40)

4.4.3 T3 DSM Dispatch Payments

$$DIPT3\_P\_D(p,d) = \sum_{i \in I(d)} DIPT3\_P\_I(p,i) \tag{143}$$

$$DIPT3\_P\_I(p,i) = \sum_{f \in DSP(p,i)} DIPT3\_F\_I(f,i) \tag{144}$$

$$DIPT3\_F\_I(f,i) = \begin{cases} DDSMD\_F\_I(f,i) \times CDP\_F\_I(f,i) & \text{for } CDIP\_F\_I(f,i) \geq T2CAP\_F\_D(f,i) \\ 0 & \text{otherwise} \end{cases} \tag{145}$$

$$CDP\_F\_I(f,i) = \begin{cases} CDPPK\_F\_D(f,i) & \text{for } PKTI\_G\_I(i) = 1 \\ CDPOP\_F\_D(f,i) & \text{otherwise} \end{cases} \tag{146}$$

Variable	Units	SC	GR	Rule	Description	Ref
DIPT3_P_D(p, d)	$	P	D	6.17.6C(c)	Tranche 3 DSM Dispatch Payments for Market Participant p in Trading Day d	(143)
DIPT3_P_I(p, i)	$	P	I	6.17.6C(c)	Tranche 3 DSM Dispatch Payments for Market Participant p in Trading Interval i	(144)
DIPT3_F_I(f, i)	$	F	I	6.17.6C(c)	Tranche 3 DSM Dispatch Payments for Facility f in Trading Interval i	(145)
DDSMD_F_I(f, i)	MWh	F	I	11	Deemed DSM Dispatch for Facility f in Trading Interval i	(270)
CDIP_F_I(f, i)	$	F	I	6.17.6	Sum of Non-Balancing Facility Dispatch Instruction Payments associated with Facility f in Trading Intervals in the same Capacity Year as, but prior to, Trading Interval i	(274)
T2CAP_F_D(f, d)	$	F	D		Upper limit of Tranche 2 DSM Dispatch Payments for Facility f in Trading Day d	(273)
CDP_F_I(f, i)	$/MWh	F	I	11	Consumption Decrease Price for Facility f in Trading Interval i	(146)
CDPPK_F_D(f, d)	$/MWh	F	D	Appendix 1 (h)vi.1	Consumption Decrease Price for Peak Trading Intervals for Facility f for Trading Day d	I
CDPOP_F_D(f, d)	$/MWh	F	D	Appendix 1 (h)vi.2	Consumption Decrease Price for Off-Peak Trading Intervals for Facility f for Trading Day d	I
PKTI_G_I(i)	Flag	G	I	11	Flag which is 1 if Trading Interval i is a Peak Trading Interval and 0 otherwise	(176)

Variable	Units	SC	GR	Rule	Description	Ref
DSP(d)	{}	G	D	11	Set of Demand Side Programmes in Trading Day d	(15)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.5 Reconciliation

Reconciliation is split into two parts:

- Constrained Compensation & DSM Dispatch T3 Costs - Which is paid to Market Participants in Balancing settlement calculations.
- Cost_LR Shortfall Costs - A charge to Market Participants for Load Rejection Services and System Restart Services which have been paid in excess of the amount specified by AEMO (when contracts exceed the value determined by the ERA).

These equations are based on the equations stated in MR 9.11. They have been modified to separate the two parts listed above and to attribute a monthly calculation to an interval calculation and then aggregate to a Trading Day. If the calculations were aggregated to a Trading Month they would be mathematically equivalent to the equations detailed in the rules.

$$RSA\_P\_D(p,d) = -(LRSF\_P\_D(p,d) + CCDSMT3C\_P\_D(p,d)) \tag{147}$$

Variable	Units	SC	GR	Rule	Description	Ref
RSA_P_D(p, d)	$	P	D	9.11.1	Reconciliation Settlement amount for Market Participant p in Trading Day d	(147)
LRSF_P_D(p, d)	$	P	D		Charges to cover any shortfall in Load Rejection and System Restart costs for Market Participant p in Trading Day d	(148)
CCDSMT3C_P_D(p, d)	$	P	D		Charges to cover the cost of constrained compensation and T3 DSM Dispatch for Market Participant p in Trading Day d	(155)

4.5.1 Load Rejection and System Restart Shortfall Costs

$$LRSF\_P\_D(p,d) = \sum_{i \in I(d)} LRSF\_P\_I(p,i) \tag{148}$$

$$LRSF\_P\_I(p,i) = CS\_P\_M(p,i) \times \frac{LRSF\_G\_M(i)}{TITM\_G\_M(i)} \tag{149}$$

$$LRSF\_G\_M(m) = max\left(0, CASL\_G\_M(m) + CASR\_G\_M(m) - COSTLR\_G\_M(m)\right) \tag{150}$$

$$CASL\_G\_M(m) = \sum_{p \in P\_M(m)} CASL\_P\_M(p,m) \tag{151}$$

$$CASR\_G\_M(m) = \sum_{p \in P\_M(m)} CASR\_P\_M(p,m) \tag{152}$$

$$COSTLR\_G\_M(m) = \frac{COSTLR\_G\_FY(m)}{12} \tag{153}$$

$$TITM\_G\_M(m) = \begin{cases} 28 \times 48 & \text{for } m = \text{February in a non-leap year} \\ 29 \times 48 & \text{for } m = \text{February in a leap year} \\ 30 \times 48 & \text{for } m \in \{ \text{ April, June, September, November } \} \\ 31 \times 48 & \text{for } m \in \{ \text{ January, March, May, July, August, October, December } \} \end{cases} \quad (154)$$

Variable	Units	SC	GR	Rule	Description	Ref
LRSF_P_D(p, d)	$	P	D		Charges to cover any shortfall in Load Rejection and System Restart costs for Market Participant p in Trading Day d	(148)
LRSF_P_I(p, i)	$	P	I		Charges to cover any shortfall in Load Rejection and System Restart costs for Market Participant p in Trading Interval i	(149)
CS_P_M(p, m)		P	M	9.3.7	Consumption share for Market Participant p in Trading Month m	(239)
LRSF_G_M(m)	$	G	M	9.9.3B	The value of the contracts to provide Load Rejection and System Restart Services in excess of the value determined by the ERA for Trading Month m	(150)
TITM_G_M(m)		G	M		Number of Trading Intervals in Trading Month m	(154)
CASL_G_M(m)	$	G	M		Sum of amounts paid for the provision of contracted Load Rejection Services for Trading Month m	(151)
CASR_G_M(m)	$	G	M		Sum of amounts paid for the provision of contracted System Restart Services for Trading Month m	(152)
CASL_P_M(p, m)	$	P	M	9.9.3(c)	Payment for the provision of contracted Load Rejection Services for Rule Participant p for Trading Month m	I
CASR_P_M(p, m)	$	P	M	9.9.3(d)	Payment for the provision of contracted System Restart Services for Rule Participant p for Trading Month m	I
COSTLR_G_FY(fy)	$	G	FY	3.22.1(g)i	The annual amount determined by the ERA to cover the costs of Load Rejection and System Restart Services, and un-contracted Dispatch Support Services for Financial Year fy	I
COSTLR_G_M(m)	$	G	M	3.22.1(g)i	The monthly equivalent of the amount determined by the ERA to cover the costs of Load Rejection and System Restart Services, and un-contracted Dispatch Support Services for Trading Month m	(153)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I
P_M(m)	{}	G	M		Set of participants (Rule Participants and the ERA) in Trading Month m	(1)

4.5.2 Constrained Compensation and T3 DSM Dispatch Costs

$$CCDSMT3C\_P\_D(p,d) = \sum_{i \in I(d)} CCDSMT3C\_P\_I(p,i) \tag{155}$$

$$CCDSMT3C\_P\_I(p,i) = CS\_P\_M(p,i) \times BSA\_G\_I(i) \tag{156}$$

$$BSA\_G\_I(i) = \sum_{p \in P\_M(i)} BSA\_P\_I(p,i) \tag{157}$$

$$BSA\_P\_I(p,i) = BSAS\_P\_I(p,i) - BSAD\_P\_I(p,i) + CONC\_P\_I(p,i) + COFFC\_P\_I(p,i) + DIPT3\_P\_I(p,i) \tag{158}$$

Variable	Units	SC	GR	Rule	Description	Ref
CCDSMT3C_P_D(p, d)	$	P	D		Charges to cover the cost of constrained compensation and T3 DSM Dispatch for Market Participant p in Trading Day d	(155)
CCDSMT3C_P_I(p, i)	$	P	I		Charges to cover the cost of constrained compensation and T3 DSM Dispatch for Market Participant p in Trading Interval i	(156)
CS_P_M(p, m)		P	M	9.3.7	Consumption share for Market Participant p in Trading Month m	(239)
BSA_G_I(i)	$	G	I		Sum of all Market Participant's Balancing settlement amount for Trading Interval i	(157)
BSA_P_I(p, i)	$	P	I	9.8.1	Balancing settlement amount for Market Participant p in Trading Interval i	(158)
BSAS_P_I(p, i)	$	P	I	9.8.1	Settlement amount for energy sold in the Balancing Market for Market Participant p in Trading Interval i	(90)
BSAD_P_I(p, i)	$	P	I	9.8.1	Settlement amount for energy purchased in the Balancing Market for Market Participant p in Trading Interval i	(91)
CONC_P_I(p, i)	$	P	I	9.8.1	Constrained On Compensation for Market Participant p in Trading Interval i	(99)
COFFC_P_I(p, i)	$	P	I	9.8.1	Constrained Off Compensation for Market Participant p in Trading Interval i	(100)
DIPT3_P_I(p, i)	$	P	I	6.17.6C(c)	Tranche 3 DSM Dispatch Payments for Market Participant p in Trading Interval i	(144)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I
P_M(m)	{}	G	M		Set of participants (Rule Participants and the ERA) in Trading Month m	(1)

4.6 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 9.10. They have been modified to attribute a monthly calculation to an interval calculation and then aggregate to a Trading Day. If the calculations were aggregated to a Trading Month they would be mathematically equivalent to the equations detailed in the rules.

$$COCSA\_P\_D(p,d) = COCP\_P\_D(p,d) - COCC\_P\_D(p,d) \tag{159}$$

Variable	Units	SC	GR	Rule	Description	Ref
COCSA_P_D(p, d)	$	P	D	9.10.1	Outage compensation settlement amount for Market Participant p in Trading Day d	(159)
COCP_P_D(p, d)	$	P	D	9.10.1	Outage compensation payment for Market Participant p in Trading Day d	(160)
COCC_P_D(p, d)	$	P	D	9.10.1	Charge to fund outage compensation, for Market Participant p in Trading Day d	(162)

4.6.1 Changed Outage Compensation

$$COCP\_P\_D(p,d) = \sum_{i \in I(d)} COCP\_P\_I(p,i) \tag{160}$$

$$COCP\_P\_I(p,i) = \frac{COCP\_P\_M(p,i)}{TITM\_G\_M(i)} \tag{161}$$

Variable	Units	SC	GR	Rule	Description	Ref
COCP_P_I(p, i)	$	P	I	9.10.1	Outage compensation payment for Market Participant p in Trading Interval i	(161)
COCP_P_D(p, d)	$	P	D	9.10.1	Outage compensation payment for Market Participant p in Trading Day d	(160)
COCP_P_M(p, m)	$	P	M	9.10.1, 3.22.1(h)	Outage compensation payment for Market Participant p for Trading Month m	I
TITM_G_M(m)		G	M		Number of Trading Intervals in Trading Month m	(154)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.6.2 Changed Outage Compensation Charges

$$COCC\_P\_D(p,d) = \sum_{i \in I(d)} COCC\_P\_I(p,i) \tag{162}$$

$$COCC\_P\_I(p,i) = CS\_P\_M(p,i) \times \frac{COCC\_G\_M(i)}{TITM\_G\_M(i)} \tag{163}$$

$$COCC\_G\_M(m) = COCP\_G\_M(m) \tag{164}$$

$$COCP\_G\_M(m) = \sum_{p \in P\_M(m)} COCP\_P\_M(p,m) \tag{165}$$

Variable	Units	SC	GR	Rule	Description	Ref
COCP_P_M(p, m)	$	P	M	9.10.1, 3.22.1(h)	Outage compensation payment for Market Participant p for Trading Month m	I
COCP_G_M(m)	$	G	M		Sum of all outage compensation payments for Trading Month m	(165)
COCC_G_M(m)	$	G	M	9.10.1	Sum of all outage compensation charges for Trading Month m	(164)
COCC_P_I(p, i)	$	P	I	9.10.1	Charge to fund outage compensation, for Market Participant p in Trading Interval i	(163)
COCC_P_D(p, d)	$	P	D	9.10.1	Charge to fund outage compensation, for Market Participant p in Trading Day d	(162)
TITM_G_M(m)		G	M		Number of Trading Intervals in Trading Month m	(154)
CS_P_M(p, m)		P	M	9.3.7	Consumption share for Market Participant p in Trading Month m	(239)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I
P_M(m)	{}	G	M		Set of participants (Rule Participants and the ERA) in Trading Month m	(1)

4.7 Ancillary Services

Ancillary Services is split into 12 parts:

- Un-contracted Spinning Reserve Services Provider Payment - Synergy is paid for its provision of un-contracted Spinning Reserve Services (acting as the default Ancillary Services provider)
- Un-contracted Load Rejection, System Restart and Dispatch Support Services Provider Payment - Synergy is paid for its provision of un-contracted Load Rejection, System Restart and Dispatch Support Services (acting as the default Ancillary Services provider)
- Contracted Spinning Reserve Services Provider Payment - Market Participants are paid for their provision of Spinning Reserve Services provided under contract
- Contracted Load Rejection Services Provider Payment - Market Participants are paid for their provision of Load Rejection Services provided under contract
- Contracted System Restart Services Provider Payment - Market Participants are paid for their provision of System Restart Services provided under contract
- Contracted Dispatch Support Services Provider Payment - Market Participants are paid for their provision of Dispatch Support Services provided under contract
- Load Following Market Payment - Market Participants are paid for their provision of Load Following services (Upwards LFAS, Downwards LFAS, Backup Upwards LFAS and Backup Downwards LFAS).
- Load Following Capacity Cost - Market Participants are charged to cover the cost of capacity of plant that provide Load Following Services.
- Load Following Market Cost - Market Participants are charged to cover the cost of plant that clears in the Load Following Markets.
- Spinning Reserve availability cost - Market Participants are charged to cover Spinning Reserve costs.
- Load Rejection System Restart and Un-contracted Dispatch Support Costs - Market Participants are charged to cover the costs of Load Rejection Service and System Restart Services.

- Contracted Dispatch Support Services Costs - Market Participants are charged to cover the costs of contracted Dispatch Support Services.

$$ASSA\_P\_D(p,d) = SynergyASPP\_P\_D(p,d) + ASPP\_P\_D(p,d) + LFSA\_P\_D(p,d) - LFCC\_P\_D(p,d) - LFMC\_P\_D(p,d) - SRAC\_P\_D(p,d) - COSTLRD\_P\_D(p,d) \quad (166)$$

$$ASPP\_P\_D(p,d) = CASSR\_P\_D(p,d) + CASL\_P\_D(p,d) + CASR\_P\_D(p,d) + CASD\_P\_D(p,d) \quad (167)$$

$$SynergyASPP\_P\_D(p,d) = UASSR\_P\_D(p,d) + UASLR\_P\_D(p,d) \quad (168)$$

$$COSTLRD\_P\_D(p,d) = COSTLR\_P\_D(p,d) + COSTD\_P\_D(p,d) \quad (169)$$

Variable	Units	SC	GR	Rule	Description	Ref
ASSA_P_D(p, d)	$	P	D	9.9.1	Ancillary Services settlement amount for Market Participant p in Trading Day d	(166)
SynergyASPP_P_D(p, d)	$	P	D	9.9.3	Payment to Synergy for un-contracted Ancillary Services for Market Participant p in Trading Day d	(168)
ASPP_P_D(p, d)	$	P	D	9.9.3	Payment for Contracted Ancillary Services for Market Participant p in Trading Day d	(167)
UASSR_P_D(p, d)	$	P	D	9.9.1	Amount paid for Synergy's provision of un-contracted Spinning Reserve Services for Market Participant p in Trading Day d	(170)
UASLR_P_D(p, d)	$	P	D	9.9.1	Amount paid for Synergy's provision of un-contracted Load Rejection and System Restart Services for Market Participant p in Trading Day d	(177)
CASSR_P_D(p, d)	$	P	D		Payment for the provision of contracted Spinning Reserve Services for Rule Participant p for Trading Day d	(181)
CASL_P_D(p, d)	$	P	D		Payment for the provision of contracted Load Rejection Services for Rule Participant p for Trading Day d	(183)
CASR_P_D(p, d)	$	P	D		Payment for the provision of contracted System Restart Services for Rule Participant p for Trading Day d	(185)
CASD_P_D(p, d)	$	P	D		Payment for the provision of contracted Dispatch Support Services for Rule Participant p for Trading Day d	(187)
LFSA_P_D(p, d)	$	P	D	9.9.2(c)	Amount paid for the provision of Load Following (Upwards LFAS, Downwards LFAS, Backup Upwards LFAS and Backup Downwards LFAS) to Market Participant p in Trading Day d	(189)
LFCC_P_D(p, d)	$	P	D	9.9.2(p)	Amount charged to recover the cost of capacity associated with Load Following for Market Participant p in Trading Day d	(201)

Variable	Units	SC	GR	Rule	Description	Ref
LFMC_P_D(p, d)	$	P	D	9.9.2(n)	Amount charged to recover the cost of Load Following (Upwards LFAS, Downwards LFAS, Backup Upwards LFAS and Backup Downwards LFAS) for Market Participant p in Trading Day d	(210)
SRAC_P_D(p, d)	$	P	D	9.9.2(l)	Amount charged to recover the cost of Spinning Reserve Services for Market Participant p in Trading Day d	(220)
COSTLRD_P_D(p, d)	$	P	D	9.9.1	Amount charged to recover the cost of Load Rejection Service, System Restart Service and Dispatch Support Services for Market Participant p in Trading Day d	(169)
COSTLR_P_D(p, d)	$	P	D	9.9.1	Amount charged to recover the cost of Load Rejection Service and System Restart Service for Market Participant p in Trading Day d	(237)
COSTD_P_D(p, d)	$	P	D	9.9.1	Amount charged to recover the cost of Dispatch Support Services for Market Participant p in Trading Day d	(241)

4.7.1 Un-contracted Spinning Reserve Services Provider Payment

These equations have been modified to tease out un-contracted Spinning Reserve from un-contracted Load Rejection, System Restart and Dispatch Support Services. In doing so, some of the equations simplify.

$$UASSR\_P\_D(p,d) = \sum_{i \in I(d)} UASSR\_P\_I(p,i) \tag{170}$$

$$UASSR\_P\_I(p,i) = \begin{cases} 0.5h \times MV\_G\_I(i) \times max(0, BP\_G\_I(i)) \times max(0, SRQ\_G\_I(i) \\ -(LFPUPQ\_G\_I(i) + LFBUPQ\_G\_I(i)) - CASSRQ\_G\_I(i)) & \text{for } p \in Synergy(i) \\ 0 & \text{for } p \notin Synergy(i) \end{cases} \tag{171}$$

$$CASSRQ\_G\_I(i) = \sum_{p \in P(i)} CASSRQ\_P\_I(p,i) \tag{172}$$

$$CASSRQ\_P\_I(p,i) = \frac{CASSRQmwh\_P\_I(p,i)}{0.5h} \tag{173}$$

$$MV\_G\_I(i) = \begin{cases} MVPK\_G\_FY(i) & \text{for } PKTI\_G\_I(i) = 1 \\ MVOP\_G\_FY(i) & \text{otherwise} \end{cases} \tag{174}$$

$$SRQ\_G\_I(i) = \begin{cases} SRQPK\_G\_FY(i) & \text{for } PKTI\_G\_I(i) = 1 \\ SRQOP\_G\_FY(i) & \text{otherwise} \end{cases} \tag{175}$$

$$PKTI\_G\_I(i) = \begin{cases} 1 & \text{for } PKSTART\_G\_D(i) \le hour(i) < PKEND\_G\_D(i) \\ 0 & \text{otherwise} \end{cases} \tag{176}$$

Variable	Units	SC	GR	Rule	Description	Ref
UASSR_P_D(p, d)	$	P	D	9.9.1	Amount paid for Synergy's provision of un-contracted Spinning Reserve Services for Market Participant p in Trading Day d	(170)

Variable	Units	SC	GR	Rule	Description	Ref
UASSR_P_I(p, i)	$	P	I	9.9.1	Amount paid for Synergy's provision of un-contracted Spinning Reserve Services for Market Participant p in Trading Interval i	(171)
BP_G_I(i)	$/MWh	G	I	7A.3.10	Balancing Price for Trading Interval i	I
MV_G_I(i)		G	I		Margin value applicable to Trading Interval i	(174)
MVPK_G_FY(fy)		G	FY	3.22.1(c)	Reserve availability payment margin applying to Peak Trading Intervals in Financial Year fy	I
MVOP_G_FY(fy)		G	FY	3.22.1(d)	Reserve availability payment margin applying to Off-Peak Trading Intervals in Financial Year fy	I
SRQ_G_I(i)	MW	G	I	9.9.2(f)	Ancillary Services Requirement for Spinning Reserve in Trading Interval i	(175)
SRQPK_G_FY(fy)	MW	G	FY	3.22.1(e)	Ancillary Services Requirement for Spinning Reserve in Peak Trading Intervals in Financial Year fy	I
SRQOP_G_FY(fy)	MW	G	FY	3.22.1(f)	Ancillary Services Requirement for Spinning Reserve in Off-Peak Trading Intervals in Financial Year fy	I
CASSRQ_G_I(i)	MW	G	I	9.9.2(f)	Sum of all quantities of Contracted Spinning Reserve Services in Trading Interval i	(172)
CASSRQ_P_I(p, i)	MW	P	I	9.9.2(f)	Quantity of Contracted Spinning Reserve Service for Rule Participant p in Trading Interval i	(173)
CASSRQmwh_P_I(p, i)	MWh	P	I		MWh quantity of Contracted Spinning Reserve Service for Rule Participant p in Trading Interval i	I
LFPUPQ_G_I(i)	MW	G	I	7.13.1(e)	Sum of any Ex-post Upwards LFAS Enablement quantities in Trading Interval i	(206)
LFBUPQ_G_I(i)	MW	G	I	7.13.1(eA)	Sum of any Backup Upwards LFAS Enablement quantities in Trading Interval i	(207)
PKTI_G_I(i)	Flag	G	I	11	Flag which is 1 if Trading Interval i is a Peak Trading Interval and 0 otherwise	(176)
PKSTART_G_D(d)		G	D		Start time of Peak Trading Intervals in Trading Day d (represented as the hour in the day)	I
PKEND_G_D(d)		G	D		End time of Peak Trading Intervals in Trading Day d (represented as the hour in the day)	I
P(d)	{}	G	D		Set of participants (Rule Participants and the ERA) in Trading Day d	(2)
Synergy(d)	{}	G	D	11	Set containing Synergy	(13)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.7.2 Un-contracted Load Rejection, System Restart and Dispatch Support Services Provider Payment

These equations have been modified to tease out un-contracted Load Rejection, System Restart and Dispatch Support Services from un-contracted Spinning Reserve. In doing so, some of the equations simplify.

$$UASLR\_P\_D(p,d) = \sum_{i \in I(d)} UASLR\_P\_I(p,i) \tag{177}$$

$$UASLR\_P\_I(p,i) = \frac{UASLR\_P\_M(p,i)}{TITM\_G\_M(i)} \tag{178}$$

$$UASLR\_P\_M(p,m) = \begin{cases} COSTLR\_G\_M(m) - min(COSTLR\_G\_M(m), CASR\_G\_M(m) + CASL\_G\_M(m)) & \text{for } p \in Synergy\_M(m) \\ 0 & \text{for } p \notin Synergy\_M(m) \end{cases} \tag{179}$$

This equation is not required for the settlement amounts, but should be calculated for completeness.

