NATIONAL ELECTRICITY MARKET

CREDIT LIMIT PROCEDURES

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Approved for distribution and use by:
APPROVED BY: Peter Geers
TITLE: Chief Strategy and Markets Officer, Strategy and Markets

DATE: TBA

VERSION RELEASE HISTORY

Version	Effective Date	Summary of Changes
1.0	29 January 2013	Initial Version
2.0	1 August 2014	Amendments to: • Address any repeal of the *Clean Energy Act 2011*. • Update section 10.2 for new entrants and inactive participants to improve consistency with standard determination of credit support. Refer to the current version of the Rules.
3.0	1 July 2017	Amendments to: • Include calculation of the prudential margin (PM) with full offsets between reallocation and energy amounts, effective for *prudential settings* applicable to periods commencing on or after 30 November 2017. • Add provisions for determination of a maximum credit limit (MCL) for Market Network Service Providers (MNSPs). • Add a section for managing prudential risk during transition from one season to the next. • Update the process for estimation of reallocation and generation amounts. Update the section on the impact of the repealed Clean Energy Act 2011.
4.0	1 May 2018	Amendments to: • Update weighting factors for average regional price and regional volatility. • Update capping factors for average regional price and regional volatility. • Update clause 10.3, relating to the use of reallocations in calculating MNSP prudential requirements. Changes effective for *prudential settings* applicable to periods commencing on or after 1 May 2018.
5.0	TBA	• Reflect new AEMO procedures format. • Reflect 5 Minute Settlement Rule Change. • Minor spelling/grammatical error fixes. • Moving the month of April to the winter season.

CONTENTS

FIGURES

1. INTRODUCTION

1.1. Purpose and scope

These are the *credit limit procedures* (Procedures) made under clause 3.3.8 of the National Electricity Rules (NER). These Procedures have effect only for the purposes set out in the NER. The NER and the National Electricity Law prevail over these Procedures to the extent of any inconsistency.

These Procedures establish the methodology by which the Australian Energy Market Operator (*AEMO*) will determine the *prudential settings* for each *Market Participant* so that the *prudential standard* is met for the *National Electricity Market* (*NEM*).

The *prudential settings* for a *Market Participant* comprise its *maximum credit limit* (MCL), *outstandings* limit (OSL) and *prudential margin* (PM). The MCL is the sum of the OSL and the PM.

The *prudential standard* means the value of the prudential probability of exceedance (POE), expressed as a