$$UASLR\_G\_I(i) = \sum_{p \in P\_M(i)} UASLR\_P\_I(p,i) \tag{180}$$

Variable	Units	SC	GR	Rule	Description	Ref
UASLR_P_D(p, d)	$	P	D	9.9.1	Amount paid for Synergy's provision of un-contracted Load Rejection and System Restart Services for Market Participant p in Trading Day d	(177)
UASLR_P_I(p, i)	$	P	I	9.9.1	Amount paid for Synergy's provision of un-contracted Load Rejection and System Restart Services for Market Participant p in Trading Interval i	(178)
UASLR_G_I(i)	$	G	I	9.9.1	Amount paid for un-contracted Load Rejection and System Restart Services in Trading Interval i	(180)
UASLR_P_M(p, m)	$	P	M	9.9.1	Amount paid for Synergy's provision of un-contracted Load Rejection and System Restart Services for Market Participant p in Trading Month m	(179)
CASL_G_M(m)	$	G	M		Sum of amounts paid for the provision of contracted Load Rejection Services for Trading Month m	(151)
CASR_G_M(m)	$	G	M		Sum of amounts paid for the provision of contracted System Restart Services for Trading Month m	(152)
COSTLR_G_M(m)	$	G	M	3.22.1(g)i	The monthly equivalent of the amount determined by the ERA to cover the costs of Load Rejection and System Restart Services, and un-contracted Dispatch Support Services for Trading Month m	(153)
TITM_G_M(m)		G	M		Number of Trading Intervals in Trading Month m	(154)
P_M(m)	{}	G	M		Set of participants (Rule Participants and the ERA) in Trading Month m	(1)
Synergy_M(m)	{}	G	M	11	Set containing Synergy	(14)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.7.3 Contracted Spinning Reserve Services Provider Payment

$$CASSR\_P\_D(p,d) = \sum_{i \in I(d)} CASSR\_P\_I(p,i) \tag{181}$$

$$CASSR\_P\_I(p,i) = \frac{CASSR\_P\_M(p,i)}{TITM\_G\_M(i)} \tag{182}$$

Variable	Units	SC	GR	Rule	Description	Ref
CASSR_P_D(p, d)	$	P	D		Payment for the provision of contracted Spinning Reserve Services for Rule Participant p for Trading Day d	(181)
CASSR_P_I(p, i)	$	P	I		Payment for the provision of contracted Spinning Reserve Services for Rule Participant p for Trading Interval i	(182)
CASSR_P_M(p, m)	$	P	M	9.9.3(a)	Payment for the provision of contracted Spinning Reserve Services for Rule Participant p for Trading Month m	I
TITM_G_M(m)		G	M		Number of Trading Intervals in Trading Month m	(154)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.7.4 Contracted Load Rejection Services Provider Payment

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

$$CASL\_P\_I(p,i) = \frac{CASL\_P\_M(p,i)}{TITM\_G\_M(i)} \tag{184}$$

Variable	Units	SC	GR	Rule	Description	Ref
CASL_P_D(p, d)	$	P	D		Payment for the provision of contracted Load Rejection Services for Rule Participant p for Trading Day d	(183)
CASL_P_I(p, i)	$	P	I		Payment for the provision of contracted Load Rejection Services for Rule Participant p for Trading Interval i	(184)
CASL_P_M(p, m)	$	P	M	9.9.3(c)	Payment for the provision of contracted Load Rejection Services for Rule Participant p for Trading Month m	I
TITM_G_M(m)		G	M		Number of Trading Intervals in Trading Month m	(154)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.7.5 Contracted System Restart Services Provider Payment

$$CASR\_P\_D(p,d) = \sum_{i \in I(d)} CASR\_P\_I(p,i) \tag{185}$$

$$CASR\_P\_I(p,i) = \frac{CASR\_P\_M(p,i)}{TITM\_G\_M(i)} \tag{186}$$

Variable	Units	SC	GR	Rule	Description	Ref
CASR_P_D(p, d)	$	P	D		Payment for the provision of contracted System Restart Services for Rule Participant p for Trading Day d	(185)
CASR_P_I(p, i)	$	P	I		Payment for the provision of contracted System Restart Services for Rule Participant p for Trading Interval i	(186)
CASR_P_M(p, m)	$	P	M	9.9.3(d)	Payment for the provision of contracted System Restart Services for Rule Participant p for Trading Month m	I
TITM_G_M(m)		G	M		Number of Trading Intervals in Trading Month m	(154)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.7.6 Contracted Dispatch Support Services Provider Payment

$$CASD\_P\_D(p,d) = \sum_{i \in I(d)} CASD\_P\_I(p,i) \tag{187}$$

$$CASD\_P\_I(p,i) = \frac{CASD\_P\_M(p,i)}{TITM\_G\_M(i)} \tag{188}$$

Variable	Units	SC	GR	Rule	Description	Ref
CASD_P_D(p, d)	$	P	D		Payment for the provision of contracted Dispatch Support Services for Rule Participant p for Trading Day d	(187)
CASD_P_I(p, i)	$	P	I		Payment for the provision of contracted Dispatch Support Services for Rule Participant p for Trading Interval i	(188)
CASD_P_M(p, m)	$	P	M	9.9.3(e)	Payment for the provision of contracted Dispatch Support Services for Rule Participant p for Trading Month m	I
TITM_G_M(m)		G	M		Number of Trading Intervals in Trading Month m	(154)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.7.7 Load Following Market Payment

$$LFSA\_P\_D(p,d) = \sum_{i \in I(d)} LFSA\_P\_I(p,i) \tag{189}$$

$$LFSA\_P\_I(p,i) = LFDSA\_P\_I(p,i) + LFUSA\_P\_I(p,i) \tag{190}$$

$$LFDSA\_P\_I(p,i) = LFPDNSA\_P\_I(p,i) + LFBDNSA\_P\_I(p,i) \tag{191}$$

$$LFUSA\_P\_I(p,i) = LFPUPSA\_P\_I(p,i) + LFBUPSA\_P\_I(p,i) \quad (192)$$

$$LFPDNSA\_P\_I(p,i) = LFPDNQ\_P\_I(p,i) \times LFPDNP\_G\_I(i) \quad (193)$$

$$LFBDNSA\_P\_I(p,i) = LFBDNQ\_P\_I(p,i) \times LFBDNP\_G\_I(i) \quad (194)$$

$$LFPUPSA\_P\_I(p,i) = LFPUPQ\_P\_I(p,i) \times LFPUPP\_G\_I(i) \quad (195)$$

$$LFBUPSA\_P\_I(p,i) = LFBUPQ\_P\_I(p,i) \times LFBUPP\_G\_I(i) \quad (196)$$

$$LFPDNQ\_P\_I(p,i) = \sum_{f \in LFASF(p,i)} LFPDNQ\_F\_I(f,i) \quad (197)$$

$$LFBDNQ\_P\_I(p,i) = \sum_{f \in LFASF(p,i)} LFBDNQ\_F\_I(f,i) \quad (198)$$

$$LFPUPQ\_P\_I(p,i) = \sum_{f \in LFASF(p,i)} LFPUPQ\_F\_I(f,i) \quad (199)$$

$$LFBUPQ\_P\_I(p,i) = \sum_{f \in LFASF(p,i)} LFBUPQ\_F\_I(f,i) \quad (200)$$

Variable	Units	SC	GR	Rule	Description	Ref
LFSA_P_D(p, d)	$	P	D	9.9.2(c)	Amount paid for the provision of Load Following (Upwards LFAS, Downwards LFAS, Backup Upwards LFAS and Backup Downwards LFAS) to Market Participant p in Trading Day d	(189)
LFSA_P_I(p, i)	$	P	I	9.9.2(c)	Amount paid for the provision of Load Following (Upwards LFAS, Downwards LFAS, Backup Upwards LFAS and Backup Downwards LFAS) to Market Participant p in Trading Interval i	(190)
LFDSA_P_I(p, i)	$	P	I	9.9.2(b)	Payment to Market Participant p for providing Downwards LFAS and Backup Downwards LFAS in Trading Interval i	(191)
LFUSA_P_I(p, i)	$	P	I	9.9.2(a)	Payment to Market Participant p for providing Upwards LFAS and Backup Upwards LFAS in Trading Interval i	(192)
LFPDNSA_P_I(p, i)	$	P	I	9.9.2(b)	Payment to Market Participant p for providing Downwards LFAS in Trading Interval i	(193)
LFBDNSA_P_I(p, i)	$	P	I	9.9.2(b)	Payment to Market Participant p for providing Backup Downwards LFAS in Trading Interval i	(194)
LFPUPSA_P_I(p, i)	$	P	I	9.9.2(a)	Payment to Market Participant p for providing Upwards LFAS in Trading Interval i	(195)
LFBUPSA_P_I(p, i)	$	P	I	9.9.2(a)	Payment to Market Participant p for providing Backup Upwards LFAS in Trading Interval i	(196)

Variable	Units	SC	GR	Rule	Description	Ref
LFPDNQ_P_I(p, i)	MW	P	I	7.13.1(eC)	Sum of any Ex-post Downwards LFAS Enablement quantities for Market Participant p in Trading Interval i	(197)
LFPDNP_G_I(i)	$/MW	G	I	7B.3.4(b)	Downwards LFAS Price for Trading Interval i	I
LFBDNQ_P_I(p, i)	MW	P	I	7.13.1(eB)	Sum of any Backup Downwards LFAS Enablement quantities for Market Participant p in Trading Interval i	(198)
LFBDNP_G_I(i)	$/MW	G	I	7B.2.6	Backup Downwards LFAS Price for Trading Interval i	I
LFPUPQ_P_I(p, i)	MW	P	I	7.13.1(e)	Sum of any Ex-post Upwards LFAS Enablement quantities for Market Participant p in Trading Interval i	(199)
LFPUPP_G_I(i)	$/MW	G	I	7B.3.4(a)	Upwards LFAS Price for Trading Interval i	I
LFBUPQ_P_I(p, i)	MW	P	I	7.13.1(eA)	Sum of any Backup Upwards LFAS Enablement quantities for Market Participant p in Trading Interval i	(200)
LFBUPP_G_I(i)	$/MW	G	I	7B.2.6	Backup Upwards LFAS Price for Trading Interval i	I
LFPDNQ_F_I(f, i)	MW	F	I	7.13.1(eC)	Ex-post Downwards LFAS Enablement quantity for Facility f in Trading Interval i	I
LFBDNQ_F_I(f, i)	MW	F	I	7.13.1(eB)	Backup Downwards LFAS Enablement quantity for Facility f in Trading Interval i	I
LFPUPQ_F_I(f, i)	MW	F	I	7.13.1(e)	Ex-post Upwards LFAS Enablement quantity for Facility f in Trading Interval i	I
LFBUPQ_F_I(f, i)	MW	F	I	7.13.1(eA)	Backup Upwards LFAS Enablement quantity for Facility f in Trading Interval i	I
LFASF(d)	{}	G	D	11	Set of LFAS Facilities in Trading Day d	(34)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.7.8 Load Following Capacity Cost

$$LFCC\_P\_D(p,d) = \sum_{i \in I(d)} LFCC\_P\_I(p,i) \tag{201}$$

$$LFCC\_P\_I(p,i) = LFS\_P\_M(p,i) \times LFCC\_G\_I(i) \tag{202}$$

$$LFCC\_G\_I(i) = RCP\_G\_I(i) \times (LFPUPQ\_G\_I(i) + LFBUPQ\_G\_I(i)) \tag{203}$$

$$RCP\_G\_I(i) = \frac{RCP\_G\_M(i)}{TITM\_G\_M(i)} \tag{204}$$

$$RCP\_G\_M(m) = \frac{RCP\_G\_CY(m)}{12} \tag{205}$$

$$LFPUPQ\_G\_I(i) = \sum_{p \in MP(i)} LFPUPQ\_P\_I(p,i) \tag{206}$$

$$LFBUPQ\_G\_I(i) = \sum_{p \in MP(i)} LFBUPQ\_P\_I(p,i) \tag{207}$$

These equations are not required for the settlement amounts, but should be calculated for completeness.

$$LFPDNQ\_G\_I(i) = \sum_{p \in MP(i)} LFPDNQ\_P\_I(p,i) \tag{208}$$

$$LFBDNQ\_G\_I(i) = \sum_{p \in MP(i)} LFBDNQ\_P\_I(p,i) \tag{209}$$

Variable	Units	SC	GR	Rule	Description	Ref
LFCC_P_D(p, d)	$	P	D	9.9.2(p)	Amount charged to recover the cost of capacity associated with Load Following for Market Participant p in Trading Day d	(201)
LFCC_P_I(p, i)	$	P	I	9.9.2(p)	Amount charged to recover the cost of capacity associated with Load Following for Market Participant p in Trading Interval i	(202)
LFCC_G_I(i)	$	G	I	9.9.2(p)	Amount charged to recover the cost of capacity associated with Load Following in Trading Interval i	(203)
LFS_P_M(p, m)		P	M	3.14.1	Load Following share for Market Participant p in Trading Month m	(218)
RCP_G_I(i)	$/MW	G	I		Interval Reserve Capacity Price for Trading Interval i	(204)
RCP_G_M(m)	$/MW	G	M	11	Monthly Reserve Capacity Price for Trading Month m	(205)
RCP_G_CY(cy)	$/MW	G	CY	11	Reserve Capacity Price for Capacity Year cy	I
LFPDNQ_G_I(i)	MW	G	I	7.13.1(eC)	Sum of any Ex-post Downwards LFAS Enablement quantities in Trading Interval i	(208)
LFBDNQ_G_I(i)	MW	G	I	7.13.1(eB)	Sum of any Backup Downwards LFAS Enablement quantities in Trading Interval i	(209)
LFPUPQ_G_I(i)	MW	G	I	7.13.1(e)	Sum of any Ex-post Upwards LFAS Enablement quantities in Trading Interval i	(206)
LFBUPQ_G_I(i)	MW	G	I	7.13.1(eA)	Sum of any Backup Upwards LFAS Enablement quantities in Trading Interval i	(207)
LFPDNQ_P_I(p, i)	MW	P	I	7.13.1(eC)	Sum of any Ex-post Downwards LFAS Enablement quantities for Market Participant p in Trading Interval i	(197)
LFBDNQ_P_I(p, i)	MW	P	I	7.13.1(eB)	Sum of any Backup Downwards LFAS Enablement quantities for Market Participant p in Trading Interval i	(198)
LFPUPQ_P_I(p, i)	MW	P	I	7.13.1(e)	Sum of any Ex-post Upwards LFAS Enablement quantities for Market Participant p in Trading Interval i	(199)
LFBUPQ_P_I(p, i)	MW	P	I	7.13.1(eA)	Sum of any Backup Upwards LFAS Enablement quantities for Market Participant p in Trading Interval i	(200)

Variable	Units	SC	GR	Rule	Description	Ref
TITM_G_M(m)		G	M		Number of Trading Intervals in Trading Month m	(154)
MP(d)	{}	G	D	11	Set of Market Participants in Trading Day d	(5)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.7.9 Load Following Market Cost

$$LFMC\_P\_D(p,d) = \sum_{i \in I(d)} LFMC\_P\_I(p,i) \tag{210}$$

$$LFMC\_P\_I(p,i) = LFS\_P\_M(p,i) \times LFMC\_G\_I(i) \tag{211}$$

$$LFMC\_G\_I(i) = LFSA\_G\_I(i) - ASSF\_G\_I(i) \times ASCS\_G\_I(i) \tag{212}$$

$$LFSA\_G\_I(i) = \sum_{p \in P\_M(i)} LFSA\_P\_I(p,i) \tag{213}$$

$$ASSF\_G\_I(i) = \begin{cases} \dfrac{LFSA\_G\_I(i)}{LFSA\_G\_I(i) + SRNoLF\_G\_I(i)} & \text{for } LFSA\_G\_I(i) + SRNoLF\_G\_I(i) \neq 0 \\ 0 & \text{for } LFSA\_G\_I(i) + SRNoLF\_G\_I(i) = 0 \end{cases} \tag{214}$$

$$\begin{aligned} ASCS\_G\_I(i) = {} & 0.5h \times MV\_G\_I(i) \times max(0, BP\_G\_I(i)) \\ & \times min(LFPUPQ\_G\_I(i) + LFBUPQ\_G\_I(i), SRQ\_G\_I(i) - CASSRQ\_G\_I(i)) \end{aligned} \tag{215}$$

$$SRNoLF\_G\_I(i) = 0.5h \times MV\_G\_I(i) \times max(0, BP\_G\_I(i)) \times max(0, SRQ\_G\_I(i) - CASSRQ\_G\_I(i)) + \frac{CASSR\_G\_M(i)}{TITM\_G\_M(i)} \tag{216}$$

$$CASSR\_G\_M(m) = \sum_{p \in P\_M(p,m)} CASSR\_P\_M(p,m) \tag{217}$$

$$LFS\_P\_M(p,m) = \frac{LFCQ\_P\_M(p,m)}{LFCQ\_G\_M(m)} \tag{218}$$

$$LFCQ\_G\_M(m) = \sum_{p \in P\_M(m)} LFCQ\_P\_M(p,m) \tag{219}$$

Variable	Units	SC	GR	Rule	Description	Ref
LFMC_P_D(p, d)	$	P	D	9.9.2(n)	Amount charged to recover the cost of Load Following (Upwards LFAS, Downwards LFAS, Backup Upwards LFAS and Backup Downwards LFAS) for Market Participant p in Trading Day d	(210)
LFMC_P_I(p, i)	$	P	I	9.9.2(n)	Amount charged to recover the cost of Load Following (Upwards LFAS, Downwards LFAS, Backup Upwards LFAS and Backup Downwards LFAS) for Market Participant p in Trading Interval i	(211)

Variable	Units	SC	GR	Rule	Description	Ref
LFMC_G_I(i)	$	G	I	9.9.2(n)	Amount charged to recover the cost of Load Following (Upwards LFAS, Downwards LFAS, Backup Upwards LFAS and Backup Downwards LFAS) for Trading Interval i	(212)
LFS_P_M(p, m)		P	M	3.14.1	Load Following share for Market Participant p in Trading Month m	(218)
LFCQ_P_M(p, m)	MWh	P	M	3.14.1(a)	Load following contributing quantity for Market Participant p in Trading Month m	(71)
LFCQ_G_M(m)	MWh	G	M	3.14.1(b)	Sum of all load following contributing quantities in Trading Month m	(219)
LFSA_G_I(i)	$	G	I	9.9.2(e)	Amount paid for the provision of Load Following (Upwards LFAS, Downwards LFAS, Backup Upwards LFAS and Backup Downwards LFAS) in Trading Interval i	(213)
LFSA_P_I(p, i)	$	P	I	9.9.2(c)	Amount paid for the provision of Load Following (Upwards LFAS, Downwards LFAS, Backup Upwards LFAS and Backup Downwards LFAS) to Market Participant p in Trading Interval i	(190)
ASSF_G_I(i)		G	I	9.9.2(j)	Ancillary Services saving factor for Trading Interval i	(214)
ASCS_G_I(i)	$	G	I	9.9.2(i)	Ancillary Services cost saving achieved from the dual use of plant to provide Spinning Reserve Service and Load Following Service for Trading Interval i	(215)
BP_G_I(i)	$/MWh	G	I	7A.3.10	Balancing Price for Trading Interval i	I
MV_G_I(i)		G	I		Margin value applicable to Trading Interval i	(174)
SRQ_G_I(i)	MW	G	I	9.9.2(f)	Ancillary Services Requirement for Spinning Reserve in Trading Interval i	(175)
CASSRQ_G_I(i)	MW	G	I	9.9.2(f)	Sum of all quantities of Contracted Spinning Reserve Services in Trading Interval i	(172)
LFPUPQ_G_I(i)	MW	G	I	7.13.1(e)	Sum of any Ex-post Upwards LFAS Enablement quantities in Trading Interval i	(206)
LFBUPQ_G_I(i)	MW	G	I	7.13.1(eA)	Sum of any Backup Upwards LFAS Enablement quantities in Trading Interval i	(207)
SRNoLF_G_I(i)	$	G	I	9.9.2(h)	Assumed total cost of Spinning Reserve if no Spinning Reserve was provided by Load Following Plant in Trading Interval i	(216)
CASSR_G_M(m)	$	G	M	9.9.3(a)	Payment for the provision of contracted Spinning Reserve Services for Trading Month m	(217)

Variable	Units	SC	GR	Rule	Description	Ref
CASSR_P_M(p, m)	$	P	M	9.9.3(a)	Payment for the provision of contracted Spinning Reserve Services for Rule Participant p for Trading Month m	I
TITM_G_M(m)		G	M		Number of Trading Intervals in Trading Month m	(154)
P_M(m)	{}	G	M		Set of participants (Rule Participants and the ERA) in Trading Month m	(1)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.7.10 Spinning Reserve Availability Cost

$$SRAC\_P\_D(p,d) = \sum_{i \in I(d)} SRAC\_P\_I(p,i) \tag{220}$$

$$SRAC\_P\_I(p,i) = SRS\_P\_I(p,i) \times SRAC\_G\_I(i) \tag{221}$$

$$SRAC\_G\_I(i) = UASSR\_G\_I(i) + \frac{CASSR\_G\_M(i)}{TITM\_G\_M(i)} + ASSF\_G\_I(i) \times ASCS\_G\_I(i) \tag{222}$$

$$UASSR\_G\_I(i) = \sum_{p \in P\_M(i)} UASSR\_P\_I(p,i) \tag{223}$$

Variable	Units	SC	GR	Rule	Description	Ref
SRAC_P_D(p, d)	$	P	D	9.9.2(l)	Amount charged to recover the cost of Spinning Reserve Services for Market Participant p in Trading Day d	(220)
SRAC_P_I(p, i)	$	P	I	9.9.2(l)	Amount charged to recover the cost of Spinning Reserve Services for Market Participant p in Trading Interval i	(221)
SRAC_G_I(i)	$	G	I	9.9.2(l)	Amount charged to recover the cost of Spinning Reserve Services for Trading Interval i	(222)
SRS_P_I(p, i)		P	I	Appendix 2 Step 4	The share of Spinning Reserve costs for Market Participant p in Trading Interval i	(236)
UASSR_G_I(i)	$	G	I	9.9.1	Amount paid for un-contracted Spinning Reserve Services for Market Participant p in Trading Interval i	(223)
UASSR_P_I(p, i)	$	P	I	9.9.1	Amount paid for Synergy's provision of un-contracted Spinning Reserve Services for Market Participant p in Trading Interval i	(171)
CASSR_G_M(m)	$	G	M	9.9.3(a)	Payment for the provision of contracted Spinning Reserve Services for Trading Month m	(217)
ASSF_G_I(i)		G	I	9.9.2(j)	Ancillary Services saving factor for Trading Interval i	(214)
ASCS_G_I(i)	$	G	I	9.9.2(i)	Ancillary Services cost saving achieved from the dual use of plant to provide Spinning Reserve Service and Load Following Service for Trading Interval i	(215)

Variable	Units	SC	GR	Rule	Description	Ref
TITM_G_M(m)		G	M		Number of Trading Intervals in Trading Month m	(154)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I
P_M(m)	{}	G	M		Set of participants (Rule Participants and the ERA) in Trading Month m	(1)

4.7.10.1 Spinning Reserve Share

Step 1 - Determine applicable capacity for each applicable facility. Note that this implementation includes those facilities which are exempt from Spinning Reserve costs and then sets their applicable capacity to 0.

$$AC\_F\_I(f,i) = SRSFlag\_F\_I(f,i) \times \frac{SRSOMS\_F\_I(f,i)}{0.5h} \tag{224}$$

$$SRSFlag\_F\_I(f,i) = SRsynchFlag\_F\_I(f,i) \times SR10Flag\_F\_I(f,i) \times SRpayableFlag\_F\_I(f,i) \tag{225}$$

$$SRpayableFlag\_F\_I(f,i) = \begin{cases} 0 & \text{for } SRexemptFlag\_F\_D(f,i) = 1 \\ 1 & \text{otherwise} \end{cases} \tag{226}$$

$$SR10Flag\_F\_I(f,i) = \begin{cases} 1 & \frac{SRSOMS\_F\_I(f,i)}{0.5h} > 10MW \\ 0 & \frac{SRSOMS\_F\_I(f,i)}{0.5h} \leq 10MW \end{cases} \tag{227}$$

$$SRSOMS\_F\_I(f,i) = \begin{cases} SOMS\_N\_I(f,i) & \text{where } f \in SGpreAGG(i) \cup \left(SG(i) \cap \overline{AGG(i)} \cap \overline{EG(i)}\right) \\ SOMSAV\_F\_M(f,i) & \text{where } f \in IG(i) \\ SCADA\_F\_I(f,i) & \text{where } f \in EG(i) \cup GEN\_UREG\_L(i) \\ 0 & \text{otherwise} \end{cases} \tag{228}$$

Step 2 - Order applicable facilities by ascending applicable capacity

$$AF\_G\_I(i) = AF(i) \text{ ordered by ascending } AC\_F\_I(f,i) \tag{229}$$

$$SRrank\_F\_I(f,i) = \text{Position of applicable facility } f \text{ in } AF\_G\_I(i) \tag{230}$$

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

$$AF[SRrank\_F\_I(f,i)] = f \tag{231}$$

Step 3 - Determine Facility Spinning Reserve Share

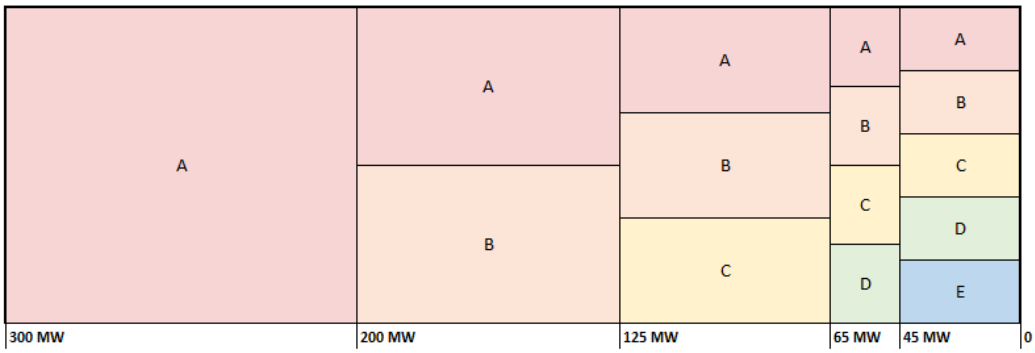
$$FSRS\_F\_I(f,i) = \sum_{r=1}^{SRrank\_F\_I(f,i)} \frac{\left(\frac{AC\_F\_I(AF[r],i) - AC\_F\_I(AF[r-1],i)}{MAXAC\_G\_I(i)}\right)}{MAXr\_G\_I(i) - r + 1} \tag{232}$$

$$AC\_F\_I(AF[0],i) = 0 \tag{233}$$

$$MAXr\_G\_I(i) = |AF\_G\_I(i)| \tag{234}$$

$$MAXAC\_G\_I(i) = AC\_F\_I(AF[MAXr\_G\_I(i)],i) \tag{235}$$

The image below is to assist in visualising the calculation of FSRS_F_I(f, i). Each applicable facility is represented by a letter, and the facility share is visually represented as the area of the 'runway'.



r	5	4	3	2	1
AC_F_I(AF[r]) - AC_F_I(AF[r-1])	100 MW	75 MW	60 MW	20 MW	45 MW
MAXAC_G_I	300 MW	300 MW	300 MW	300 MW	300 MW
	33%	25%	20%	7%	15%
MAXr_G_I	5	5	5	5	5
MAXr_G_I - r + 1	1	2	3	4	5
	33%	13%	7%	2%	3%
FSRS_F_I(f)	57%	24%	11%	5%	3%

Step 4 - Determine participant Spinning Reserve share

$$SRS\_P\_I(p,i) = \sum_{f \in AF(p,i)} FSRS\_F\_I(f,i) \tag{236}$$

Variable	Units	SC	GR	Rule	Description	Ref
SRS_P_I(p, i)		P	I	Appendix 2 Step 4	The share of Spinning Reserve costs for Market Participant p in Trading Interval i	(236)
FSRS_F_I(f, i)		F	I	Appendix 2 Step 3	The share of Spinning Reserve costs for Facility f in Trading Interval i	(232)
MAXr_G_I(i)		G	I		The number of applicable facilities in Trading Interval i	(234)
MAXAC_G_I(i)	MW	G	I		The largest applicable capacity in Trading Interval i	(235)
AF_G_I(i)	{}	G	I	Appendix 2 Step 2	Ordered set of applicable facilities in Trading Interval i (ordered by ascending applicable capacity)	(229)
AF[r]		G	I		The r-th element of the set $AF\_G\_I(i)$	(231)
AF(d)	{}	G	D	Appendix 2	Set of applicable facilities (including any exempt under 2.30A.2) in Trading Day d	(36)
AC_F_I(f, i)	MW	F	I	Appendix 2 Step 1	Applicable capacity for applicable facility f in Trading Interval i	(224) & (233)
SRrank_F_I(f, i)		F	I		The element number of applicable facility f in AF_G_I(i), where 1 is the applicable facility with the lowest applicable capacity.	(230)
SRSFlag_F_I(f, i)	Flag	F	I		Flag used to set the applicable capacity for applicable facility f in Trading Interval i to 0, when required	(225)
SRsynchFlag_F_I(f, i)	Flag	F	I	Appendix 2 Step 1 1.	Flag that is 1 when applicable facility f is synchronised to the SWIS in Trading Interval i	I

Variable	Units	SC	GR	Rule	Description	Ref
SR10Flag_F_I(f, i)	Flag	F	I	Appendix 2 Step 1 2.	Flag that is 1 when applicable facility f sent power out at an average rate greater than 10MW over Trading Interval i	(227)
SRpayableFlag_F_I(f, i)	Flag	F	I		Flag that is 1 when the Facility associated with applicable facility f is required to fund Spinning Reserve in Trading Interval i	(226)
SRexemptFlag_F_D(f, d)	Flag	F	D	2.30A.2	Flag that is 1 when the Facility associated with applicable facility f is exempt from funding Spinning Reserve in Trading Day d	I
SRSOMS_F_I(f, i)	MWh	F	I		Sent Out Metered Scheduled used when determining applicable capacity for connection point n in Trading Interval i	(228)
SOMS_N_I(f, i)	MWh	F	I		Sent Out Metered Schedule for applicable facility f in Trading Interval i	(44)
SCADA_F_I(f, i)	MWh	F	I		Net generation measured by SCADA for Facility f in Trading Interval i, non-loss adjusted	I
SOMSAV_F_M(f, m)	MWh	F	M		Average Sent Out Metered Schedule for Facility f in Trading Month m	(72)
SGpreAGG(d)	{}	G	D	2.30	Set of Facilities which comprise an aggregated Scheduled Generator on Trading Day d	(39)
SG(d)	{}	G	D	11	Set of Scheduled Generators in Trading Day d	(17)
IG(d)	{}	G	D	11	Set of Intermittent Generators in Trading Day d	(29)
AGG(d)	{}	G	D	2.30	Set of accepted aggregated Facilities in Trading Day d	(38)
EG(d)	{}	G	D	2.30B.2(a)	Set of Scheduled Generators that serve an Intermittent Load locally in Trading Day d	(31)
GEN_UREG_L(d)	{}	G	D		Set of unregistered generation system serving an Intermittent Load in Trading Day d	(37)

4.7.11 Load Rejection, System Restart and un-contracted Dispatch Support Services Costs

$$COSTLR\_P\_D(p,d) = \sum_{i \in I(d)} COSTLR\_P\_I(p,i) \tag{237}$$

$$COSTLR\_P\_I(p,i) = CS\_P\_M(p,i) \times \frac{COSTLR\_G\_M(i)}{TITM\_G\_M(i)} \tag{238}$$

$$CS\_P\_M(p,m) = \frac{CQ\_P\_M(p,m)}{CQ\_G\_M(m)} \tag{239}$$

$$CQ\_G\_M(m) = \sum_{p \in P\_M(m)} CQ\_P\_M(p,m) \tag{240}$$

Variable	Units	SC	GR	Rule	Description	Ref
COSTLR_P_D(p, d)	$	P	D	9.9.1	Amount charged to recover the cost of Load Rejection Service and System Restart Service for Market Participant p in Trading Day d	(237)
COSTLR_P_I(p, i)	$	P	I	9.9.1	Amount charged to recover the cost of Load Rejection Service and System Restart Service for Market Participant p in Trading Interval i	(238)
CS_P_M(p, m)		P	M	9.3.7	Consumption share for Market Participant p in Trading Month m	(239)
CQ_P_M(p, m)	MWh	P	M	9.3.7(a)	Contributing quantity for Market Participant p in Trading Month m	(70)
CQ_G_M(m)	MWh	G	M	9.3.7(b)	Sum of all contributing quantities in Trading Month m	(240)
COSTLR_G_M(m)	$	G	M	3.22.1(g)i	The monthly equivalent of the amount determined by the ERA to cover the costs of Load Rejection and System Restart Services, and un-contracted Dispatch Support Services for Trading Month m	(153)
TITM_G_M(m)		G	M		Number of Trading Intervals in Trading Month m	(154)
P_M(m)	{}	G	M		Set of participants (Rule Participants and the ERA) in Trading Month m	(1)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.7.12 Contracted Dispatch Support Costs

$$COSTD\_P\_D(p,d) = \sum_{i \in I(d)} COSTD\_P\_I(p,i) \tag{241}$$

$$COSTD\_P\_I(p,i) = CS\_P\_M(p,i) \times \frac{CASD\_G\_M(i)}{TITM\_G\_M(i)} \tag{242}$$

$$CASD\_G\_M(m) = \sum_{p \in P\_M(m)} CASD\_P\_M(p,m) \tag{243}$$

Variable	Units	SC	GR	Rule	Description	Ref
COSTD_P_D(p, d)	$	P	D	9.9.1	Amount charged to recover the cost of Dispatch Support Services for Market Participant p in Trading Day d	(241)
COSTD_P_I(p, i)	$	P	I	9.9.1	Amount charged to recover the cost of Dispatch Support Services for Market Participant p in Trading Interval i	(242)
CS_P_M(p, m)		P	M	9.3.7	Consumption share for Market Participant p in Trading Month m	(239)
CASD_G_M(m)	$	G	M	3.22.1(g)ii	The monthly amount for Dispatch Support Services for Trading Month m	(243)
CASD_P_M(p, m)	$	P	M	9.9.3(e)	Payment for the provision of contracted Dispatch Support Services for Rule Participant p for Trading Month m	I

Variable	Units	SC	GR	Rule	Description	Ref
TITM_G_M(m)		G	M		Number of Trading Intervals in Trading Month m	(154)
P_M(m)	{}	G	M		Set of participants (Rule Participants and the ERA) in Trading Month m	(1)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.8 Reserve Capacity

Reserve Capacity is split into 12 parts:

- Capacity Payments - Payment to Market Participants for unallocated Capacity Credits (not SPA and not DSM).
- DSM Capacity Payments - Payment to Market Participants for DSM Capacity Credits.
- SPA Capacity Payments - Payments to Market Participants for Special Price Arrangement 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.
- T2 DSM Dispatch Payments - Payments to Market Participants for the dispatch of a DSP.
- 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.
- Capacity Rebate - Payment to Market Participants redistributing the Capacity Refunds.
- Load Following Capacity Rebate - Payment to Market Participants to return Capacity charges relating to the Load Following Requirement (as these are paid through another equation).

These equations are based on the equations stated in MR 9.7. They have been modified to attribute a monthly calculation to an interval calculation and then aggregate to a Trading Day. They have also been altered so that payments are represented as positive values and charges negative values. If the calculations were aggregated to a Trading Month they would be mathematically equivalent to the equations detailed in the rules.

$$RCSA\_P\_D(p,d) = CPP\_P\_D(p,d) - CPC\_P\_D(p,d) \tag{244}$$

$$\begin{aligned} CPP\_P\_D(p,d) = {} & CAPREBSA\_P\_D(p,d) + GCCSA\_P\_D(p,d) + SPACCSA\_P\_D(p,d) \\ & - IMLR\_P\_D(p,d) + SUPCAPSA\_P\_D(p,d) + DSMCCSA\_P\_D(p,d) \\ & + DIPT2\_P\_D(p,d) - CCR\_P\_D(p,d) + CCAOASA\_P\_D(p,d) \end{aligned} \tag{245}$$

$$CPC\_P\_D(p,d) = TRCC\_P\_D(p,d) + SRCC\_P\_D(p,d) - LFREBATE\_P\_D(p,d) \tag{246}$$

Variable	Units	SC	GR	Rule	Description	Ref
RCSA_P_D(p, d)	$	P	D	9.7.1	Reserve Capacity settlement amount for Market Participant p in Trading Day d	(244)
CPP_P_D(p, d)	$	P	D	9.7.1A	Capacity Provider Payment for Market Participant p in Trading Day d	(245)

Variable	Units	SC	GR	Rule	Description	Ref
CPC_P_D(p, d)	$	P	D	9.7.1B	Capacity Purchaser Charge for Market Participant p in Trading Day d	(246)
CAPREBSA_P_D(p, d)	$	P	D	4.26.4	Participant Capacity Rebate (whereby Capacity Cost Refunds are redistributed) for Market Participant p in Trading Day d	(354)
GCCSA_P_D(p, d)	$	P	D	9.7.1A	Payment for non-allocated Capacity Credits (excluding DSM and SPA) for Market Participant p in Trading Day d	(247)
SPACCSA_P_D(p, d)	$	P	D	9.7.1A	Payment for SPA Capacity Credits for Market Participant p in Trading Day d	(255)
IMLR_P_D(p, d)	$	P	D	4.28A.1	Intermittent Load Refunds for Market Participant p in Trading Day d	(352)
SUPCAPSA_P_D(p, d)	$	P	D	9.7.1	Payment to be made under Supplementary Capacity Contracts to Market Participant p in Trading Day d	(263)
DSMCCSA_P_D(p, d)	$	P	D	9.7.1A	Payment for DSM Capacity Credits for Market Participant p in Trading Day d	(250)
DIPT2_P_D(p, d)	$	P	D	6.17.6C(b)	Tranche 2 DSM Dispatch Payments for Market Participant p in Trading Day d	(266)
CCR_P_D(p, d)	$	P	D	4.26.2E	Capacity Cost Refund charged to Market Participant p in Trading Day d	(300)
CCAOASA_P_D(p, d)	$	P	D	9.7.1A	Capacity Credit Allocation over-allocation Payment (when Capacity Credit Allocations exceed IRCR) for Market Participant p in Trading Day d	(260)
TRCC_P_D(p, d)	$	P	D	9.7.1B	Charge to cover the Targeted Reserve Capacity Cost for Market Participant p in Trading Day d	(276)
SRCC_P_D(p, d)	$	P	D	9.7.1B	Charge to cover the Shared Reserve Capacity Cost for Market Participant p in Trading Day d	(289)
LFREBATE_P_D(p, d)	$	P	D	9.7.1B	Payment returning cost of Capacity associated with Load Following, for Market Participant p in Trading Day d	(366)

4.8.1 Capacity Payments

$$GCCSA\_P\_D(p,d) = \sum_{i \in I(d)} GCCSA\_P\_I(p,i) \tag{247}$$

$$GCCSA\_P\_I(p,i) = RCP\_G\_I(i) \times (GCC\_P\_D(p,i) - CCAM\_P\_M(p,i)) \tag{248}$$

$$GCC\_P\_D(p,d) = \sum_{f \in CCF(p,d) \cap \overline{DSP(d)}} CC\_F\_D(f,d) \tag{249}$$

Variable	Units	SC	GR	Rule	Description	Ref
GCCSA_P_D(p, d)	$	P	D	9.7.1A	Payment for non-allocated Capacity Credits (excluding DSM and SPA) for Market Participant p in Trading Day d	(247)
GCCSA_P_I(p, i)	$	P	I	9.7.1A	Payment for non-allocated Capacity Credits (excluding DSM and SPA) for Market Participant p in Trading Interval i	(248)
RCP_G_I(i)	$/MW	G	I		Interval Reserve Capacity Price for Trading Interval i	(204)
GCC_P_D(p, d)	MW	P	D	9.7.1A	Number of Capacity Credits (excluding DSM and SPA) held by Market Participant p on Trading Day d	(249)
CC_F_D(f, d)	MW	F	D	11	Non-SPA Capacity Credits associated with Facility f on Trading Day d	I
CCAM_P_M(p, m)	MW	P	M		Number of Capacity Credits allocated by Market Participant p to another Market Participant in Trading Month m	I
CCF(d)	{}	G	D		Set of Facilities with Capacity Credits on Trading Day d	I
DSP(d)	{}	G	D	11	Set of Demand Side Programmes in Trading Day d	(15)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.8.2 DSM Capacity Payments

This implementation appears slightly inconsistent with the rule stated in 9.7.1A as it includes the term $DSPVRR\_F\_I$. This term relates to a refund outlined in clause 4.25.4E. The rules do not state where this refund should be included in 9.7.1A, and therefore AEMO has included it within this term. The rules are explicit in defining a Demand Side Programme Capacity Cost Refund, which does not include the refund outlined in 4.25.4E. Similarly, the rules are explicit in defining what refunds are distributed as a Participant Capacity Rebate which again do not include the $DSPVRR\_F\_I$ refund. Implementing this refund here, allows AEMO to maintain the zero-sum nature of the settlement equations by returning the refund in the calculation of the Shared Reserve Capacity Cost.

$$DSMCCSA\_P\_D(p,d) = \sum_{i \in I(d)} DSMCCSA\_P\_I(p,i) \tag{250}$$

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

$$DSMCCSA\_F\_I(f,i) = \begin{cases} DSMRCP\_G\_I(i) \times CC\_F\_D(f,i) - DSPVRR\_F\_I(f,i) & \text{for } f \in DSP(i) \\ 0 & \text{for } f \notin DSP(i) \end{cases} \tag{252}$$

$$DSMRCP\_G\_I(i) = \frac{DSMRCP\_G\_M(i)}{TITM\_G\_M(i)} \tag{253}$$

$$DSMRCP\_G\_M(m) = \frac{DSMRCP\_G\_CY(m)}{12} \tag{254}$$

Variable	Units	SC	GR	Rule	Description	Ref
DSMCCSA_P_D(p, d)	$	P	D	9.7.1A	Payment for DSM Capacity Credits for Market Participant p in Trading Day d	(250)

Variable	Units	SC	GR	Rule	Description	Ref
DSMCCSA_P_I(p, i)	$	P	I	9.7.1A	Payment for DSM Capacity Credits for Market Participant p in Trading Interval i	(251)
DSMCCSA_F_I(f, i)	$	F	I		Payment for DSM Capacity Credits for Facility f in Trading Interval i	(252)
DSPVRR_F_I(f, i)	$	F	I	4.25.4E	Refund payable related to the voluntary reduction of Capacity Credits for Facility f in Trading Interval i	(341)
DSMRCP_G_I(i)	$/MW	G	I		Interval DSM Reserve Capacity Price for Trading Interval i	(253)
DSMRCP_G_M(m)	$/MW	G	M		Monthly DSM Reserve Capacity Price for Trading Month m	(254)
DSMRCP_G_CY(cy)	$/MW	G	CY	11	DSM Reserve Capacity Price for Capacity Year cy	I
TITM_G_M(m)		G	M		Number of Trading Intervals in Trading Month m	(154)
CC_F_D(f, d)	MW	F	D	11	Non-SPA Capacity Credits associated with Facility f on Trading Day d	I
DSP(d)	{}	G	D	11	Set of Demand Side Programmes in Trading Day d	(15)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.8.3 SPA Capacity Payments

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

$$SPACCSA\_P\_I(p,i) = \sum_{f \in CCF(p,i)} SPACCSA\_F\_I(f,i) \tag{256}$$

$$SPACCSA\_F\_I(f,i) = SPACC\_F\_D(f,i) \times SPARCP\_F\_I(f,i) \tag{257}$$

$$SPARCP\_F\_I(f,i) = \frac{SPARCP\_F\_M(f,i)}{TITM\_G\_M(i)} \tag{258}$$

$$SPARCP\_F\_M(f,m) = \frac{SPARCP\_F\_CY(f,m)}{12} \tag{259}$$

Variable	Units	SC	GR	Rule	Description	Ref
SPACCSA_P_D(p, d)	$	P	D	9.7.1A	Payment for SPA Capacity Credits for Market Participant p in Trading Day d	(255)
SPACCSA_P_I(p, i)	$	P	I	9.7.1A	Payment for SPA Capacity Credits for Market Participant p in Trading Interval i	(256)
SPACCSA_F_I(f, i)	$	F	I		Payment for SPA Capacity Credits for Facility f in Trading Interval i	(257)
SPACC_F_D(f, d)	MW	F	D		Number of Capacity Credits subject to Special Price Arrangement with Facility f in Trading Day d	I
SPARCP_F_I(f, i)	$/MW	F	I		Interval Special Reserve Capacity Price for Special Price Arrangement associated with Facility f in Trading Interval i	(258)

Variable	Units	SC	GR	Rule	Description	Ref
SPARCP_F_M(f, m)	$/MW	F	M		Monthly Special Reserve Capacity Price for Special Price Arrangement with Facility f in Trading Month m	(259)
SPARCP_F_CY(f, cy)	$/MW	F	CY		Special Reserve Capacity Price for Special Price Arrangement with Facility f in Capacity Year cy	I
TITM_G_M(m)		G	M		Number of Trading Intervals in Trading Month m	(154)
CCF(d)	{}	G	D		Set of Facilities with Capacity Credits on Trading Day d	I
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.8.4 Capacity Credit Over-Allocations Payment

$$CCAOASA\_P\_D(p,d) = \sum_{i \in I(d)} CCAOASA\_P\_I(p,i) \tag{260}$$

$$CCAOASA\_P\_I(p,i) = CCAOA\_P\_M(p,i) \times RCP\_G\_I(i) \tag{261}$$

$$CCAOA\_P\_M(p,m) = max(0, CCAR\_P\_M(p,m) - IRCR\_P\_M(p,m)) \tag{262}$$

Variable	Units	SC	GR	Rule	Description	Ref
CCAOASA_P_D(p, d)	$	P	D	9.7.1A	Capacity Credit Allocation over-allocation Payment (when Capacity Credit Allocations exceed IRCR) for Market Participant p in Trading Day d	(260)
CCAOASA_P_I(p, i)	$	P	I	9.7.1A	Capacity Credit Allocation over-allocation Payment (when Capacity Credit Allocations exceed IRCR) for Market Participant p in Trading Interval i	(261)
CCAOA_P_M(p, m)	MW	P	M		Number of Capacity Credit Allocations received by Market Participant p in excess of its IRCR for Trading Month m	(262)
IRCR_P_M(p, m)	MW	P	M	4.28.7, 4.28.11A	Individual Reserve Capacity Requirement for Market Participant p for Trading Month m	I
CCAR_P_M(p, m)	MW	P	M		Number of Capacity Credits received by Market Participant p through Capacity Credit Allocations in Trading Month m	I
RCP_G_I(i)	$/MW	G	I		Interval Reserve Capacity Price for Trading Interval i	(204)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.8.5 Supplementary Capacity Payments

$$SUPCAPSA\_P\_D(p,d) = \sum_{i \in I(d)} SUPCAPSA\_P\_I(p,i) \tag{263}$$

$$SUPCAPSA\_P\_I(p,i) = \sum_{c \in SUP(p,i)} SUPCAPSA\_C\_I(c,i) \tag{264}$$

$$SUPCAPSA\_C\_I(c,i) = \frac{SUPCAPSA\_C\_M(c,i)}{TITM\_G\_M(i)} \tag{265}$$

Variable	Units	SC	GR	Rule	Description	Ref
SUPCAPSA_P_D(p, d)	$	P	D	9.7.1	Payment to be made under Supplementary Capacity Contracts to Market Participant p in Trading Day d	(263)
SUPCAPSA_P_I(p, i)	$	P	I	9.7.1	Payment to be made under Supplementary Capacity Contracts to Market Participant p in Trading Interval i	(264)
SUPCAPSA_C_M(c, m)	$	C	M	4.29.3(e)i	Payment to be made under Supplementary Capacity Contract c in Trading Month m	I
SUPCAPSA_C_I(c, i)	$	C	I		Payment to be made under Supplementary Capacity Contract c in Trading Interval i	(265)
TITM_G_M(m)		G	M		Number of Trading Intervals in Trading Month m	(154)
SUP(m)	{}	G	M		Set of Supplementary Capacity contracts in Trading Month m	I
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.8.6 T2 DSM Dispatch Payments

$$DIPT2\_P\_D(p,d) = \sum_{i \in I(d)} DIPT2\_P\_I(p,i) \tag{266}$$

$$DIPT2\_P\_I(p,i) = \sum_{f \in DSP(p,i)} DIPT2\_F\_I(f,i) \tag{267}$$

$$DIPT2\_F\_I(f,i) = \begin{cases} 0 & \text{for } CADSMD\_F\_I(f,i) \leq CDSPQ\_F\_CY(f,i) \\ 0 & \text{for } CDIP\_F\_I(f,i) \geq T2CAP\_F\_D(f,i) \\ DDSMD\_F\_I(f,i) \times ECDP\_F\_I(f,i) & \text{otherwise} \end{cases} \tag{268}$$

$$CADSMD\_F\_I(f,i) = \sum_{j \in PI(i)} DDSMD\_F\_I(f,j) \tag{269}$$

$$DDSMD\_F\_I(f,i) = min\left(0.5h \times CC\_F\_D(f,i), DI\_F\_I(f,i), max\left(0, 0.5h \times RD\_F\_D(f,i) - (DSPL\_F\_I(f,i) + FDSMCD\_F\_I(f,i))\right)\right) \tag{270}$$

$$ECDP\_F\_I(f,i) = \begin{cases} ECDPPK\_F\_D(f,i) & \text{for } PKTI\_G\_I(i) = 1 \\ ECDPOP\_F\_D(f,i) & \text{otherwise} \end{cases} \tag{271}$$

$$FDSMCD\_F\_I(f,i) = OINCS\_F\_I(f,i) + OIAS\_F\_I(f,i) + OIT\_F\_I(f,i) + OISC\_F\_I(f,i) \tag{272}$$

$$T2CAP\_F\_D(f,d) = CC\_F\_D(f,d) \times RCP\_G\_CY(d) - MAXFR\_F\_CY(f,d) \tag{273}$$

$$CDIP\_F\_I(f,i) = \sum_{j \in PI(i)} DIP\_F\_I(f,j) \tag{274}$$

$$DIP\_F\_I(f,i) = DIPT2\_F\_I(f,i) + DIPT3\_F\_I(f,i) \tag{275}$$

Variable	Units	SC	GR	Rule	Description	Ref
DIPT2_P_D(p, d)	$	P	D	6.17.6C(b)	Tranche 2 DSM Dispatch Payments for Market Participant p in Trading Day d	(266)
DIPT2_P_I(p, i)	$	P	I	6.17.6C(b)	Tranche 2 DSM Dispatch Payments for Market Participant p in Trading Interval i	(267)
DIPT2_F_I(f, i)	$	F	I	6.17.6C(b)	Tranche 2 DSM Dispatch Payments for Facility f in Trading Interval i	(268)
DIPT3_F_I(f, i)	$	F	I	6.17.6C(c)	Tranche 3 DSM Dispatch Payments for Facility f in Trading Interval i	(145)
DIP_F_I(f, i)	$	F	I	6.17.6	Non-Balancing Facility Dispatch Instruction Payment associated with Facility f in Trading Interval i	(275)
CDIP_F_I(f, i)	$	F	I	6.17.6	Sum of Non-Balancing Facility Dispatch Instruction Payments associated with Facility f in Trading Intervals in the same Capacity Year as, but prior to, Trading Interval i	(274)
CADSMD_F_I(f, i)	MWh	F	I	11	Cumulative Annual DSM Dispatch for Facility f for Trading Intervals prior to Trading Interval i	(269)
DDSMD_F_I(f, i)	MWh	F	I	11	Deemed DSM Dispatch for Facility f in Trading Interval i	(270)
ECDP_F_I(f, i)	$/MWh	F	I	11	Extra Consumption Decrease Price for Facility f in Trading Interval i	(271)
ECDPPK_F_D(f, d)	$/MWh	F	D	Appendix 1 (h)vi.3	Extra Consumption Decrease Price for Peak Trading Intervals for Facility f for Trading Day d	I
ECDPOP_F_D(f, d)	$/MWh	F	D	Appendix 1 (h)vi.4	Extra Consumption Decrease Price for Off-Peak Trading Intervals for Facility f for Trading Day d	I
PKTI_G_I(i)	Flag	G	I	11	Flag which is 1 if Trading Interval i is a Peak Trading Interval and 0 otherwise	(176)
CC_F_D(f, d)	MW	F	D	11	Non-SPA Capacity Credits associated with Facility f on Trading Day d	I
RCP_G_CY(cy)	$/MW	G	CY	11	Reserve Capacity Price for Capacity Year cy	I
CDSPQ_F_CY(f, cy)	MWh	F	CY	11	Calculated DSP Quantity for Facility f for Capacity Year cy	I
DSPL_F_I(f, i)	MWh	F	I	6.16.2	Demand Side Programme Load for Facility f in Trading Interval i	(67)
RD_F_D(f, d)	MW	F	D	4.26.2CA	Relevant Demand of Facility f in Trading Day d	I
DI_F_I(f, i)	MWh	F	I	7.13.1(eG)	Dispatch Instruction for Facility f in Trading Interval i	I

Variable	Units	SC	GR	Rule	Description	Ref
OINCS_F_I(f, i)	MWh	F	I	11	Operating Instruction for Facility f to meet the requirements of a Network Control Service Contract in Trading Interval i	I
OIAS_F_I(f, i)	MWh	F	I	11	Operating Instruction for Facility f to meet the requirements of an Ancillary Service Contract in Trading Interval i	I
OIT_F_I(f, i)	MWh	F	I	11	Operating Instruction for Facility f to meet the requirements of a Test under the Market Rules in Trading Interval i	I
OISC_F_I(f, i)	MWh	F	I	11	Operating Instruction for Facility f to meet the requirements of a Supplementary Capacity Contract in Trading Interval i	I
FDSMCD_F_I(f, i)	MWh	F	I	6.17.6D(d)	Further DSM Consumption Decrease for Facility f in Trading Interval i	(272)
MAXFR_F_CY(f, cy)	$	F	CY	11	Maximum Facility Refund for Facility f in Capacity Year cy	(311)
T2CAP_F_D(f, d)	$	F	D		Upper limit of Tranche 2 DSM Dispatch Payments for Facility f in Trading Day d	(273)
DSP(d)	{}	G	D	11	Set of Demand Side Programmes in Trading Day d	(15)
PI(i)	{}	G	I		Set of Trading Intervals in the same Capacity Year as, but prior to, Trading Interval i	I
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.8.7 TRCC Charges

$$TRCC\_P\_D(p,d) = \sum_{i \in I(d)} TRCC\_P\_I(p,i) \tag{276}$$

$$TRCC\_P\_I(p,i) = SS\_P\_M(p,i) \times TRCC\_G\_I(i) \tag{277}$$

$$SS\_P\_M(p,m) = \frac{CCASF\_P\_M(p,m)}{CCASF\_G\_M(m)} \tag{278}$$

$$CCASF\_G\_M(m) = \sum_{p \in P\_M(m)} CCASF\_P\_M(p,m) \tag{279}$$

$$CCASF\_P\_M(p,m) = max(0, IRCR\_P\_M(p,m) - CCAR\_P\_M(p,m)) \tag{280}$$

$$TRCC\_G\_I(i) = \sum_{t \in CC(i)}^{\sum CCQ\_T\_D(t,i) = TRCCQ\_G\_D(i)} CCP\_T\_I(t,i) \times CCQ\_T\_D(t,i) \tag{281}$$

$$CCP\_T\_I(t,i) = \begin{cases} SPARCP\_F\_I(f,i) & \text{for } t \text{ associated with a SPA CC for facility f} \\ RCP\_G\_I(i) & \text{otherwise} \end{cases} \tag{282}$$

$$CCQ\_T\_D(t,d) = \begin{cases} SPACC\_F\_D(f,d) & \text{for } t \text{ associated with a SPA CC for facility f} \\ CC\_F\_D(f,d) & \text{otherwise} \end{cases} \tag{283}$$

$$TRCCQ\_G\_D(d) = min(RCR\_G\_CY(d), GCC\_G\_D(d) + SPACC\_G\_D(d)) - (CCAR\_G\_M(d) - CCAOA\_G\_M(d)) \quad (284)$$

$$SPACC\_G\_D(d) = \sum_{f \in CCF(d)} SPACC\_F\_D(f, d) \quad (285)$$

$$GCC\_G\_D(d) = \sum_{p \in P\_M(d)} GCC\_P\_D(p, d) \quad (286)$$

$$CCAR\_G\_M(m) = \sum_{p \in P\_M(m)} CCAR\_P\_M(p, m) \quad (287)$$

$$CCAOA\_G\_M(m) = \sum_{p \in P\_M(m)} CCAOA\_P\_M(p, m) \quad (288)$$

Variable	Units	SC	GR	Rule	Description	Ref
TRCC_P_D(p, d)	$	P	D	9.7.1B	Charge to cover the Targeted Reserve Capacity Cost for Market Participant p in Trading Day d	(276)
TRCC_P_I(p, i)	$	P	I	9.7.1B	Charge to cover the Targeted Reserve Capacity Cost for Market Participant p in Trading Interval i	(277)
TRCC_G_I(i)	$	G	I	4.28.3	Targeted Reserve Capacity Cost in Trading Interval i	(281)
SS_P_M(p, m)		P	M	9.7.1B	Shortfall share for Market Participant p in Trading Month m	(278)
CCASF_G_M(m)	MW	G	M	9.7.1B	The sum of the amount IRCR exceeds Capacity Credit Allocations received by Market Participants in Trading Month m	(279)
CCASF_P_M(p, m)	MW	P	M	9.7.1B	The amount IRCR exceeds Capacity Credit Allocations received by Market Participant p in Trading Month m	(280)
IRCR_P_M(p, m)	MW	P	M	4.28.7, 4.28.11A	Individual Reserve Capacity Requirement for Market Participant p for Trading Month m	I
CCAR_P_M(p, m)	MW	P	M		Number of Capacity Credits received by Market Participant p through Capacity Credit Allocations in Trading Month m	I
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	(284)
CCQ_T_D(t, d)	MW	T	D		Capacity Credits associated with tranche t on Trading Day d	(283)
CC_F_D(f, d)	MW	F	D	11	Non-SPA Capacity Credits associated with Facility f on Trading Day d	I
SPACC_F_D(f, d)	MW	F	D		Number of Capacity Credits subject to Special Price Arrangement with Facility f in Trading Day d	I
CCP_T_I(t, i)	$/MW	T	I		Interval capacity price for tranche t in Trading Interval i	(282)

Variable	Units	SC	GR	Rule	Description	Ref
RCP_G_I(i)	$/MW	G	I		Interval Reserve Capacity Price for Trading Interval i	(204)
SPARCP_F_I(f, i)	$/MW	F	I		Interval Special Reserve Capacity Price for Special Price Arrangement associated with Facility f in Trading Interval i	(258)
RCR_G_CY(cy)	MW	G	CY	4.6.1	Reserve Capacity Requirement for Capacity Year cy	I
GCC_G_D(d)	MW	G	D	9.7.1A	Number of Capacity Credits (excluding DSM and SPA) on Trading Day d	(286)
GCC_P_D(p, d)	MW	P	D	9.7.1A	Number of Capacity Credits (excluding DSM and SPA) held by Market Participant p on Trading Day d	(249)
SPACC_G_D(d)	MW	G	D		Number of Capacity Credits subject to a Special Price Arrangement in Trading Day d	(285)
CCAR_G_M(m)	MW	G	M		Number of Capacity Credits allocated in Trading Month m	(287)
CCAOA_G_M(m)	MW	G	M		Sum of Capacity Credit Allocations received in excess of a Market Participant's IRCR for Trading Month m	(288)
CCAOA_P_M(p, m)	MW	P	M		Number of Capacity Credit Allocations received by Market Participant p in excess of its IRCR for Trading Month m	(262)
CC(d)	{}	G	D		Ordered set of all price-quantity pairs (to 0.001MW granularity) associated with Capacity Credits (excluding DSM, including SPA) for Trading Day d (ordered by ascending price)	I
CCF(d)	{}	G	D		Set of Facilities with Capacity Credits on Trading Day d	I
P_M(m)	{}	G	M		Set of participants (Rule Participants and the ERA) in Trading Month m	(1)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.8.8 SRCC Charges

$$SRCC\_P\_D(p,d) = \sum_{i \in I(d)} SRCC\_P\_I(p,i) \tag{289}$$

$$SRCC\_P\_I(p,i) = IRCRS\_P\_M(p,i) \times SRCC\_G\_I(i) \tag{290}$$

$$SRCC\_G\_I(i) = ECCSA\_G\_I(i) + SUPCAPSA\_G\_I(i) + DIPT2\_G\_I(i) - IMLR\_G\_I(i) - RCSW\_G\_I(i) \tag{291}$$

$$ECCSA\_G\_I(i) = (GCCSA\_G\_I(i) + DSMCCSA\_G\_I(i) + SPACCSA\_G\_I(i)) - TRCC\_G\_I(i) \tag{292}$$

$$SUPCAPSA\_G\_I(i) = \sum_{p \in P\_M(i)} SUPCAPSA\_P\_I(p,i) \tag{293}$$

$$DIPT2\_G\_I(i) = \sum_{p \in P\_M(i)} DIPT2\_P\_I(p,i) \quad (294)$$

$$IMLR\_G\_I(i) = \sum_{p \in P\_M(i)} IMLR\_P\_I(p,i) \quad (295)$$

$$DSMCCSA\_G\_I(i) = \sum_{p \in P\_M(i)} DSMCCSA\_P\_I(p,i) \quad (296)$$

$$GCCSA\_G\_I(i) = \sum_{p \in P\_M(i)} GCCSA\_P\_I(p,i) \quad (297)$$

$$SPACCSA\_G\_I(i) = \sum_{p \in P\_M(i)} SPACCSA\_P\_I(p,i) \quad (298)$$

$$RCSW\_G\_I(i) = \frac{RCSW\_G\_M(i)}{TITM\_G\_M(i)} \quad (299)$$

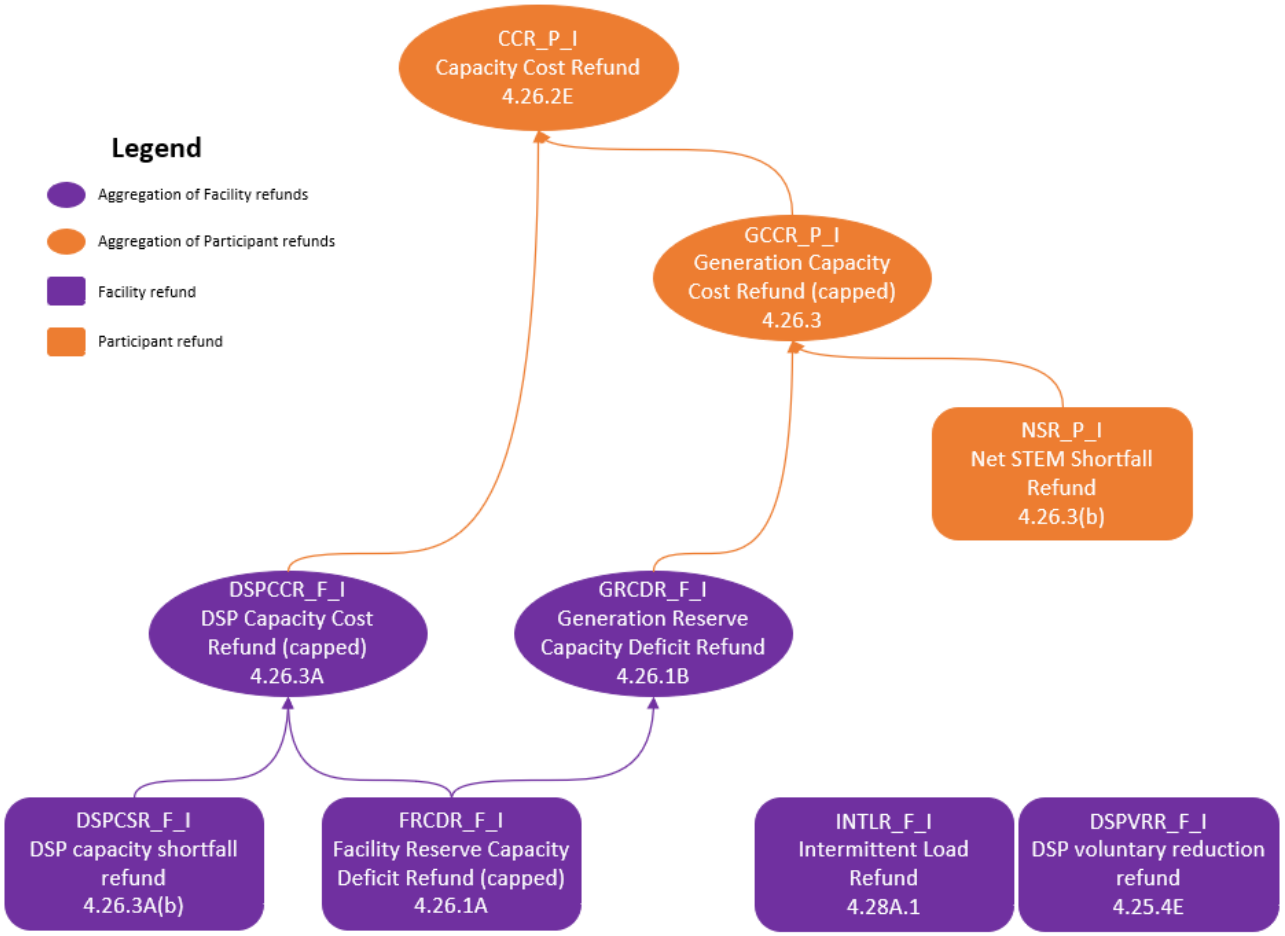
Variable	Units	SC	GR	Rule	Description	Ref
SRCC_P_D(p, d)	$	P	D	9.7.1B	Charge to cover the Shared Reserve Capacity Cost for Market Participant p in Trading Day d	(289)
SRCC_P_I(p, i)	$	P	I	9.7.1B	Charge to cover the Shared Reserve Capacity Cost for Market Participant p in Trading Interval i	(290)
SRCC_G_I(i)	$	G	I	4.28.4	Shared Reserve Capacity Cost for Trading Interval i	(291)
ECCSA_G_I(i)	$	G	I	4.28.4(a)	Payments made for Capacity Credits in excess of the Reserve Capacity Requirement for Trading Interval i	(292)
IRCRS_P_M(p, m)		P	M	9.7.1B	Capacity share for Market Participant p for Trading Month m	(368)
GCCSA_P_I(p, i)	$	P	I	9.7.1A	Payment for non-allocated Capacity Credits (excluding DSM and SPA) for Market Participant p in Trading Interval i	(248)
GCCSA_G_I(i)	$	G	I		Payment for non-allocated Capacity Credits (excluding DSM and SPA) in Trading Interval i	(297)
DSMCCSA_P_I(p, i)	$	P	I	9.7.1A	Payment for DSM Capacity Credits for Market Participant p in Trading Interval i	(251)
DSMCCSA_G_I(i)	$	G	I		Payment for DSM Capacity Credits in Trading Interval i	(296)
SPACCSA_P_I(p, i)	$	P	I	9.7.1A	Payment for SPA Capacity Credits for Market Participant p in Trading Interval i	(256)
SPACCSA_G_I(i)	$	G	I		Payment for SPA Capacity Credits in Trading Interval i	(298)
TRCC_G_I(i)	$	G	I	4.28.3	Targeted Reserve Capacity Cost in Trading Interval i	(281)
SUPCAPSA_P_I(p, i)	$	P	I	9.7.1	Payment to be made under Supplementary Capacity Contracts to Market Participant p in Trading Interval i	(264)

Variable	Units	SC	GR	Rule	Description	Ref
SUPCAPSA_G_I(i)	$	G	I	4.28.4(b)	Payment to be made under Supplementary Capacity Contracts in Trading Interval i	(293)
DIPT2_P_I(p, i)	$	P	I	6.17.6C(b)	Tranche 2 DSM Dispatch Payments for Market Participant p in Trading Interval i	(267)
DIPT2_G_I(i)	$	G	I	4.28.4(bA)	Tranche 2 DSM Dispatch Payments for Trading Interval i	(294)
IMLR_P_I(p, i)	$	P	I	4.28A.1	Intermittent Load Refunds for Market Participant p in Trading Interval i	(353)
IMLR_G_I(i)	$	G	I	4.28.4(c)	Intermittent Load Refunds for Trading Interval i	(295)
RCSW_G_I(i)	$	G	I	4.28.4(b), 4.28.4(d)	Total amount drawn under a Reserve Capacity Security by AEMO for Trading Interval i	(299)
RCSW_G_M(m)	$	G	M	4.28.4(b), 4.28.4(d)	Total amount drawn under a Reserve Capacity Security by AEMO for Trading Month m	I
TITM_G_M(m)		G	M		Number of Trading Intervals in Trading Month m	(154)
P_M(m)	{}	G	M		Set of participants (Rule Participants and the ERA) in Trading Month m	(1)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.8.9 Capacity Cost Refunds

The rules have many defined terms relating to refunds. The drawing below outlines some of these terms/variables and how they relate to each other. The important points to note are:

- Whether the variable relates to the 'lowest-level' refund (shown as rectangles) or whether it is an aggregation of other lower-level refunds (shown as ellipses)
- Whether the variable is capped
- Whether the variable relates to a Facility (shown in purple) or Market Participant (shown in orange)



To assist in understanding this document has grouped most of the refund types into this section; however, the Intermittent Load Refunds and DSP voluntary reduction refunds are aggregated and handled in separate sections as they are returned to a different set of Market Participants than Capacity Cost Refunds.

4.8.9.1 Refund Aggregations

$$CCR\_P\_D(p,d) = \sum_{i \in I(d)} CCR\_P\_I(p,i) \tag{300}$$

$$CCR\_P\_I(p,i) = GCCR\_P\_I(p,i) + DSPCCR\_P\_I(p,i) \tag{301}$$

$$GCCR\_P\_I(p,i) = min(MAXPGR\_P\_CY(p,i) - CGCCR\_P\_I(p,i), GRCDR\_P\_I(p,i) + NSR\_P\_I(p,i)) \tag{302}$$

$$CGCCR\_P\_I(p,i) = \sum_{j \in PI(i)} GCCR\_P\_I(p,j) \tag{303}$$

$$GRCDR\_P\_I(p,i) = \sum_{f \in REG\_F(p,i) \cap \overline{DSP(i)}} GRCDR\_F\_I(f,i) \tag{304}$$

$$GRCDR\_F\_I(f,i) = \begin{cases} FRCDR\_F\_I(f,i) & \text{for } f \notin DSP(i) \\ 0 & \text{for } f \in DSP(i) \end{cases} \tag{305}$$

$$DSPCCR\_P\_I(p,i) = \sum_{f \in DSP(p,i)} DSPCCR\_F\_I(f,i) \tag{306}$$

$$DSPCCR\_F\_I(f,i) = \begin{cases} min(MAXFR\_F\_CY(f,i) - CDSPCCR\_F\_I(f,i), DSPCSR\_F\_I(f,i) + FRCDR\_F\_I(f,i)) & \text{for } f \in DSP(i) \\ 0 & \text{for } f \notin DSP(i) \end{cases} \quad (307)$$

$$CDSPCCR\_F\_I(f,i) = \sum_{j \in PI(i)} DSPCCR\_F\_I(f,j) \quad (308)$$

Variable	Units	SC	GR	Rule	Description	Ref
CCR_P_D(p, d)	$	P	D	4.26.2E	Capacity Cost Refund charged to Market Participant p in Trading Day d	(300)
CCR_P_I(p, i)	$	P	I	4.26.2E	Capacity Cost Refund charged to Market Participant p in Trading Interval i	(301)
GCCR_P_I(p, i)	$	P	I	4.26.3	Generation Capacity Cost Refund for Market Participant p in Trading Interval i	(302)
DSPCCR_P_I(p, i)	$	P	I	4.26.2F(b)	Sum of DSP Capacity Cost Refunds for Market Participant p in Trading Interval i	(306)
DSPCCR_F_I(f, i)	$	F	I	4.26.3A	DSP Capacity Cost Refund for Facility f in Trading Interval i	(307)
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	(308)
CGCCR_P_I(p, i)	$	P	I	4.26.3	Sum of Generation Capacity Cost Refund for Market Participant p in Trading Intervals in the same Capacity Year as, but prior to, Trading Interval i	(303)
MAXPGR_P_CY(p, cy)	$	P	CY	11	Maximum Participant Generation Refund for Market Participant p in Capacity Year cy	(312)
GRCDR_P_I(p, i)	$	P	I	4.26.1B	Generation Reserve Capacity Deficit Refund for Market Participant p in Trading Interval i	(304)
GRCDR_F_I(f, i)	$	F	I		Generation Reserve Capacity Deficit Refund contribution by Facility f in Trading Interval i	(305)
FRCDR_F_I(f, i)	$	F	I	4.26.1A	Facility Reserve Capacity Deficit Refund for Facility f in Trading Interval i	(331)
DSPCSR_F_I(f, i)	$	F	I	4.26.3A(b)	DSP capacity shortfall refund for Facility f in Trading Interval i	(329)
NSR_P_I(p, i)	$	P	I	4.26.3(b)	Net STEM Refund for Market Participant p in Trading Interval i	(313)
MAXFR_F_CY(f, cy)	$	F	CY	11	Maximum Facility Refund for Facility f in Capacity Year cy	(311)
REG_F(d)	{}	G	D	11	Set of Registered Facilities in Trading Day d	(26)
DSP(d)	{}	G	D	11	Set of Demand Side Programmes in Trading Day d	(15)

Variable	Units	SC	GR	Rule	Description	Ref
PI(i)	{}	G	I		Set of Trading Intervals in the same Capacity Year as, but prior to, Trading Interval i	I
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.8.9.2 Refund Caps

This implementation uses the calculation of $DSMCCSA\_F\_I$ to determine $MAXFR\_F\_CY$ for DSPs. The $DSMCCSA\_F\_I$ variable is reduced by the refund amount outlined in 4.25.4E, $DSPVRR\_F\_I$. Given that this variable depends on Capacity Cost Refunds, consideration must be given in implementation to ensure that future Capacity Cost refunds associated with Facility f are assumed to be 0.

$$MAXFR\_F\_I(f,i) = \begin{cases} \sum_{j \in IY(i)} (SPACCSA\_F\_I(f,j) + CC\_F\_D(f,j) \times RCP\_G\_I(j)) & \text{for } f \notin DSP(i) \\ \sum_{j \in IY(i)} DSMCCSA\_F\_I(f,j) & \text{for } f \in DSP(i) \end{cases} \quad (309)$$

$$MAXPGR\_P\_I(p,i) = \sum_{f \in CCF(p,i) \cap GEN(i)} MAXFR\_F\_I(f,i) \quad (310)$$

$$MAXFR\_F\_CY(f,cy) = \sum_{i \in IY(cy)} MAXFR\_F\_I(f,i) \quad (311)$$

$$MAXPGR\_P\_CY(p,cy) = \sum_{i \in IY(cy)} MAXPGR\_P\_I(p,i) \quad (312)$$

Variable	Units	SC	GR	Rule	Description	Ref
MAXPGR_P_CY(p, cy)	$	P	CY	11	Maximum Participant Generation Refund for Market Participant p in Capacity Year cy	(312)
MAXPGR_P_I(p, i)	$	P	I	11	Maximum Participant Generation Refund for Market Participant p contributed by Trading Interval i	(310)
MAXFR_F_CY(f, cy)	$	F	CY	11	Maximum Facility Refund for Facility f in Capacity Year cy	(311)
MAXFR_F_I(f, i)	$	F	I	11	Maximum Facility Refund for Facility f contributed by Trading Interval i	(309)
DSMCCSA_F_I(f, i)	$	F	I		Payment for DSM Capacity Credits for Facility f in Trading Interval i	(252)
RCP_G_I(i)	$/MW	G	I		Interval Reserve Capacity Price for Trading Interval i	(204)
CC_F_D(f, d)	MW	F	D	11	Non-SPA Capacity Credits associated with Facility f on Trading Day d	I
SPACCSA_F_I(f, i)	$	F	I		Payment for SPA Capacity Credits for Facility f in Trading Interval i	(257)
GEN(d)	{}	G	D	2.29.1(c)	Set of generation systems in Trading Day d	(16)
CCF(d)	{}	G	D		Set of Facilities with Capacity Credits on Trading Day d	I

Variable	Units	SC	GR	Rule	Description	Ref
IY(cy)	{}	G	CY		Set of Trading Intervals in Capacity Year cy	I
DSP(d)	{}	G	D	11	Set of Demand Side Programmes in Trading Day d	(15)

4.8.9.3 Net STEM Refund

$$NSR\_P\_I(p,i) = TIRRW\_P\_I(p,i) \times NSSF\_P\_I(p,i) \tag{313}$$

In the WEM Rules $NSSF\_P\_I(p,i)$ is expressed as shown in (314) and (315).

$$NSSF\_P\_I(p,i) = max(RCDF\_P\_I(p,i), RCOQ\_P\_I(p,i) - A\_P\_I(p,i)) - RCDF\_P\_I(p,i) \tag{314}$$

$$A\_P\_I(p,i) = min(RCOQ\_P\_I(p,i), CAPA\_P\_I(p,i)) \tag{315}$$

Because $RCDF\_P\_I(p,i)$ is non-negative, (314) and (315) are equivalent to (316), which makes it simpler to understand what the shortfall represents conceptually. The Net STEM Shortfall is the difference between a Market Participant's obligation ($RCOQ\_P\_I$) and the capacity it makes available ($CAPA\_P\_I$), net of any deficits it will pay refunds for by another mechanism ($RCDF\_P\_I$).

$$NSSF\_P\_I(p,i) = max(0, RCOQ\_P\_I(p,i) - CAPA\_P\_I(p,i) - RCDF\_P\_I(p,i)) \tag{316}$$

$$CAPA\_P\_I(p,i) \tag{317}$$
$$= \begin{cases} RCOQ\_P\_I(p,i) & \text{if } SSF\_G\_D(i) = 0 \\ RCOQIL\_P\_I(p,i) + \dfrac{NCP\_P\_I(p,i)}{0.5h \times LF\_P\_D(p,i)} + \dfrac{STEMNSOQ\_P\_I(p,i) + STEMSBQ\_P\_I(p,i)}{0.5h \times LF\_P\_D(p,i)} & \text{if } SSF\_G\_D(i) = 1 \\ + \dfrac{BSASQ\_P\_I(p,i)}{0.5h \times LF\_P\_D(p,i)} + max(0, BSFO\_P\_I(p,i) - RTFO\_P\_I(p,i)) \end{cases}$$

$$RCOQIL\_P\_I(p,i) = \sum_{f \in IRL(p,i)} RCOQ\_F\_I(f,i) \tag{318}$$

$$LF\_P\_D(p,d) = 1 \tag{319}$$

$$LFCAPPED\_F\_D(f,d) = min(1, TLF\_F\_D(f,d) \times DLF\_F\_D(f,d)) \tag{320}$$

$$BSFO\_P\_I(p,i) = \sum_{f \in REG\_F(p,i)} min(RCOQ\_F\_I(f,i), BSFO\_F\_I(f,i)) \tag{321}$$

$$RCOQ\_P\_I(p,i) = RCOQU\_P\_I(p,i) + \sum_{f \in REG\_F(p,i) \cap \overline{DSP(i)}} LFCAPPED\_F\_D(f,i) \times RCOQ\_F\_I(f,i) \tag{322}$$

$$RCOQU\_P\_I(p,i) = \sum_{f \in CCF(p,i) \cap \overline{REG\_F(i)} \cap \overline{IRL\_UREG(i)}} RCOQ\_F\_I(f,i) \tag{323}$$

$$RCDF\_P\_I(p,i) = RTFO\_P\_I(p,i) + RTRPPO\_P\_I(p,i) \tag{324}$$

$$RTFO\_P\_I(p,i) = \sum_{f \in REG\_F(p,i)} RTFO\_F\_I(f,i) \tag{325}$$

$$RTRPPO\_P\_I(p,i) = \sum_{f \in SG(p,i)} RTRPPO\_F\_I(f,i) \tag{326}$$

$$RTFO\_F\_I(f,i) = min(RCOQ\_F\_I(f,i), EXPFO\_F\_I(f,i)) \tag{327}$$

$$RTRPPO\_F\_I(f,i) = max(0, RPPO\_F\_I(f,i) - BSPO\_F\_I(f,i)) \tag{328}$$

Variable	Units	SC	GR	Rule	Description	Ref
NSR_P_I(p, i)	$	P	I	4.26.3(b)	Net STEM Refund for Market Participant p in Trading Interval i	(313)
TIRRW_P_I(p, i)	$/MW	P	I	4.26.3(b)ii	Weighted average Trading Interval refund rate for Market Participant p in Trading Interval i	(342)
NSSF_P_I(p, i)	MW	P	I	4.26.2	Net STEM Shortfall for Market Participant p in Trading Interval i	(314) & (316)
RCDF_P_I(p, i)	MW	P	I	4.26.2	Reserve capacity deficit caused by Forced Outages and Refund Payable Planned Outages for Market Participant p in Trading Interval i	(324)
RCOQ_P_I(p, i)	MW	P	I	4.26.2	Reserve Capacity Obligation Quantity for Market Participant p in Trading Interval i	(322)
RCOQ_F_I(f, i)	MW	F	I	11	Reserve Capacity Obligation Quantity of Facility f in Trading Interval i	I
RCOQU_P_I(p, i)	MW	P	I	4.26.2(a)	Reserve Capacity Obligation Quantity associated with unregistered Facilities (excluding interruptible loads) for Market Participant p in Trading Interval i	(323)
RCOQIL_P_I(p, i)	MW	P	I	4.26.2(d)i	Sum of Interruptible Load Reserve Capacity Obligation Quantities for Market Participant p in Trading Interval i	(318)
CAPA_P_I(p, i)	MW	P	I	4.26.2	Capacity made available by Market Participant p in Trading Interval i	(317)
NCP_P_I(p, i)	MWh	P	I	6.9.13	Net Contract Position for Market Participant p in Trading Interval i	(96)
LF_P_D(p, d)		P	D	4.26.2A	Loss Factor for Market Participant p for Trading Day d	(319)
LFCAPPED_F_D(f, d)		F	D	4.26.2B	Loss Factor (capped at 1) for Facility f for Trading Day d	(320)
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
RTFO_P_I(p, i)	MW	P	I	4.26.2	Real time Forced Outages for Market Participant p in Trading Interval i	(325)
RTFO_F_I(f, i)	MW	F	I	4.26.2	Real time Forced Outage for Facility f in Trading Interval i	(327)
RTRPPO_P_I(p, i)	MW	P	I	4.26.2	Real time Refund Payable Planned Outages for Market Participant p in Trading Interval i	(326)
RTRPPO_F_I(f, i)	MW	F	I	4.26.2	Real time Refund Payable Planned Outage for Facility f in Trading Interval i	(328)
RPPO_F_I(f, i)	MW	F	I	4.26.1C(b)	Refund Payable Planned Outage for Facility f in Trading Interval i	(334)
BSFO_P_I(p, i)	MW	P	I	4.26.2	Before STEM Forced Outage for Market Participant p in Trading Interval i	(321)

Variable	Units	SC	GR	Rule	Description	Ref
BSFO_F_I(f, i)	MW	F	I	7.3.4	Before STEM Forced Outage for Facility f in Trading Interval i	I
BSPO_F_I(f, i)	MW	F	I	7.3.4	Before STEM Planned Outage for Facility f in Trading Interval i	I
BSASQ_P_I(p, i)	MWh	P	I	6.3A.2(e)(i)	Before STEM Ancillary Services quantity for Market Participant p in Trading Interval i	I
STEMSBQ_P_I(p, i)	MWh	P	I		Energy bid (and scheduled) in STEM by Market Participant p in Trading Interval i	I
STEMNSOQ_P_I(p, i)	MWh	P	I		Energy offered (but not scheduled) in STEM by Market Participant p in Trading Interval i	I
EXPFO_F_I(f, i)	MW	F	I	7.13.1A(b)	Ex-post Forced Outage for Facility f in Trading Interval i	I
SSF_G_D(d)	Flag	G	D		0 if STEM was suspended in Trading Day d, and 1 otherwise	I
A_P_I(p, i)	MW	P	I	4.26.2	Capped capacity made available by Market Participant p in Trading Interval i	(315)
SG(d)	{}	G	D	11	Set of Scheduled Generators in Trading Day d	(17)
REG_F(d)	{}	G	D	11	Set of Registered Facilities in Trading Day d	(26)
DSP(d)	{}	G	D	11	Set of Demand Side Programmes in Trading Day d	(15)
CCF(d)	{}	G	D		Set of Facilities with Capacity Credits on Trading Day d	I
IRL_UREG(d)	{}	G	D		Set of unregistered Loads that can be interrupted upon request in Trading Day d	(22)
IRL(d)	{}	G	D	11	Set of Interruptible Loads in Trading Day d	(21)

4.8.9.4 DSP Capacity Shortfall Refund

$$DSPCSR\_F\_I(f,i) = \begin{cases} TIRR\_F\_I(f,i) \times DSPSF\_F\_I(f,i) & \text{for } f \in DSP(i) \\ 0 & \text{for } f \notin DSP(i) \end{cases} \quad (329)$$

$$DSPSF\_F\_I(f,i) = max\left(0, min\left(RCOQ\_F\_I(f,i), \frac{DI\_F\_I(f,i)}{0.5h}\right) - max\left(0, RD\_F\_D(f,i) - \frac{DSPL\_F\_I(f,i)}{0.5h}\right)\right) \quad (330)$$

Variable	Units	SC	GR	Rule	Description	Ref
DSPCSR_F_I(f, i)	$	F	I	4.26.3A(b)	DSP capacity shortfall refund for Facility f in Trading Interval i	(329)
TIRR_F_I(f, i)	$/MW	F	I	4.26.1(a)	Trading Interval Refund Rate for Facility f in Trading Interval i	(343)
DSPSF_F_I(f, i)	MW	F	I	4.26.2D	DSP Capacity Shortfall for Facility f for Trading Interval i	(330)

Variable	Units	SC	GR	Rule	Description	Ref
RCOQ_F_I(f, i)	MW	F	I	11	Reserve Capacity Obligation Quantity of Facility f in Trading Interval i	I
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	6.16.2	Demand Side Programme Load for Facility f in Trading Interval i	(67)
DI_F_I(f, i)	MWh	F	I	7.13.1(eG)	Dispatch Instruction for Facility f in Trading Interval i	I
DSP(d)	{}	G	D	11	Set of Demand Side Programmes in Trading Day d	(15)

4.8.9.5 Facility Reserve Capacity Deficit Refund

$$FRCDR\_F\_I(f,i) = \begin{cases} 0 & \text{for } f \in IML(i) \\ min(RCD\_F\_I(f,i) \times TIRR\_F\_I(f,i), MAXFR\_F\_CY(f,i) - CFRCDR\_F\_I(f,i)) & \text{for } f \notin IML(i) \end{cases} \quad (331)$$

$$CFRCDR\_F\_I(f,i) = \sum_{j \in PI(i)} FRCDR\_F\_I(f,j) \quad (332)$$

$$RCD\_F\_I(f,i) \quad (333)$$
$$= \begin{cases} max(0, RCOQ\_F\_I(f,i) - max(0, RD\_F\_D(f,i) - MINL\_F\_D(f,i))) & \text{for } f \in DSP(i) \\ CC\_F\_D(f,i) & \text{for } (f \in SG(i) \cup NSG(i)) \text{ and } COP\_F\_D(f,i) = 0 \\ EXPFO\_F\_I(f,i) + RPPO\_F\_I(f,i) & \text{for } f \in SG(i) \text{ and } COP\_F\_D(f,i) = 1 \\ EXPFO\_F\_I(f,i) & \text{for } f \in NSG(i) \cap \overline{IG(i)} \text{ and } COP\_F\_D(f,i) = 1 \\ REQLA\_F\_D(f,i) - max\left(\frac{MAX2\_F\_M(f,i)}{0.5h}, ESTSOC\_F\_D(f,i)\right) & \text{for } f \in IG(i) \text{ and } COP\_F\_D(f,i) = 1 \text{ and } Y\_F\_I(f,i) \neq 0 \\ 0 & \text{otherwise} \end{cases}$$

$$RPPO\_F\_I(f,i) = \begin{cases} 0 & \text{for } f \in SG(i) \text{ and } REPOC\_F\_D(f,i) < 8400 \\ EXPPO\_F\_I(f,i) & \text{otherwise} \end{cases} \quad (334)$$

$$MINL\_F\_D(f,d) = \sum_{n \in NMI(f,d)} MINL\_N\_D(n,d) \quad (335)$$

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	(331)
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	(332)

Variable	Units	SC	GR	Rule	Description	Ref
MAXFR_F_CY(f, cy)	$	F	CY	11	Maximum Facility Refund for Facility f in Capacity Year cy	(311)
CC_F_D(f, d)	MW	F	D	11	Non-SPA Capacity Credits associated with Facility f on Trading Day d	I
RCD_F_I(f, i)	MW	F	I	4.26.1A	Reserve Capacity Deficit for Facility f for Trading Interval i	(333)
COP_F_D(f, d)	Flag	F	D	4.13.10B	Flag that is 1 if Facility f is in Commercial Operations in Trading Day d, and 0 otherwise	I
MAX2_F_M(f, m)	MWh	F	M	4.26.1A (a)(ii).3	2nd highest Sent Out Metered Schedule of Facility f up to and including Trading Month m	(74)
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
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
EXPPO_F_I(f, i)	MW	F	I	7.13.1A(b)	Ex-post Planned Outage for Facility f in Trading Interval i	I
EXPFO_F_I(f, i)	MW	F	I	7.13.1A(b)	Ex-post Forced Outage for Facility f in Trading Interval i	I
RPPO_F_I(f, i)	MW	F	I	4.26.1C(b)	Refund Payable Planned Outage for Facility f in Trading Interval i	(334)
REPOC_F_D(f, d)		F	D	11	Refund Exempt Planned Outage Count for Facility f over the preceding 1000 Trading Days prior to (and excluding) 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
RD_F_D(f, d)	MW	F	D	4.26.2CA	Relevant Demand of Facility f in Trading Day d	I
MINL_F_D(f, d)	MW	F	D	4.26.1(e)iii.4	Minimum load of Facility f for Trading Day d	(335)
MINL_N_D(n, d)	MW	N	D	2.29.5B(c)	Minimum load of NMI n for Trading Day d	I
TIRR_F_I(f, i)	$/MW	F	I	4.26.1(a)	Trading Interval Refund Rate for Facility f in Trading Interval i	(343)
Y_F_I(f, i)	$/MW	F	I	4.26.1(b)	Per Interval Reserve Capacity Price for Facility f in Trading Interval i	(344)
NMI(d)	{}	G	D		Set of all connection points in Trading Day d	I
DSP(d)	{}	G	D	11	Set of Demand Side Programmes in Trading Day d	(15)
SG(d)	{}	G	D	11	Set of Scheduled Generators in Trading Day d	(17)
NSG(d)	{}	G	D	11	Set of Non-Scheduled Generators in Trading Day d	(18)
IG(d)	{}	G	D	11	Set of Intermittent Generators in Trading Day d	(29)

Variable	Units	SC	GR	Rule	Description	Ref
IML(d)	{}	G	D	2.30B.1	Set of Loads which have an Intermittent Load component in Trading Day d	(28)
PI(i)	{}	G	I		Set of Trading Intervals in the same Capacity Year as, but prior to, Trading Interval i	I

4.8.9.6 Intermittent Load Refunds

$$IMLR\_F\_I(f,i) = \begin{cases} IMLSF\_F\_I(f,i) \times Y\_F\_I(f,i) & \text{for } f \in IML(i) \\ 0 & \text{otherwise} \end{cases} \tag{336}$$

$$IMLSF\_F\_I(f,i) = \begin{cases} max\left(0, \frac{-SOMSIL\_F\_I(f,i)}{0.5h} - 1.03 \times NC\_F\_D(f,i)\right) & \text{for } IMLPOFlag\_F\_I(f,i) \\ & +IMLCOFlag\_F\_I(f,i) > 0 \\ max\left(0, \frac{-SOMSIL\_F\_I(f,i)}{0.5h} - 0.03 \times NC\_F\_D(f,i) - ACR\_F\_D(f,i)\right) & \text{for } IMLPOFlag\_F\_I(f,i) \\ & +IMLCOFlag\_F\_I(f,i) \\ & +IMLFOFlag\_F\_I(f,i) = 0 \\ & \text{and } MAXTEMP\_F\_D(f,i) > 41°C \\ max\left(0, \frac{-SOMSIL\_F\_I(f,i)}{0.5h} - 0.03 \times NC\_F\_D(f,i)\right) & \text{otherwise} \end{cases} \tag{337}$$

$$IMLPOFlag\_F\_I(f,i) = \begin{cases} 1 & \text{for } EXPPO\_F\_I(EG(f,i),i) > 0 \\ 0 & \text{otherwise} \end{cases} \tag{338}$$

$$IMLCOFlag\_F\_I(f,i) = \begin{cases} 1 & \text{for } EXPCO\_F\_I(EG(f,i),i) > 0 \\ 0 & \text{otherwise} \end{cases} \tag{339}$$

$$IMLFOFlag\_F\_I(f,i) = \begin{cases} 1 & \text{for } EXPFO\_F\_I(EG(f,i),i) > 0 \\ 0 & \text{otherwise} \end{cases} \tag{340}$$

Variable	Units	SC	GR	Rule	Description	Ref
IMLR_F_I(f, i)	$	F	I	4.28A.1	Intermittent Load Refunds for Facility f in Trading Interval i	(336)
IMLSF_F_I(f, i)	MW	F	I	4.28A.1(c)	Intermittent Load Capacity Shortfall for Facility f for Trading Interval i	(337)
Y_F_I(f, i)	$/MW	F	I	4.26.1(b)	Per Interval Reserve Capacity Price for Facility f in Trading Interval i	(344)
SOMSIL_F_I(f, i)	MWh	F	I		Sent Out Metered Schedule for the intermittent load associated with Facility f in Trading Interval i	(66)
EXPPO_F_I(f, i)	MW	F	I	7.13.1A(b)	Ex-post Planned Outage for Facility f in Trading Interval i	I
EXPFO_F_I(f, i)	MW	F	I	7.13.1A(b)	Ex-post Forced Outage for Facility f in Trading Interval i	I

Variable	Units	SC	GR	Rule	Description	Ref
EXPCO_F_I(f, i)	MW	F	I	7.13.1A(b)	Ex-post Consequential Outage for Facility f in Trading Interval i	I
IMLPOFlag_F_I(f, i)	Flag	F	I	7.13.1A(b)	Flag indicating if the embedded generator associated with Facility f is on a Planned Outage in Trading Interval i	(338)
IMLFOFlag_F_I(f, i)	Flag	F	I	7.13.1A(b)	Flag indicating if the embedded generator associated with Facility f is on a Forced Outage in Trading Interval i	(340)
IMLCOFlag_F_I(f, i)	Flag	F	I	7.13.1A(b)	Flag indicating if the embedded generator associated with Facility f is on a Consequential Outage in Trading Interval i	(339)
MAXTEMP_F_D(f, d)	°C	F	D	2.30B.3(b)ii	Daily maximum temperature associated with Facility f for Trading Day d	I
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
EG(d)	{}	G	D	2.30B.2(a)	Set of Scheduled Generators that serve an Intermittent Load locally in Trading Day d	(31)
IML(d)	{}	G	D	2.30B.1	Set of Loads which have an Intermittent Load component in Trading Day d	(28)

4.8.9.7 DSP Voluntary Reduction Refunds

$$DSPVRR\_F\_I(f,i) = VRCC\_F\_D(f,i) \times DSMRCP\_G\_I(i) - \frac{VRCC\_F\_D(f,i)}{CC\_F\_D(f,i)} \times DSPCCR\_F\_I(f,i) \quad (341)$$

Variable	Units	SC	GR	Rule	Description	Ref
DSPVRR_F_I(f, i)	$	F	I	4.25.4E	Refund payable related to the voluntary reduction of Capacity Credits for Facility f in Trading Interval i	(341)
VRCC_F_D(f, d)	MW	F	D	4.25.4E	The amount of Capacity Credits voluntarily reduced for Facility f in the Capacity Year in which Trading Day d falls, but prior to the application being approved	I
DSPCCR_F_I(f, i)	$	F	I	4.26.3A	DSP Capacity Cost Refund for Facility f in Trading Interval i	(307)
DSMRCP_G_I(i)	$/MW	G	I		Interval DSM Reserve Capacity Price for Trading Interval i	(253)
CC_F_D(f, d)	MW	F	D	11	Non-SPA Capacity Credits associated with Facility f on Trading Day d	I

4.8.9.8 Refund Rates

$$TIRRW\_P\_I(p,i) = \begin{cases} 0 & \text{for } \sum_{f \in SG(p,i)} CC\_F\_D(f,i) = 0 \\ \dfrac{\sum_{f \in SG(p,i)} TIRR\_F\_I(f,i) \times CC\_F\_D(f,i)}{\sum_{f \in SG(p,i)} CC\_F\_D(f,i)} & \text{otherwise} \end{cases} \tag{342}$$

$$TIRR\_F\_I(f,i) = RF\_F\_I(f,i) \times Y\_F\_I(f,i) \tag{343}$$

$$Y\_F\_I(f,i) = \begin{cases} \dfrac{DSMRCP\_G\_CY(i)}{400} & \text{for } f \in DSP(i) \\ 0 & \text{for } f \in NSG(i) \text{ and } REQLAFlag\_F\_I(f,i) = 1 \\ RCP\_G\_I(i) & \text{otherwise} \end{cases} \tag{344}$$

$$REQLAFlag\_F\_I(f,i) = \begin{cases} 1 & \text{for } COP\_F\_D(f,i) = 1 \text{ and } max\left(\dfrac{MAX2\_F\_M(f,i)}{0.5h}, ESTSOC\_F\_D(f,i)\right) \geq REQLA\_F\_D(f,i) \\ 0 & \text{otherwise} \end{cases} \tag{345}$$

$$RF\_F\_I(f,i) = min(6, max(RFdyn\_G\_I(i), RFfloor\_F\_I(f,i))) \tag{346}$$

$$RFdyn\_G\_I(i) = 11.75 - \frac{5.75}{750MW} \times SPARE\_G\_I(i) \tag{347}$$

$$SPARE\_G\_I(i) = \sum_{f \in CCF(i)} SPARE\_F\_I(f,i) \tag{348}$$

$$SPARE\_F\_I(f,i) \tag{349}$$
$$= \begin{cases} max\left(0, CC\_F\_D(f,i) - EXPPO\_F\_I(f,i) - EXPFO\_F\_I(f,i) - EXPCO\_F\_I(f,i) - \dfrac{SOMS\_F\_I(f,i)}{0.5h}\right) & \text{for } f \in SG(i) \\ max\left(0, min\left(RCOQ\_F\_I(f,i), \dfrac{DSPL\_F\_I(f,i)}{0.5h} - MINL\_F\_D(f,i)\right)\right) & \text{for } f \in DSP(i) \\ 0 & \text{otherwise} \end{cases}$$

$$RFfloor\_F\_I(f,i) = \begin{cases} 1 & \text{for } f \in DSP(i) \\ 1 & \text{for } f \in SG(i) \cup (NSG(i) \cap \overline{IG(i)}) \text{ and } COP\_F\_D(f,i) = 0 \\ 1 & \text{for } f \in IG(i) \text{ and } (COP\_F\_D(f,i) = 0 \text{ or } Y\_F\_I(f,i) \neq 0)) \\ 1 - 0.75 \times DISP\_F\_I(f,i) & \text{otherwise} \end{cases} \tag{350}$$

$$DISP\_F\_I(f,i) = \begin{cases} 0 & \text{for } \sum_{j \in PI4320(i)} CC\_F\_D(f,j) = 0 \\ 1 - \dfrac{\sum_{j \in PI4320(i)} EXPFO\_F\_I(f,j)}{\sum_{j \in PI4320(i)} CC\_F\_D(f,j)} & \text{otherwise} \end{cases} \tag{351}$$

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 Market Participant p in Trading Interval i	(342)
TIRR_F_I(f, i)	$/MW	F	I	4.26.1(a)	Trading Interval Refund Rate for Facility f in Trading Interval i	(343)
Y_F_I(f, i)	$/MW	F	I	4.26.1(b)	Per Interval Reserve Capacity Price for Facility f in Trading Interval i	(344)
REQLAFlag_F_I(f, i)	Flag	F	I	4.26.1(b)i	Flag that is 1 if Facility f has met its Required Level as at Trading Interval i and 0 otherwise	(345)
RCP_G_I(i)	$/MW	G	I		Interval Reserve Capacity Price for Trading Interval i	(204)
DSMRCP_G_CY(cy)	$/MW	G	CY	11	DSM Reserve Capacity Price for Capacity Year cy	I
COP_F_D(f, d)	Flag	F	D	4.13.10B	Flag that is 1 if Facility f is in Commercial Operations in Trading Day d, and 0 otherwise	I
MAX2_F_M(f, m)	MWh	F	M	4.26.1A (a)(ii).3	2nd highest Sent Out Metered Schedule of Facility f up to and including Trading Month m	(74)
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
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
RF_F_I(f, i)		F	I	4.26.1(c), 4.28A.1(a)	Refund factor for Facility f in Trading Interval i	(346)
RFdyn_G_I(i)		G	I	4.26.1(d)	Dynamic refund factor for in Trading Interval i	(347)
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	(350)
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	(348)
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	(349)
CC_F_D(f, d)	MW	F	D	11	Non-SPA Capacity Credits associated with 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	(45)
EXPPO_F_I(f, i)	MW	F	I	7.13.1A(b)	Ex-post Planned Outage for Facility f in Trading Interval i	I
EXPFO_F_I(f, i)	MW	F	I	7.13.1A(b)	Ex-post Forced Outage for Facility f in Trading Interval i	I
EXPCO_F_I(f, i)	MW	F	I	7.13.1A(b)	Ex-post Consequential Outage for Facility f in Trading Interval i	I
RCOQ_F_I(f, i)	MW	F	I	11	Reserve Capacity Obligation Quantity of Facility f in Trading Interval i	I

Variable	Units	SC	GR	Rule	Description	Ref
DSPL_F_I(f, i)	MWh	F	I	6.16.2	Demand Side Programme Load for Facility f in Trading Interval i	(67)
MINL_F_D(f, d)	MW	F	D	4.26.1(e)iii.4	Minimum load of Facility f for Trading Day d	(335)
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	(351)
PI4320(i)	{}	G	I		Set of previous 4320 Trading Intervals up to and including Trading Interval i	I
SG(d)	{}	G	D	11	Set of Scheduled Generators in Trading Day d	(17)
DSP(d)	{}	G	D	11	Set of Demand Side Programmes in Trading Day d	(15)
NSG(d)	{}	G	D	11	Set of Non-Scheduled Generators in Trading Day d	(18)
IG(d)	{}	G	D	11	Set of Intermittent Generators in Trading Day d	(29)
CCF(d)	{}	G	D		Set of Facilities with Capacity Credits on Trading Day d	I

4.8.10 Intermittent Load Refunds

$$IMLR\_P\_D(p,d) = \sum_{i \in I(d)} IMLR\_P\_I(p,i) \tag{352}$$

$$IMLR\_P\_I(p,i) = \sum_{f \in IML(p,i)} IMLR\_F\_I(f,i) \tag{353}$$

Variable	Units	SC	GR	Rule	Description	Ref
IMLR_P_D(p, d)	$	P	D	4.28A.1	Intermittent Load Refunds for Market Participant p in Trading Day d	(352)
IMLR_P_I(p, i)	$	P	I	4.28A.1	Intermittent Load Refunds for Market Participant p in Trading Interval i	(353)
IMLR_F_I(f, i)	$	F	I	4.28A.1	Intermittent Load Refunds for Facility f in Trading Interval i	(336)
IML(d)	{}	G	D	2.30B.1	Set of Loads which have an Intermittent Load component in Trading Day d	(28)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.8.11 Capacity Rebate

$$CAPREBSA\_P\_D(p,d) = \sum_{i \in I(d)} CAPREBSA\_P\_I(p,i) \tag{354}$$

$$CAPREBSA\_P\_I(p,i) = \sum_{f \in SG(p,i) \cup DSP(p,i)} CAPREBSA\_F\_I(f,i) \tag{355}$$

$$CAPREBSA\_F\_I(f,i) = CAPREBS\_F\_I(f,i) \times CCR\_G\_I(i) \tag{356}$$

$$CAPREBS\_F\_I(f,i) = \frac{CAPREBCQ\_F\_I(f,i)}{CAPREBCQ\_G\_I(i)} \tag{357}$$

$$CAPREBCQ\_F\_I(f,i) = CCNSO\_F\_I(f,i) \times E\_F\_I(f,i) \tag{358}$$

$$CAPREBCQ\_G\_I(i) = \sum_{f \in SG(i) \cup DSP(i)} CAPREBCQ\_F\_I(f,i) \tag{359}$$

$$CCR\_G\_I(i) = \sum_{p \in P\_M(i)} CCR\_P\_I(p,i) \tag{360}$$

$$E\_F\_I(f,i) = \begin{cases} 1 & f \in SG(i) \text{ and } DISP1440Flag\_F\_I(f,i) = 1 \text{ and } MAXREFFlag\_F\_I(f,i) = 0 \\ & \text{and } MAXREFFlag\_P\_I(p,i) = 0 \\ 1 & f \in DSP(i) \text{ and } DISP1440Flag\_F\_I(f,i) = 1 \text{ and } RCOQ\_F\_I(f,i) \neq 0 \\ & \text{and } MAXREFFlag\_F\_I(f,i) = 0 \\ 0 & \text{otherwise} \end{cases} \tag{361}$$

$$MAXREFFlag\_F\_I(f,i) = \begin{cases} 1 & f \in DSP(i) \text{ and } CDSPCCR\_F\_I(f,i) + DSPCCR\_F\_I(f,i) = MAXFR\_F\_CY(f,i) \\ 1 & f \notin DSP(i) \text{ and } CFRCDR\_F\_I(f,i) + FRCDR\_F\_I(f,i) = MAXFR\_F\_CY(f,i) \\ 0 & \text{otherwise} \end{cases} \tag{362}$$

$$MAXREFFlag\_P\_I(p,i) = \begin{cases} 1 & \text{for } CGCCR\_P\_I(p,i) + GCCR\_P\_I(p,i) = MAXPGR\_P\_CY(p,i) \\ 0 & \text{otherwise} \end{cases} \tag{363}$$

$$DISP1440Flag\_F\_I(f,i) = \begin{cases} 1 & f \in SG(i) \text{ and } \sum_{j \in PI1440(i)} max(0, SOMS\_F\_I(f,j)) > 0 \\ 1 & f \in DSP(i) \text{ and } \sum_{j \in PI1440(i)} max(0, DI\_F\_I(f,j)) > 0 \\ 0 & \text{otherwise} \end{cases} \tag{364}$$

$$CCNSO\_F\_I(f,i) = \begin{cases} min\left(RCOQ\_F\_I(f,i), \frac{DSPL\_F\_I(f,i)}{0.5h} - MINL\_F\_D(f,i)\right) & \text{for } f \in DSP(i) \\ CC\_F\_D(f,i) - (EXPPO\_F\_I(f,i) + EXPFO\_F\_I(f,i) + EXPCO\_F\_I(f,i)) & \text{for } f \in SG(i) \\ 0 & \text{otherwise} \end{cases} \tag{365}$$

Variable	Units	SC	GR	Rule	Description	Ref
CAPREBSA_P_D(p, d)	$	P	D	4.26.4	Participant Capacity Rebate (whereby Capacity Cost Refunds are redistributed) for Market Participant p in Trading Day d	(354)
CAPREBSA_P_I(p, i)	$	P	I	4.26.4	Participant Capacity Rebate (whereby Capacity Cost Refunds are redistributed) for Market Participant p in Trading Interval i	(355)
CAPREBSA_F_I(f, i)	$	F	I	4.26.6	Facility Capacity Rebate for Facility f in Trading Interval i	(356)
CAPREBS_F_I(f, i)		F	I		Share of Capacity Rebates for Facility f in Trading Interval i	(357)
CAPREBCQ_F_I(f, i)		F	I		Capacity Rebate contributing quantity for Facility f in Trading Interval i	(358)

Variable	Units	SC	GR	Rule	Description	Ref
CAPREBCQ_G_I(i)		G	I		Total Capacity Rebate contributing quantity in Trading Interval i	(359)
CCR_G_I(i)	$	G	I	4.26.6(b)	Capacity Cost Refunds charged in Trading Interval i	(360)
CCR_P_I(p, i)	$	P	I	4.26.2E	Capacity Cost Refund charged to Market Participant p in Trading Interval i	(301)
CCNSO_F_I(f, i)	MW	F	I	4.26.6(d)	Capacity Credits not subject to an Outage for Facility f in Trading Interval i	(365)
DSPL_F_I(f, i)	MWh	F	I	6.16.2	Demand Side Programme Load for Facility f in Trading Interval i	(67)
MINL_F_D(f, d)	MW	F	D	4.26.1(e)iii.4	Minimum load of Facility f for Trading Day d	(335)
RCOQ_F_I(f, i)	MW	F	I	11	Reserve Capacity Obligation Quantity of Facility f in Trading Interval i	I
CC_F_D(f, d)	MW	F	D	11	Non-SPA Capacity Credits associated with Facility f on Trading Day d	I
EXPPO_F_I(f, i)	MW	F	I	7.13.1A(b)	Ex-post Planned Outage for Facility f in Trading Interval i	I
EXPFO_F_I(f, i)	MW	F	I	7.13.1A(b)	Ex-post Forced Outage for Facility f in Trading Interval i	I
EXPCO_F_I(f, i)	MW	F	I	7.13.1A(b)	Ex-post Consequential Outage for Facility f in Trading Interval i	I
E_F_I(f, i)	Flag	F	I	4.26.6(e)	Flag representing whether Facility f is eligible to receive a Facility Capacity Rebate in Trading Interval i	(361)
FRCDR_F_I(f, i)	$	F	I	4.26.1A	Facility Reserve Capacity Deficit Refund for Facility f in Trading Interval i	(331)
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	(332)
MAXFR_F_CY(f, cy)	$	F	CY	11	Maximum Facility Refund for Facility f in Capacity Year cy	(311)
GCCR_P_I(p, i)	$	P	I	4.26.3	Generation Capacity Cost Refund for Market Participant p in Trading Interval i	(302)
CGCCR_P_I(p, i)	$	P	I	4.26.3	Sum of Generation Capacity Cost Refund for Market Participant p in Trading Intervals in the same Capacity Year as, but prior to, Trading Interval i	(303)
MAXPGR_P_CY(p, cy)	$	P	CY	11	Maximum Participant Generation Refund for Market Participant p in Capacity Year cy	(312)
DISP1440Flag_F_I(f, i)	Flag	F	I	4.26.6(e)i.1, 4.26.6(e)ii.1	Flag that is 1 when Facility f has been dispatched in the previous 1440 intervals prior to and including Trading Interval i and 0 otherwise	(364)

Variable	Units	SC	GR	Rule	Description	Ref
MAXREFFlag_F_I(f, i)	Flag	F	I	4.26.6(e)i.2, 4.26.6(e)ii.3	Flag that is 1 when Facility f has accrued the maximum Facility Reserve Capacity Deficit Refunds as at Trading Interval i and 0 otherwise	(362)
MAXREFFlag_P_I(p, i)	Flag	P	I	4.26.6(e)i.3	Flag that is 1 when Market Participant p has accrued the maximum Generation Reserve Capacity Deficit Refunds as at Trading Interval i and 0 otherwise	(363)
DI_F_I(f, i)	MWh	F	I	7.13.1(eG)	Dispatch Instruction for Facility f in Trading Interval i	I
RCOQ_F_I(f, i)	MW	F	I	11	Reserve Capacity Obligation Quantity of Facility f in Trading Interval i	I
DSPCCR_F_I(f, i)	$	F	I	4.26.3A	DSP Capacity Cost Refund for Facility f in Trading Interval i	(307)
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	(308)
SOMS_F_I(f, i)	MWh	F	I		Sent Out Metered Schedule for Facility f in Trading Interval i	(45)
CC_F_D(f, d)	MW	F	D	11	Non-SPA Capacity Credits associated with Facility f on Trading Day d	I
SG(d)	{}	G	D	11	Set of Scheduled Generators in Trading Day d	(17)
DSP(d)	{}	G	D	11	Set of Demand Side Programmes in Trading Day d	(15)
P_M(m)	{}	G	M		Set of participants (Rule Participants and the ERA) in Trading Month m	(1)
PI1440(i)	{}	G	I		Set of Trading Intervals prior to and including Trading Interval i	I
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.8.12 Load Following Capacity Rebate

$$LFREBATE\_P\_D(p,d) = \sum_{i \in I(d)} LFREBATE\_P\_I(p,i) \tag{366}$$

$$LFREBATE\_P\_I(p,i) = IRCRS\_P\_M(p,i) \times LFCC\_G\_I(i) \tag{367}$$

$$IRCRS\_P\_M(p,m) = \frac{IRCR\_P\_M(p,m)}{IRCR\_G\_M(m)} \tag{368}$$

$$IRCR\_G\_M(m) = \sum_{p \in P\_M(m)} IRCR\_P\_M(p,m) \tag{369}$$

Variable	Units	SC	GR	Rule	Description	Ref
LFREBATE_P_D(p, d)	$	P	D	9.7.1B	Payment returning cost of Capacity associated with Load Following, for Market Participant p in Trading Day d	(366)

Variable	Units	SC	GR	Rule	Description	Ref
LFREBATE_P_I(p, i)	$	P	I	9.7.1B	Payment returning cost of Capacity associated with Load Following, for Market Participant p in Trading Interval i	(367)
IRCRS_P_M(p, m)		P	M	9.7.1B	Capacity share for Market Participant p for Trading Month m	(368)
IRCR_P_M(p, m)	MW	P	M	4.28.7, 4.28.11A	Individual Reserve Capacity Requirement for Market Participant p for Trading Month m	I
IRCR_G_M(m)	MW	G	M		Sum of the all Individual Reserve Capacity Requirement for Trading Month m	(369)
LFCC_G_I(i)	$	G	I	9.9.2(p)	Amount charged to recover the cost of capacity associated with Load Following in Trading Interval i	(203)
P_M(m)	{}	G	M		Set of participants (Rule Participants and the ERA) in Trading Month m	(1)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.9 Market Participant Fees

Fees are split into three parts:

- Market Fees
- System Management Fees
- Regulator Fees

The corresponding payment made to AEMO, AEMO (acting as System Management) and the ERA are included in a separate chapter titled Service Fees.

These equations are based on the equations stated in MR 9.13. They have been modified to aggregate to a Trading Day and separate out the three components of the fees.

$$MPFSA\_P\_D(p,d) = -(MFSAD\_P\_D(p,d) + SFSAD\_P\_D(p,d) + RFSAD\_P\_D(p,d)) \quad (370)$$

Variable	Units	SC	GR	Rule	Description	Ref
MPFSA_P_D(p, d)	$	P	D	9.13.1	Market Participant Fee Settlement Amount charged to Market Participant p for Trading Day d	(370)
MFSAD_P_D(p, d)	$	P	D		Market Fee settlement amount charged to Market Participant p for Trading Day d	(371)
SFSAD_P_D(p, d)	$	P	D		System Management Fee settlement amount charged to Market Participant p for Trading Day d	(375)
RFSAD_P_D(p, d)	$	P	D		Regulator Fee settlement amount charged to Market Participant p for Trading Day d	(377)

4.9.1 Market Fees

$$MFSAD\_P\_D(p,d) = \sum_{i \in I(d)} MFSAD\_P\_I(p,i) \tag{371}$$

$$MFSAD\_P\_I(p,i) = MFRATE\_G\_FY(i) \times (ABSGEN\_P\_I(p,i) + ABSLOAD\_P\_I(p,i)) \tag{372}$$

$$ABSGEN\_P\_I(p,i) = \sum_{f \in SG(p,i) \cup NSG(p,i)} |MS\_F\_I(f,i)| \tag{373}$$

$$ABSLOAD\_P\_I(p,i) = ABSNDL\_P\_I(p,i) + \sum_{f \in IRL(p,i)} |MS\_F\_I(f,i)| \tag{374}$$

Variable	Units	SC	GR	Rule	Description	Ref
MFSAD_P_D(p, d)	$	P	D		Market Fee settlement amount charged to Market Participant p for Trading Day d	(371)
MFSAD_P_I(p, i)	$	P	I		Market Fee settlement amount charged to Market Participant p for Trading Interval i	(372)
MFRATE_G_FY(fy)	$/MWh	G	FY	2.24.2	Market Fee rate applicable in Financial Year fy	I
ABSGEN_P_I(p, i)	MWh	P	I	9.13.1	Metered Generation for Market Participant p in Trading Interval i	(373)
ABSLOAD_P_I(p, i)	MWh	P	I	9.13.1	Metered Load for Market Participant p in Trading Interval i	(374)
ABSNDL_P_I(p, i)	MWh	P	I	9.13.1	Sum of the absolute values of the Non-Dispatchable Load Metered Schedules for Market Participant p in Trading Interval i	(69)
MS_F_I(f, i)	MWh	F	I	9.3.4, 2.30B.10(c), 2.30B.12	Metered Schedule for Facility f in Trading Interval i	(46)
IRL(d)	{}	G	D	11	Set of Interruptible Loads in Trading Day d	(21)
SG(d)	{}	G	D	11	Set of Scheduled Generators in Trading Day d	(17)
NSG(d)	{}	G	D	11	Set of Non-Scheduled Generators in Trading Day d	(18)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.9.2 System Management Fees

$$SFSAD\_P\_D(p,d) = \sum_{i \in I(d)} SFSAD\_P\_I(p,i) \tag{375}$$

$$SFSAD\_P\_I(p,i) = SFRATE\_G\_FY(i) \times (ABSGEN\_P\_I(p,i) + ABSLOAD\_P\_I(p,i)) \tag{376}$$

Variable	Units	SC	GR	Rule	Description	Ref
SFSAD_P_D(p, d)	$	P	D		System Management Fee settlement amount charged to Market Participant p for Trading Day d	(375)

Variable	Units	SC	GR	Rule	Description	Ref
SFSAD_P_I(p, i)	$	P	I		System Management Fee settlement amount charged to Market Participant p for Trading Interval i	(376)
SFRATE_G_FY(fy)	$/MWh	G	FY	2.24.2	System Management Fee rate applicable in Financial Year fy	I
ABSGEN_P_I(p, i)	MWh	P	I	9.13.1	Metered Generation for Market Participant p in Trading Interval i	(373)
ABSLOAD_P_I(p, i)	MWh	P	I	9.13.1	Metered Load for Market Participant p in Trading Interval i	(374)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.9.3 Regulator Fees

$$RFSAD\_P\_D(p,d) = \sum_{i \in I(d)} RFSAD\_P\_I(p,i) \tag{377}$$

$$RFSAD\_P\_I(p,i) = RFRATE\_G\_FY(i) \times (ABSGEN\_P\_I(p,i) + ABSLOAD\_P\_I(p,i)) \tag{378}$$

Variable	Units	SC	GR	Rule	Description	Ref
RFSAD_P_D(p, d)	$	P	D		Regulator Fee settlement amount charged to Market Participant p for Trading Day d	(377)
RFSAD_P_I(p, i)	$	P	I		Regulator Fee settlement amount charged to Market Participant p for Trading Interval i	(378)
RFRATE_G_FY(fy)	$/MWh	G	FY	2.24.2	Regulator Fee rate applicable in Financial Year fy	I
ABSGEN_P_I(p, i)	MWh	P	I	9.13.1	Metered Generation for Market Participant p in Trading Interval i	(373)
ABSLOAD_P_I(p, i)	MWh	P	I	9.13.1	Metered Load for Market Participant p in Trading Interval i	(374)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.10 Service Fees

Fees are split into three parts:

- Market Fees
- System Management Fees
- Regulator 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 9.15. They have been modified to aggregate to a Trading Day, and avoid the concept of a proportionality factor.

$$RRSA\_P\_D(p,d) = MFSAS\_P\_D(p,d) + SFSAS\_P\_D(p,d) + RFSAS\_P\_D(p,d) \tag{379}$$

Variable	Units	SC	GR	Rule	Description	Ref
RRSA_P_D(p, d)	$	P	D	9.15.1	Service Fee Settlement Amount paid to Rule Participant p for Trading Day d	(379)
MFSAS_P_D(p, d)	$	P	D		Service Fee Settlement Amount paid for the provision of market operations to Rule Participant p for Trading Day d	(380)
SFSAS_P_D(p, d)	$	P	D		Service Fee Settlement Amount paid for the provision of System Management functions to Rule Participant p for Trading Day d	(384)
RFSAS_P_D(p, d)	$	P	D		Service Fee Settlement Amount paid for the provision of regulation functions to Rule Participant p for Trading Day d	(386)

4.10.1 Market Fee Payments

$$MFSAS\_P\_D(p,d) = \sum_{i \in I(d)} MFSAS\_P\_I(p,i) \tag{380}$$

$$MFSAS\_P\_I(p,i) = \begin{cases} MFRATE\_G\_FY(i) \times (ABSGEN\_G\_I(i) + ABSLOAD\_G\_I(i)) & \text{for } p \in AEMO(i) \\ 0 & \text{for } p \notin AEMO(i) \end{cases} \tag{381}$$

$$ABSGEN\_G\_I(i) = \sum_{p \in MP(i)} ABSGEN\_P\_I(p,i) \tag{382}$$

$$ABSLOAD\_G\_I(i) = \sum_{p \in MP(i)} ABSLOAD\_P\_I(p,i) \tag{383}$$

Variable	Units	SC	GR	Rule	Description	Ref
MFSAS_P_D(p, d)	$	P	D		Service Fee Settlement Amount paid for the provision of market operations to Rule Participant p for Trading Day d	(380)
MFSAS_P_I(p, i)	$	P	I		Service Fee Settlement Amount paid for the provision of market operations to Rule Participant p for Trading Interval i	(381)
MFRATE_G_FY(fy)	$/MWh	G	FY	2.24.2	Market Fee rate applicable in Financial Year fy	I
ABSGEN_G_I(i)	MWh	G	I	9.13.1	Metered Generation in Trading Interval i	(382)
ABSLOAD_G_I(i)	MWh	G	I	9.13.1	Metered Load in Trading Interval i	(383)
ABSGEN_P_I(p, i)	MWh	P	I	9.13.1	Metered Generation for Market Participant p in Trading Interval i	(373)
ABSLOAD_P_I(p, i)	MWh	P	I	9.13.1	Metered Load for Market Participant p in Trading Interval i	(374)
MP(d)	{}	G	D	11	Set of Market Participants in Trading Day d	(5)
AEMO(d)	{}	G	D	11	Set containing the AEMO	(8)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.10.2 System Management Fee Payments

$$SFSAS\_P\_D(p,d) = \sum_{i \in I(d)} SFSAS\_P\_I(p,i) \tag{384}$$

$$SFSAS\_P\_I(p,i) = \begin{cases} SFRATE\_G\_FY(i) \times (ABSGEN\_G\_I(i) + ABSLOAD\_G\_I(i)) & \text{for } p \in SM(i) \\ 0 & \text{for } p \notin SM(i) \end{cases} \tag{385}$$

Variable	Units	SC	GR	Rule	Description	Ref
SFSAS_P_D(p, d)	$	P	D		Service Fee Settlement Amount paid for the provision of System Management functions to Rule Participant p for Trading Day d	(384)
SFSAS_P_I(p, i)	$	P	I		Service Fee Settlement Amount paid for the provision of System Management functions to Rule Participant p for Trading Interval i	(385)
SFRATE_G_FY(fy)	$/MWh	G	FY	2.24.2	System Management Fee rate applicable in Financial Year fy	I
ABSGEN_G_I(i)	MWh	G	I	9.13.1	Metered Generation in Trading Interval i	(382)
ABSLOAD_G_I(i)	MWh	G	I	9.13.1	Metered Load in Trading Interval i	(383)
SM(d)	{}	G	D	11	Set containing System Management	(9)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.10.3 Regulator Fee Payments

$$RFSAS\_P\_D(p,d) = \sum_{i \in I(d)} RFSAS\_P\_I(p,i) \tag{386}$$

$$RFSAS\_P\_I(p,i) = \begin{cases} RFRATE\_G\_FY(i) \times (ABSGEN\_G\_I(i) + ABSLOAD\_G\_I(i)) & \text{for } p \in ERA(i) \\ 0 & \text{for } p \notin ERA(i) \end{cases} \tag{387}$$

Variable	Units	SC	GR	Rule	Description	Ref
RFSAS_P_D(p, d)	$	P	D		Service Fee Settlement Amount paid for the provision of regulation functions to Rule Participant p for Trading Day d	(386)
RFSAS_P_I(p, i)	$	P	I		Service Fee Settlement Amount paid for the provision of regulation functions to Rule Participant p for Trading Interval i	(387)
RFRATE_G_FY(fy)	$/MWh	G	FY	2.24.2	Regulator Fee rate applicable in Financial Year fy	I
ABSGEN_G_I(i)	MWh	G	I	9.13.1	Metered Generation in Trading Interval i	(382)
ABSLOAD_G_I(i)	MWh	G	I	9.13.1	Metered Load in Trading Interval i	(383)
ERA(d)	{}	G	D	11	Set containing the ERA	(3)
I(d)	{}	G	D		Set of Trading Intervals in Trading Day d	I

4.11 GST

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

$$GSTSA\_P\_D(p,d) = GSTP\_P\_D(p,d) - GSTC\_P\_D(p,d) \tag{388}$$

$$GSTP\_P\_D(p,d) = \sum_{i \in I(d)} GSTP\_P\_I(p,i) \tag{389}$$

$$GSTP\_P\_I(p,i) = GST\_G\_D(i) \times \sum_{py \in PGST(p,i)} py \tag{390}$$

$$GSTC\_P\_D(p,d) = \sum_{i \in I(d)} GSTC\_P\_I(p,i) \tag{391}$$

$$GSTC\_P\_I(p,i) = GST\_G\_D(i) \times \sum_{cg \in CGST(p,i)} cg \tag{392}$$

Variable	Units	SC	GR	Rule	Description	Ref
GSTSA_P_D(p, d)	$	P	D	9.1.2	Net GST paid to Market Participant p in Trading Day d	(388)
GSTP_P_D(p, d)	$	P	D	9.1.2	GST paid to Market Participant p in Trading Day d	(389)
GSTC_P_D(p, d)	$	P	D	9.1.2	GST charged to Market Participant p in Trading Day d	(391)
GSTP_P_I(p, i)	$	P	I	9.1.2	GST paid to Market Participant p in Trading Interval i	(390)
GSTC_P_I(p, i)	$	P	I	9.1.2	GST charged to Market Participant p in Trading Interval i	(392)
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

The table below outlines the variables that are payments from AEMO to the Market Participant or charges to be paid by the Market Participant to AEMO and whether GST is applicable. The use of the character 'X' is to denote any granularity. The daily granularity variables are presented in the statement summary.

Variable	P or C	GST	Rule	Description
STEMSAS_P_X(p, x)	P	Y	9.6.1	Settlement amount for energy sold in STEM for Market Participant p in trading period x
STEMSAD_P_X(p, x)	C	Y	9.6.1	Settlement amount for energy purchased in STEM for Market Participant p in trading period x
MFSAD_P_X(p, x)	C	N		Market Fee settlement amount charged to Market Participant p for trading period x
SFSAD_P_X(p, x)	C	N		System Management Fee settlement amount charged to Market Participant p for trading period x

Variable	P or C	GST	Rule	Description
RFSAD_P_X(p, x)	C	N		Regulator Fee settlement amount charged to Market Participant p for trading period x
BSAS_P_X(p, x)	P	Y	9.8.1	Settlement amount for energy sold in the Balancing Market for Market Participant p in trading period x
BSAD_P_X(p, x)	C	Y	9.8.1	Settlement amount for energy purchased in the Balancing Market for Market Participant p in trading period x
CONC_P_X(p, x)	P	Y	9.8.1	Constrained On Compensation for Market Participant p in trading period x
COFFC_P_X(p, x)	P	Y	9.8.1	Constrained Off Compensation for Market Participant p in trading period x
DIPT3_P_X(p, x)	P	Y	6.17.6C(c)	Tranche 3 DSM Dispatch Payments for Market Participant p in trading period x
LRSF_P_X(p, x)	C	Y		Charges to cover any shortfall in Load Rejection and System Restart costs for Market Participant p in trading period x
CCDSMT3C_P_X(p, x)	C	Y		Charges to cover the cost of constrained compensation and T3 DSM Dispatch for Market Participant p in trading period x
COCP_P_X(p, x)	P	Y	9.10.1	Outage compensation payment for Market Participant p in trading period x
COCC_P_X(p, x)	C	Y	9.10.1	Charge to fund outage compensation, for Market Participant p in trading period x
UASSR_P_X(p, x)	P	Y	9.9.1	Amount paid for Synergy's provision of uncontracted Spinning Reserve Services for Market Participant p in trading period x
UASLR_P_X(p, x)	P	Y	9.9.1	Amount paid for Synergy's provision of uncontracted Load Rejection and System Restart Services for Market Participant p in trading period x
CASSR_P_X(p, x)	P	Y		Payment for the provision of contracted Spinning Reserve Services for Rule Participant p for trading period x
CASL_P_X(p, x)	P	Y		Payment for the provision of contracted Load Rejection Services for Rule Participant p for trading period x
CASR_P_X(p, x)	P	Y		Payment for the provision of contracted System Restart Services for Rule Participant p for trading period x
CASD_P_X(p, x)	P	Y		Payment for the provision of contracted Dispatch Support Services for Rule Participant p for trading period x
LFSA_P_X(p, x)	P	Y	9.9.2(c)	Amount paid for the provision of Load Following (Upwards LFAS, Downwards LFAS, Backup Upwards LFAS and Backup Downwards LFAS) to Market Participant p in trading period x
LFCC_P_X(p, x)	C	Y	9.9.2(p)	Amount charged to recover the cost of capacity associated with Load Following for Market Participant p in trading period x
LFMC_P_X(p, x)	C	Y	9.9.2(n)	Amount charged to recover the cost of Load Following (Upwards LFAS, Downwards LFAS, Backup Upwards LFAS and Backup Downwards LFAS) for Market Participant p in trading period x

Variable	P or C	GST	Rule	Description
SRAC_P_X(p, x)	C	Y	9.9.2(l)	Amount charged to recover the cost of Spinning Reserve Services for Market Participant p in trading period x
COSTLR_P_X(p, x)	C	Y	9.9.1	Amount charged to recover the cost of Load Rejection Service and System Restart Service for Market Participant p in trading period x
COSTD_P_X(p, x)	C	Y	9.9.1	Amount charged to recover the cost of Dispatch Support Services for Market Participant p in trading period x
GCCSA_P_X(p, x)	P	Y	9.7.1A	Payment for non-allocated Capacity Credits (excluding DSM and SPA) for Market Participant p in trading period x
DSMCCSA_P_X(p, x)	P	Y	9.7.1A	Payment for DSM Capacity Credits for Market Participant p in trading period x
SPACCSA_P_X(p, x)	P	Y	9.7.1A	Payment for SPA Capacity Credits for Market Participant p in trading period x
CCAOASA_P_X(p, x)	P	Y	9.7.1A	Capacity Credit Allocation over-allocation Payment (when Capacity Credit Allocations exceed IRCR) for Market Participant p in trading period x
SUPCAPSA_P_X(p, x)	P	Y	9.7.1	Payment to be made under Supplementary Capacity Contracts to Market Participant p in trading period x
DIPT2_P_X(p, x)	P	Y	6.17.6C(b)	Tranche 2 DSM Dispatch Payments for Market Participant p in trading period x
TRCC_P_X(p, x)	C	Y	9.7.1B	Charge to cover the Targeted Reserve Capacity Cost for Market Participant p in trading period x
SRCC_P_X(p, x)	C	Y	9.7.1B	Charge to cover the Shared Reserve Capacity Cost for Market Participant p in trading period x
CCR_P_X(p, x)	C	Y	4.26.2E	Capacity Cost Refund charged to Market Participant p in trading period x
IMLR_P_X(p, x)	C	Y	4.28A.1	Intermittent Load Refunds for Market Participant p in trading period x
CAPREBSA_P_X(p, x)	P	Y	4.26.4	Participant Capacity Rebate (whereby Capacity Cost Refunds are redistributed) for Market Participant p in trading period x
LFREBATE_P_X(p, x)	P	Y	9.7.1B	Payment returning cost of Capacity associated with Load Following, for Market Participant p in trading period x
MFSAS_P_X(p, x)	P	N		Service Fee Settlement Amount paid to AEMO for trading period x
SFSAS_P_X(p, x)	P	N		Service Fee Settlement Amount paid to AEMO (in its capacity as System Management) for trading period x
RFSAS_P_X(p, x)	P	N		Service Fee Settlement Amount paid to the Economic Regulation Authority in trading period x

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, which is represented by $RCSW\_G\_X(x)$.

Category	Payments	=	Charges
STEM	STEMSAS_G_X(x)	=	STEMSAD_G_X(x)

Category	Payments	=	Charges
Market Fees	MFSAS_G_X(x)	=	MFSAD_G_X(x)
System Management Fees	SFSAS_G_X(x)	=	SFSAD_G_X(x)
Regulation Fees	RFSAS_G_X(x)	=	RFSAD_G_X(x)
Balancing Market	BSAS_G_X(x)	=	BSAD_G_X(x)
Constrained Compensation and T3 DSP Dispatch	CONC_G_X(x) + COFFC_G_X(x) + DIPT3_G_X(x)	=	CCDSMT3C_G_X(x)
Changed Outage Compensation	COCP_G_X(x)	=	COCC_G_X(x)
Spinning Reserve and Load Following (ex. Capacity)	UASSR_G_X(x) + CASSR_G_X(x) + LFSA_G_X(x)	=	SRAC_G_X(x) + LFMC_G_X(x)
Load Rejection and System Restart	UASLR_G_X(x) + CASL_G_X(x) + CASR_G_X(x)	=	COSTLR_G_X(x) + LRSF_G_X(x)
Dispatch Support Services	CASD_G_X(x)	=	COSTD_G_X(x)
Capacity	GCCSA_G_X(x) + DSMCCSA_G_X(x) + SPACCSA_G_X(x) + CCAOASA_G_X(x) + SUPCAPSA_G_X(x) + DIPT2_G_X(x)	=	TRCC_G_X(x) + SRCC_G_X(x) + IMLR_G_X(x) + RCSW_G_X(x)
Capacity Cost Refunds	CCR_G_X(x)	=	CAPREBSA_G_X(x)
Load Following Capacity adjustment	LFREBATE_G_X(x)	=	LFCC_G_X(x)

5 Settlements

Daily outputs from the common calculation engine are aggregated to achieve the required settlement outputs.

5.1 High-Level Settlement Variables

For the purposes of certification, the following three equations make use of the common calculation engine to determine the high-level settlement variables defined in the rules.

$$STEMSA\_P\_W(p,w) = \sum_{d \in D\_W(w)} STEMSA\_P\_D(p,d) \tag{393}$$

$$NSTEMSA\_P\_M(p,m) = \sum_{d \in D(m)} NSTEMSA\_P\_D(p,d) \tag{394}$$

$$RRSA\_P\_M(p,m) = \sum_{d \in D(m)} RRSA\_P\_D(p,d) \tag{395}$$

Variable	Units	SC	GR	Rule	Description	Ref
STEMSA_P_W(p, w)	$	P	W	9.6.1	Settlement amount for energy cleared in STEM for Market Participant p in Trading Week w	(393)
STEMSA_P_D(p, d)	$	P	D	9.6.1	Settlement amount for energy cleared in STEM for Market Participant p in Trading Day d	(80)
NSTEMSA_P_M(p, m)	$	P	M	9.14.1	Net NSTEM Settlement amount for Market Participant p in Trading Month m	(394)
NSTEMSA_P_D(p, d)	$	P	D	9.14.1	Net NSTEM Settlement amount for Market Participant p in Trading Day d	(79)
RRSA_P_M(p, m)	$	P	M	9.15.1	Service Fee Settlement Amount paid to Rule Participant p for Trading Month m	(395)
RRSA_P_D(p, d)	$	P	D	9.15.1	Service Fee Settlement Amount paid to Rule Participant p for Trading Day d	(379)
D_W(w)	{}	G	W		Set of Trading Days in Trading Week w	I
D(m)	{}	G	M		Set of Trading Days in Trading Month m	I

5.2 Other Settlement Variables

There are other settlement variables (of Trading Month granularity) that participants can determine from the variables used in the common calculation engine.

5.2.1 Reconciliation

$$RSA\_P\_M(p,m) = \sum_{d \in D(m)} RSA\_P\_D(p,d) \tag{396}$$

Variable	Units	SC	GR	Rule	Description	Ref
RSA_P_M(p, m)	$	P	M	9.11.1	Reconciliation Settlement amount for Market Participant p in Trading Month m	(396)

Variable	Units	SC	GR	Rule	Description	Ref
RSA_P_D(p, d)	$	P	D	9.11.1	Reconciliation Settlement amount for Market Participant p in Trading Day d	(147)
D(m)	{}	G	M		Set of Trading Days in Trading Month m	I

5.2.2 Changed Outage Compensation

$$COCSA\_P\_M(p,m) = \sum_{d \in D(m)} COCSA\_P\_D(p,d) \tag{397}$$

Variable	Units	SC	GR	Rule	Description	Ref
COCSA_P_M(p, m)	$	P	M	9.10.1	Outage compensation settlement amount for Market Participant p in Trading Month m	(397)
COCSA_P_D(p, d)	$	P	D	9.10.1	Outage compensation settlement amount for Market Participant p in Trading Day d	(159)
D(m)	{}	G	M		Set of Trading Days in Trading Month m	I

5.2.3 Ancillary Services

$$ASSA\_P\_M(p,m) = \sum_{d \in D(m)} ASSA\_P\_D(p,d) \tag{398}$$

$$SynergyASPP\_P\_M(p,m) = \sum_{d \in D(m)} SynergyASPP\_P\_D(p,d) \tag{399}$$

$$ASPP\_P\_M(p,m) = \sum_{d \in D(m)} ASPP\_P\_D(p,d) \tag{400}$$

$$LFSA\_P\_M(p,m) = \sum_{d \in D(m)} LFSA\_P\_D(p,d) \tag{401}$$

$$LFCC\_P\_M(p,m) = \sum_{d \in D(m)} LFCC\_P\_D(p,d) \tag{402}$$

$$LFMC\_P\_M(p,m) = \sum_{d \in D(m)} LFMC\_P\_D(p,d) \tag{403}$$

$$SRAC\_P\_M(p,m) = \sum_{d \in D(m)} SRAC\_P\_D(p,d) \tag{404}$$

$$COSTLRD\_G\_M(m) = COSTLR\_G\_M(m) + CASD\_G\_M(m) \tag{405}$$

$$SRAC\_G\_M(m) = \sum_{i \in I\_M(m)} SRAC\_G\_I(i) \tag{406}$$

$$\begin{aligned} &ASPBP\_G\_M(m) \\ &= CASSR\_G\_M(m) + min\left(COSTLR\_G\_M(m), CASL\_G\_M(m) + CASR\_G\_M(m)\right) + CASD\_G\_M(m) \end{aligned} \tag{407}$$

Variable	Units	SC	GR	Rule	Description	Ref
ASSA_P_M(p, m)	$	P	M	9.9.1	Ancillary Services settlement amount for Market Participant p in Trading Month m	(398)
ASSA_P_D(p, d)	$	P	D	9.9.1	Ancillary Services settlement amount for Market Participant p in Trading Day d	(166)
SynergyASPP_P_M(p, m)	$	P	M	9.9.3	Payment to Synergy for un-contracted Ancillary Services for Market Participant p in Trading Month m	(399)
SynergyASPP_P_D(p, d)	$	P	D	9.9.3	Payment to Synergy for un-contracted Ancillary Services for Market Participant p in Trading Day d	(168)
ASPP_P_M(p, m)	$	P	M	9.9.3	Payment for Contracted Ancillary Services for Market Participant p in Trading Month m	(400)
ASPP_P_D(p, d)	$	P	D	9.9.3	Payment for Contracted Ancillary Services for Market Participant p in Trading Day d	(167)
LFSA_P_M(p, m)	$	P	M	9.9.2(c)	Amount paid for the provision of Load Following (Upwards LFAS, Downwards LFAS, Backup Upwards LFAS and Backup Downwards LFAS) to Market Participant p in Trading Month m	(401)
LFSA_P_D(p, d)	$	P	D	9.9.2(c)	Amount paid for the provision of Load Following (Upwards LFAS, Downwards LFAS, Backup Upwards LFAS and Backup Downwards LFAS) to Market Participant p in Trading Day d	(189)
LFCC_P_M(p, m)	$	P	M	9.9.2(p)	Amount charged to recover the cost of capacity associated with Load Following for Market Participant p in Trading Month m	(402)
LFCC_P_D(p, d)	$	P	D	9.9.2(p)	Amount charged to recover the cost of capacity associated with Load Following for Market Participant p in Trading Day d	(201)
LFMC_P_M(p, m)	$	P	M	9.9.2(n)	Amount charged to recover the cost of Load Following (Upwards LFAS, Downwards LFAS, Backup Upwards LFAS and Backup Downwards LFAS) for Market Participant p in Trading Month m	(403)
LFMC_P_D(p, d)	$	P	D	9.9.2(n)	Amount charged to recover the cost of Load Following (Upwards LFAS, Downwards LFAS, Backup Upwards LFAS and Backup Downwards LFAS) for Market Participant p in Trading Day d	(210)
SRAC_P_M(p, m)	$	P	M	9.9.2(l)	Amount charged to recover the cost of Spinning Reserve Services for Market Participant p in Trading Month m	(404)

Variable	Units	SC	GR	Rule	Description	Ref
SRAC_P_D(p, d)	$	P	D	9.9.2(l)	Amount charged to recover the cost of Spinning Reserve Services for Market Participant p in Trading Day d	(220)
COSTLRD_G_M(m)	$	G	M	3.22.1(g)	The total Load Rejection, System Restart and Dispatch Support Services payment cost for Trading Month m	(405)
COSTLR_G_M(m)	$	G	M	3.22.1(g)i	The monthly equivalent of the amount determined by the ERA to cover the costs of Load Rejection and System Restart Services, and un-contracted Dispatch Support Services for Trading Month m	(153)
CASD_G_M(m)	$	G	M	3.22.1(g)ii	The monthly amount for Dispatch Support Services for Trading Month m	(243)
SRAC_G_M(m)	$	G	M	9.9.2(l)	Total Spinning Reserve availability cost for Trading Month m	(406)
SRAC_G_I(i)	$	G	I	9.9.2(l)	Amount charged to recover the cost of Spinning Reserve Services for Trading Interval i	(222)
ASPBP_G_M(m)	$	G	M	9.9.3A	Ancillary Service Provider balance payment for Trading Month m	(407)
CASSR_G_M(m)	$	G	M	9.9.3(a)	Payment for the provision of contracted Spinning Reserve Services for Trading Month m	(217)
CASL_G_M(m)	$	G	M		Sum of amounts paid for the provision of contracted Load Rejection Services for Trading Month m	(151)
CASR_G_M(m)	$	G	M		Sum of amounts paid for the provision of contracted System Restart Services for Trading Month m	(152)
D(m)	{}	G	M		Set of Trading Days in Trading Month m	I
I_M(m)	{}	G	M		Set of Trading Intervals in Trading Month m	I

5.2.4 Reserve Capacity

$$RCSA\_P\_M(p,m) = \sum_{d \in D(m)} RCSA\_P\_D(p,d) \tag{408}$$

$$CPP\_P\_M(p,m) = \sum_{d \in D(m)} CPP\_P\_D(p,d) \tag{409}$$

$$CPC\_P\_M(p,m) = \sum_{d \in D(m)} CPC\_P\_D(p,d) \tag{410}$$

$$CAPREBSA\_P\_M(p,m) = \sum_{d \in D(m)} CAPREBSA\_P\_D(p,d) \tag{411}$$

$$GCCSA\_P\_M(p,m) = \sum_{d \in D(m)} GCCSA\_P\_D(p,d) \tag{412}$$

$$SPACCSA\_P\_M(p,m) = \sum_{d \in D(m)} SPACCSA\_P\_D(p,d) \tag{413}$$

$$IMLR\_P\_M(p,m) = \sum_{d \in D(m)} IMLR\_P\_D(p,d) \tag{414}$$

$$SUPCAPSA\_P\_M(p,m) = \sum_{d \in D(m)} SUPCAPSA\_P\_D(p,d) \tag{415}$$

$$DSMCCSA\_P\_M(p,m) = \sum_{d \in D(m)} DSMCCSA\_P\_D(p,d) \tag{416}$$

$$DIPT2\_P\_M(p,m) = \sum_{d \in D(m)} DIPT2\_P\_D(p,d) \tag{417}$$

$$CCR\_P\_M(p,m) = \sum_{d \in D(m)} CCR\_P\_D(p,d) \tag{418}$$

$$CCAOASA\_P\_M(p,m) = \sum_{d \in D(m)} CCAOASA\_P\_D(p,d) \tag{419}$$

$$TRCC\_P\_M(p,m) = \sum_{d \in D(m)} TRCC\_P\_D(p,d) \tag{420}$$

$$SRCC\_P\_M(p,m) = \sum_{d \in D(m)} SRCC\_P\_D(p,d) \tag{421}$$

$$TRCC\_G\_M(m) = \sum_{i \in I\_M(m)} TRCC\_G\_I(i) \tag{422}$$

$$SRCC\_G\_M(m) = \sum_{i \in I\_M(m)} SRCC\_G\_I(i) \tag{423}$$

$$LFREBATE\_P\_M(p,m) = \sum_{d \in D(m)} LFREBATE\_P\_D(p,d) \tag{424}$$

$$LFCC\_G\_M(m) = \sum_{i \in I\_M(m)} LFCC\_G\_I(i) \tag{425}$$

$$GCC\_P\_M(p,m) = \frac{\sum_{d \in D(m)} GCC\_P\_D(p,d)}{TDTM\_G\_M(m)} \tag{426}$$

$$DSMCC\_P\_M(p,m) = \frac{\sum_{d \in D(m)} \sum_{f \in DSP(p,d)} CC\_F\_D(f,d)}{TDTM\_G\_M(m)} \tag{427}$$

$$SPACC\_F\_M(f,m) = \frac{\sum_{d \in D(m)} SPACC\_F\_D(f,d)}{TDTM\_G\_M(m)} \tag{428}$$

$$SPACC\_G\_M(m) = \sum_{d \in D(m)} SPACC\_G\_D(d) \tag{429}$$

$$GCC\_G\_M(m) = \sum_{d \in D(m)} GCC\_G\_D(d) \tag{430}$$

$$SUPCAPSA\_G\_M(m) = \sum_{i \in I\_M(m)} SUPCAPSA\_G\_I(i) \tag{431}$$

$$DIPT2\_G\_M(m) = \sum_{i \in I\_M(m)} DIPT2\_G\_I(i) \tag{432}$$

$$IMLR\_G\_M(m) = \sum_{i \in I\_M(m)} IMLR\_G\_I(i) \quad (433)$$

$$DSMCCSA\_G\_M(m) = \sum_{i \in I\_M(m)} DSMCCSA\_G\_I(i) \quad (434)$$

$$GCCSA\_G\_M(m) = \sum_{i \in I\_M(m)} GCCSA\_G\_I(i) \quad (435)$$

$$SPACCSA\_G\_M(m) = \sum_{i \in I\_M(m)} SPACCSA\_G\_I(i) \quad (436)$$

Variable	Units	SC	GR	Rule	Description	Ref
RCSA_P_M(p, m)	$	P	M	9.7.1	Reserve Capacity settlement amount for Market Participant p in Trading Month m	(408)
RCSA_P_D(p, d)	$	P	D	9.7.1	Reserve Capacity settlement amount for Market Participant p in Trading Day d	(244)
CPP_P_M(p, m)	$	P	M	9.7.1A	Capacity Provider Payment for Market Participant p in Trading Month m	(409)
CPP_P_D(p, d)	$	P	D	9.7.1A	Capacity Provider Payment for Market Participant p in Trading Day d	(245)
CPC_P_M(p, m)	$	P	M	9.7.1B	Capacity Purchaser Charge for Market Participant p in Trading Month m	(410)
CPC_P_D(p, d)	$	P	D	9.7.1B	Capacity Purchaser Charge for Market Participant p in Trading Day d	(246)
CAPREBSA_P_M(p, m)	$	P	M	4.26.4	Participant Capacity Rebate (whereby Capacity Cost Refunds are redistributed) for Market Participant p in Trading Month m	(411)
CAPREBSA_P_D(p, d)	$	P	D	4.26.4	Participant Capacity Rebate (whereby Capacity Cost Refunds are redistributed) for Market Participant p in Trading Day d	(354)
GCCSA_P_M(p, m)	$	P	M	9.7.1A	Payment for non-allocated Capacity Credits (excluding DSM and SPA) for Market Participant p in Trading Month m	(412)
GCCSA_P_D(p, d)	$	P	D	9.7.1A	Payment for non-allocated Capacity Credits (excluding DSM and SPA) for Market Participant p in Trading Day d	(247)
SPACCSA_P_M(p, m)	$	P	M	9.7.1A	Payment for SPA Capacity Credits for Market Participant p in Trading Month m	(413)
SPACCSA_P_D(p, d)	$	P	D	9.7.1A	Payment for SPA Capacity Credits for Market Participant p in Trading Day d	(255)
IMLR_P_M(p, m)	$	P	M	4.28A.1	Intermittent Load Refunds for Market Participant p in Trading Month m	(414)
IMLR_P_D(p, d)	$	P	D	4.28A.1	Intermittent Load Refunds for Market Participant p in Trading Day d	(352)

Variable	Units	SC	GR	Rule	Description	Ref
SUPCAPSA_P_M(p, m)	$	P	M	9.7.1	Payment to be made under Supplementary Capacity Contracts to Market Participant p in Trading Month m	(415)
SUPCAPSA_P_D(p, d)	$	P	D	9.7.1	Payment to be made under Supplementary Capacity Contracts to Market Participant p in Trading Day d	(263)
DSMCCSA_P_M(p, m)	$	P	M	9.7.1A	Payment for DSM Capacity Credits for Market Participant p in Trading Month m	(416)
DSMCCSA_P_D(p, d)	$	P	D	9.7.1A	Payment for DSM Capacity Credits for Market Participant p in Trading Day d	(250)
DIPT2_P_M(p, m)	$	P	M	6.17.6C(b)	Tranche 2 DSM Dispatch Payments for Market Participant p in Trading Month m	(417)
DIPT2_P_D(p, d)	$	P	D	6.17.6C(b)	Tranche 2 DSM Dispatch Payments for Market Participant p in Trading Day d	(266)
CCR_P_M(p, m)	$	P	M	4.26.2E	Capacity Cost Refund charged to Market Participant p in Trading Month m	(418)
CCR_P_D(p, d)	$	P	D	4.26.2E	Capacity Cost Refund charged to Market Participant p in Trading Day d	(300)
CCAOASA_P_M(p, m)	$	P	M	9.7.1A	Capacity Credit Allocation over-allocation Payment (when Capacity Credit Allocations exceed IRCR) for Market Participant p in Trading Month m	(419)
CCAOASA_P_D(p, d)	$	P	D	9.7.1A	Capacity Credit Allocation over-allocation Payment (when Capacity Credit Allocations exceed IRCR) for Market Participant p in Trading Day d	(260)
TRCC_P_M(p, m)	$	P	M	9.7.1B	Charge to cover the Targeted Reserve Capacity Cost for Market Participant p in Trading Month m	(420)
TRCC_P_D(p, d)	$	P	D	9.7.1B	Charge to cover the Targeted Reserve Capacity Cost for Market Participant p in Trading Day d	(276)
SRCC_P_M(p, m)	$	P	M	9.7.1B	Charge to cover the Shared Reserve Capacity Cost for Market Participant p in Trading Month m	(421)
SRCC_P_D(p, d)	$	P	D	9.7.1B	Charge to cover the Shared Reserve Capacity Cost for Market Participant p in Trading Day d	(289)
TRCC_G_M(m)	$	G	M	4.28.3	Targeted Reserve Capacity Cost in Trading Month m	(422)
TRCC_G_I(i)	$	G	I	4.28.3	Targeted Reserve Capacity Cost in Trading Interval i	(281)
SRCC_G_M(m)	$	G	M	4.28.4	Shared Reserve Capacity Cost for Trading Month m	(423)

Variable	Units	SC	GR	Rule	Description	Ref
SRCC_G_I(i)	$	G	I	4.28.4	Shared Reserve Capacity Cost for Trading Interval i	(291)
LFREBATE_P_M(p, m)	$	P	M	9.7.1B	Payment returning cost of Capacity associated with Load Following, for Market Participant p in Trading Month m	(424)
LFREBATE_P_D(p, d)	$	P	D	9.7.1B	Payment returning cost of Capacity associated with Load Following, for Market Participant p in Trading Day d	(366)
LFCC_G_M(m)	$	G	M	9.9.2(p)	Amount charged to recover the cost of capacity associated with Load Following in Trading Month m	(425)
LFCC_G_I(i)	$	G	I	9.9.2(p)	Amount charged to recover the cost of capacity associated with Load Following in Trading Interval i	(203)
GCC_P_M(p, m)	MW	P	M	9.7.1A	Number of Capacity Credits (excluding DSM and SPA) held by Market Participant p on Trading Month m	(426)
GCC_P_D(p, d)	MW	P	D	9.7.1A	Number of Capacity Credits (excluding DSM and SPA) held by Market Participant p on Trading Day d	(249)
CC_F_D(f, d)	MW	F	D	11	Non-SPA Capacity Credits associated with Facility f on Trading Day d	I
DSMCC_P_M(p, m)	MW	P	M	4.29.3 (d)(ivA)	DSM Capacity Credits held by Market Participant p for Trading Month m	(427)
SPACC_F_M(f, m)	MW	F	M	9.7.1A	Number of Capacity Credits subject to Special Price Arrangement with Facility f in Trading Month m	(428)
SPACC_F_D(f, d)	MW	F	D		Number of Capacity Credits subject to Special Price Arrangement with Facility f in Trading Day d	I
SPACC_G_M(m)	MW	G	M		Number of Capacity Credits subject to a Special Price Arrangement in Trading Month m	(429)
SPACC_G_D(d)	MW	G	D		Number of Capacity Credits subject to a Special Price Arrangement in Trading Day d	(285)
GCC_G_M(m)	MW	G	M	9.7.1A	Number of Capacity Credits (excluding DSM and SPA) on Trading Month m	(430)
GCC_G_D(d)	MW	G	D	9.7.1A	Number of Capacity Credits (excluding DSM and SPA) on Trading Day d	(286)
SUPCAPSA_G_M(m)	$	G	M	4.28.4(b)	Payment to be made under Supplementary Capacity Contracts in Trading Month m	(431)
SUPCAPSA_G_I(i)	$	G	I	4.28.4(b)	Payment to be made under Supplementary Capacity Contracts in Trading Interval i	(293)
DIPT2_G_M(m)	$	G	M	4.28.4(bA)	Tranche 2 DSM Dispatch Payments for Trading Month m	(432)

Variable	Units	SC	GR	Rule	Description	Ref
DIPT2_G_I(i)	$	G	I	4.28.4(bA)	Tranche 2 DSM Dispatch Payments for Trading Interval i	(294)
IMLR_G_M(m)	$	G	M	4.28.4(c)	Intermittent Load Refunds for Trading Month m	(433)
IMLR_G_I(i)	$	G	I	4.28.4(c)	Intermittent Load Refunds for Trading Interval i	(295)
DSMCCSA_G_M(m)	$	G	M		Payment for DSM Capacity Credits in Trading Month m	(434)
DSMCCSA_G_I(i)	$	G	I		Payment for DSM Capacity Credits in Trading Interval i	(296)
GCCSA_G_M(m)	$	G	M		Payment for non-allocated Capacity Credits (excluding DSM and SPA) in Trading Month m	(435)
GCCSA_G_I(i)	$	G	I		Payment for non-allocated Capacity Credits (excluding DSM and SPA) in Trading Interval i	(297)
SPACCSA_G_M(m)	$	G	M		Payment for SPA Capacity Credits in Trading Month m	(436)
SPACCSA_G_I(i)	$	G	I		Payment for SPA Capacity Credits in Trading Interval i	(298)
TDTM_G_M(m)		G	M		Number of Trading Days in Trading Month m	I
DSP(d)	{}	G	D	11	Set of Demand Side Programmes in Trading Day d	(15)
D(m)	{}	G	M		Set of Trading Days in Trading Month m	I
I_M(m)	{}	G	M		Set of Trading Intervals in Trading Month m	I

5.2.5 Market Participant Fees

$$MPFSA\_P\_M(p,m) = \sum_{d \in D(m)} MPFSA\_P\_D(p,d) \tag{437}$$

Variable	Units	SC	GR	Rule	Description	Ref
MPFSA_P_M(p, m)	$	P	M	9.13.1	Market Participant Fee Settlement Amount charged to Market Participant p for Trading Month m	(437)
MPFSA_P_D(p, d)	$	P	D	9.13.1	Market Participant Fee Settlement Amount charged to Market Participant p for Trading Day d	(370)
D(m)	{}	G	M		Set of Trading Days in Trading Month m	I

6 Prudentials

Prudential calculations require the estimation of exposure before all inputs are known. To determine this estimate, AEMO uses the same settlement equations, but estimates inputs which are not known at the time of calculation. This section outlines the methodology for estimating inputs when they are unknown. The section is separated into the estimation of metering inputs and settlement inputs.

6.1 Estimating Metering Inputs

***** THIS ESTIMATION SECTION IS TO BE DEVELOPED/FORMALISED IN CONSULTATION WITH MARKET PARTICIPANTS THROUGH THE MARKET PROCEDURE CHANGE PROCESS *****
Metered Schedules will be required to be estimated for the purposes of determining a Market Participant's Outstanding Amount.
A key component of estimating Metered Schedules requires the concept of identifying Like Day, Like Periods of a Trading Interval.

6.1.1 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.

The set of 'Like Day, Like Periods' of i is represented as LDLP(i).

Refer to the table below for examples illustrating LDLP(i) for a given i.

#	i	LDLP(i)	Purpose of example
1	20:30 Fri 03 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 10 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 publishing NSTEM Statements for Trading Month March 2019 on 8 May 2019.
3	08:00 Thu 25 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).
4	07:30 Thu 25 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, $LDLP\_N\_I(n,i)$ and $LDLP\_F\_I(f,i)$ will be used as the inputs to functions that expect a single Trading Interval (and not a set of Trading Intervals). When this occurs, the implication is that the most recent interval within the set for which the relevant data exists for the facility is used in the calculation. If no relevant data exists for any LDLP, then a value of zero will be used in subsequent calculations.

6.1.2 Scaling Factors

The previous section introduces the concept of identifying LDLP for a Trading Interval i. This concept is now used to estimate data for Trading Interval i by scaling data from the most recent LDLP of Trading Interval i for which data is available. To scale the data a scaling factor (SF) is used. Scaling Factors apply to a facility (or NMI) for a specific Trading Interval.

Note that this specifically implies that an estimated value is determined for all NMIs, and the Scaling Factor is set to zero for those that are not active. The WEM Rules do not have the concept of an active NMI, and therefore all settlement calculations should be performed on any NMIs that have meter data. This philosophy is maintained during meter estimation, rather than only estimating active NMIs.

$$SF\_F\_I(f,i) = ACTIVE\_F\_D(f,i) \times \frac{RDQ\_G\_I(i)}{RDQ\_G\_I(LDLP\_F\_I(f,i))} \tag{438}$$

$$SF\_N\_I(n,i) = ACTIVE\_N\_D(n,i) \times \frac{RDQ\_G\_I(i)}{RDQ\_G\_I(LDLP\_N\_I(n,i))} \tag{439}$$

Variable	Units	SC	GR	Rule	Description	Ref
SF_F_I(f, i)		F	I		Scaling Factor for Facility f in Trading Interval i	(438)
SF_N_I(n, i)		N	I		Scaling Factor for NMI n in Trading Interval i	(439)
ACTIVE_F_D(f, d)	Flag	F	D		1 if the Facility f is registered to a Market Participant in Trading Day d and 0 otherwise	I
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
RDQ_G_I(i)	MW	G	I		Relevant Dispatch Quantity in Trading Interval i	I
LDLP_F_I(f, i)		F	I		The most recent Like Day Like Period using $SCADA\_N\_I$ data for Facility f in Trading Interval i	I
LDLP_N_I(n, i)		N	I		The most recent Like Day Like Period using $SOMS\_N\_I$ data for NMI n in Trading Interval i	I

6.1.3 Estimation

Meter Schedules are determined or estimated based on what data is available. The general philosophy for this estimation is described in order of preference by the two lists below.

For a Facility f for which no interval meters exist:

1. Use SCADA energy data if it exists for Facility f, for Trading Interval i
2. Scale SCADA energy data from a Like Day Like Period of Trading Interval i

For a Facility f for which interval meters exist:

1. Use Meter data for the entire Facility, if meter 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. Scale meter data from a Like Day Like Period of Trading Interval i

The estimated expressions vary:

- depending on whether meter data or SCADA data are used
- depending on the WEMS Facility Type

The following subsections outline the estimation methodology for each of the WEM Facility Types depending on whether SCADA or metering data is used.

6.1.3.1 SG, NSG, IRLs & NDL_WEMS

This section applies to $f \in NDL\_WEMS(d) \cup IRL(d) \cup SG(d) \cup NSG(d)$ and $f \notin IML(d) \cup EG(d) \cup RG(d)$.

When energy SCADA is used for estimation, the output of (45) is estimated as:

$$SOMS\_F\_I(f,i) = SCADA\_F\_I(f,i) \tag{440}$$

When scaled energy SCADA is used for estimation, the output of (45) is estimated as:

$$SOMS\_F\_I(f,i) = SCADA\_F\_I(f, LDLP\_F\_I(f,i)) \times SF\_F\_I(f,i) \tag{441}$$

When Metering data is used for estimation, the input of (45) is estimated as:

$$SOMS\_N\_I(n,i) = SOMS\_N\_I(n, LDLP\_N\_I(n,i)) \times SF\_N\_I(n,i) \tag{442}$$

Variable	Units	SC	GR	Rule	Description	Ref
SOMS_F_I(f, i)	MWh	F	I		Sent Out Metered Schedule for Facility f in Trading Interval i	(440) & (441)
SOMS_N_I(n, i)	MWh	N	I		Sent Out Metered Schedule for NMI n in Trading Interval i	(442)
SCADA_F_I(f, i)	MWh	F	I		Net generation measured by SCADA for Facility f in Trading Interval i, non-loss adjusted	I
SF_F_I(f, i)		F	I		Scaling Factor for Facility f in Trading Interval i	(438)
SF_N_I(n, i)		N	I		Scaling Factor for NMI n in Trading Interval i	(439)
LDLP_F_I(f, i)		F	I		The most recent Like Day Like Period using $SCADA\_N\_I$ data for Facility f in Trading Interval i	I
LDLP_N_I(n, i)		N	I		The most recent Like Day Like Period using $SOMS\_N\_I$ data for NMI n in Trading Interval i	I

6.1.3.2 IML

This section applies to $f \in IML(d)$.

When energy SCADA is used for estimating, the output of (47) & (52) are estimated as:

$$SOMSRG\_F\_I(f,i) = SCADA\_F\_I(RG(f,i),i) \tag{443}$$

$$AMQnoRG\_F\_I(f,i) = SCADA\_F\_I(f,i) \times TLF\_F\_D(f,i) \times DLF\_F\_D(f,i) \tag{444}$$

When scaled energy SCADA is used for estimating, the output of (47) & (52) are estimated as:

$$SOMSRG\_F\_I(f,i) = SCADA\_F\_I(RG(f,i), LDLP\_F\_I(RG(f,i),i)) \times SF\_F\_I(RG(f,i),i) \tag{445}$$

$$AMQnoRG\_F\_I(f,i) = SCADA(f, LDLP\_F\_I(f,i)) \times SF\_F\_I(f,i) \times TLF\_F\_D(f,i) \times DLF\_F\_D(f,i) \quad (446)$$

When Metering data is used for estimating, the input of (47), (49) & (51) are estimated as:

$$SOMS\_N\_I(n,i) = SOMS\_N\_I(n, LDLP\_N\_I(n,i)) \times SF\_N\_I(n,i) \quad (447)$$

Variable	Units	SC	GR	Rule	Description	Ref
SOMSRG_F_I(f, i)	MWh	F	I		Non-loss adjusted energy output of remote generators associated with Intermittent Load Facility f in Trading Interval i	(443) & (445)
AMQnoRG_F_I(f, i)	MWh	F	I	2.30B.10 (a)vi	Adjusted meter quantity (except Remote Generators) for Facility f in Trading Interval i	(444) & (446)
SOMS_N_I(n, i)	MWh	N	I		Sent Out Metered Schedule for NMI n in Trading Interval i	(447)
SCADA_F_I(f, i)	MWh	F	I		Net generation measured by SCADA for Facility f in Trading Interval i, non-loss adjusted	I
SF_F_I(f, i)		F	I		Scaling Factor for Facility f in Trading Interval i	(438)
SF_N_I(n, i)		N	I		Scaling Factor for NMI n in Trading Interval i	(439)
LDLP_F_I(f, i)		F	I		The most recent Like Day Like Period using $SCADA\_N\_I$ data for Facility f in Trading Interval i	I
LDLP_N_I(n, i)		N	I		The most recent Like Day Like Period using $SOMS\_N\_I$ data for NMI n in Trading Interval i	I
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
RG(d)	{}	G	D	2.30B.2(a)	Set of Scheduled Generators that serve an Intermittent Load remotely in Trading Day d	(30)
IML(d)	{}	G	D	2.30B.1	Set of Loads which have an Intermittent Load component in Trading Day d	(28)
EG(d)	{}	G	D	2.30B.2(a)	Set of Scheduled Generators that serve an Intermittent Load locally in Trading Day d	(31)

6.1.3.3 NDL_MTR

This section applies to $f \in MTR\_NDL(d)$.
Neither SCADA nor scaled SCADA are used to estimate a NDL_MTR.

When Metering data is used for estimating, the output of (44) is estimated as:

$$SOMS\_N\_I(n,i) = SOMS\_N\_I(n, LDLP\_N\_I(n,i)) \times SF\_N\_I(n,i) \quad (448)$$

Variable	Units	SC	GR	Rule	Description	Ref
SOMS_N_I(n, i)	MWh	N	I		Sent Out Metered Schedule for NMI n in Trading Interval i	(448)
SF_N_I(n, i)		N	I		Scaling Factor for NMI n in Trading Interval i	(439)
LDLP_N_I(n, i)		N	I		The most recent Like Day Like Period using $SOMS\_N\_I$ data for NMI n in Trading Interval i	I
NDL_MTR(d)	{}	G	D		Set of Non-Dispatchable Loads with interval meters that are not in WEMS in Trading Day d	I

6.1.3.4 Notional Wholesale Metered Schedules

This section applies to $f \in NOTIONAL(d)$.

The Metered Schedule for the Notional Wholesale Meter is determined using other calculated Metered Schedules as outlined in (46) and (45). Therefore, no special estimation methodology is required for the Notional Wholesale Meter.

Variable	Units	SC	GR	Rule	Description	Ref
NOTIONAL(d)	{}	G	D	11	Set containing the Notional Wholesale Meter	(24)

6.2 Estimating Settlement Inputs

***** THIS ESTIMATION SECTION IS TO BE DEVELOPED/FORMALISED IN CONSULTATION WITH MARKET PARTICIPANTS THROUGH THE MARKET PROCEDURE CHANGE PROCESS *****
Settlement inputs will be required to be estimated for the purposes of determining a Market Participant's Outstanding Amount.

6.2.1 Estimation

Settlement inputs are estimated based on what data is available. The table below specifies the different methodologies (in order of priority) for estimating various settlement inputs. If an input is not defined in the table below a zero value is used when the actual data is unavailable.

Variable	Priority	Estimation Expression	Description
BP_G_I(i)	1		Provisional Balancing Price is used
BP_G_I(i)	2		Forecast Balancing Price is used
SCADA_F_I(f, i)	1	$0.5h \times SCADAEOI\_F\_I(f, i)$	End of interval SCADA data is used
TLF_F_D(f, d)	1	1	A value of 1 is used
DLF_F_D(f, d)	1	1	A value of 1 is used

6.3 Estimated Exposure

In the WEM, Market Participants are invoiced for their participation in the market. After a Market Participant receives an initial invoice for a period of time, the invoice amount can be adjusted on multiple occasions through adjustment invoices. Any adjustment invoice amounts are subject to interest payments. Exposure is any amount of money that is estimated to be owed to/by the Market Participant, inclusive of any interest payments.

To calculate estimated exposure, the settlement amount that was previously invoiced $SA\_P\_X(p, x)_{prev}$ must be known as well as the settlement amount that is currently estimated current estimated $SA\_P\_X(p, x)_{cur}$. If no invoice has previously been issued an amount of 0 is used. Interest is then applied to the difference as per the equations below.

It is worth noting that STEM settlement amounts are not adjusted, and therefore the estimate will never be different. The implementation below relies on this fact.

$$EE\_P\_D(p,d) = -(SAadj\_P\_D(p,d) + INTEREST\_P\_D(p,d)) \quad (449)$$

$$INTEREST\_P\_D(p,d) = SAadj\_P\_D(p,d) \times \sum_{j \in INTDAYS(d)} \frac{BBR\_G\_D(j)}{365} \quad (450)$$

$$SAadj\_P\_D(p,d) = (SA\_P\_D(p,d)_{cur} + GSTSA\_P\_D(p,d)_{cur}) - (SA\_P\_D(p,d)_{prev} + GSTSA\_P\_D(p,d)_{prev}) \quad (451)$$

Variable	Units	SC	GR	Rule	Description	Ref
EE_P_D(p, d)	$	P	D		Estimated exposure for Market Participant p relating to Trading Day d	(449)
INTEREST_P_D(p, d)	$	P	D	9.1.3	Interest payment to be made to Market Participant p relating to Trading Day d	(450)
BBR_G_D(d)		G	D		Annual Bank Bill Rate applicable to Trading Day d	I
SAadj_P_D(p, d)	$	P	D		Difference in settlement amount (between current estimate and previous estimate) for Market Participant p in Trading Day d	(451)
SA_P_D(p, d)$_{cur}$	$	P	D		Current estimate of settlement amount for Market Participant p in Trading Day d	(78)
SA_P_D(p, d)$_{prev}$	$	P	D		Previous estimate of settlement amount (at time of last issued Settlement Statement for Trading Day d) for Market Participant p in Trading Day d	(78)
GSTSA_P_D(p, d)$_{cur}$	$	P	D	9.1.2	Current estimate of net GST paid to Market Participant p in Trading Day d	(388)
GSTSA_P_D(p, d)$_{prev}$	$	P	D	9.1.2	Previous estimate of net GST paid to Market Participant p in Trading Day d	(388)
INTDAYS(d)	{}	G	D	9.1.3	Set of days from (and including) the settlement day associated with the original NSTEM Settlement Statement up to (but excluding) settlement day associated with the most recently published NSTEM Settlement Statement for Trading Day d	I

6.4 Trading Margin

$$TM\_P\_D(p,d) = TL\_P\_D(p,d) - OA\_P\_D(p,d) \quad (452)$$

$$TL\_P\_D(p,d) = PF\_G\_D(d) \times CREDSUP\_P\_D(p,d) \quad (453)$$

$$PF\_G\_D(d) = 0.87 \quad (454)$$

$$OA\_P\_D(p,d) = CEE\_P\_D(p,d) + INP\_P\_D(p,d) - PP\_P\_D(p,d) \quad (455)$$

$$CEE\_P\_D(p,d) = \sum_{j \in EXPDAYS(d)} EE\_P\_D(p,j) \tag{456}$$

Variable	Units	SC	GR	Rule	Description	Ref
TM_P_D(p, d)	$	P	D	2.41.1	Trading Margin for Market Participant p for Trading Day d	(452)
TL_P_D(p, d)	$	P	D	2.39.1	Trading Limit for Market Participant p for Trading Day d	(453)
CREDSUP_P_D(p, d)	$	P	D	2.38	Credit Support held by AEMO on behalf of Market Participant p on Trading Day d	I
PF_G_D(d)		G	D	2.39.2	Prudential factor on Trading Day d	(454)
OA_P_D(p, d)	$	P	D	2.40.1	Outstanding Amount for Market Participant p on Trading Day d	(455)
INP_P_D(p, d)	$	P	D		Amount of money a Rule 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 Market Participant p on Trading Day d	I
CEE_P_D(p, d)	$	P	D		Cumulative Estimated exposure for Market Participant p as calculated on Trading Day d	(456)
EE_P_D(p, d)	$	P	D		Estimated exposure for Market Participant p relating to Trading Day d	(449)
EXPDAYS(d)	{}	G	D		Set of Trading Days that have not yet had the final Settlement Statement issued, up to and including Trading Day d-1	I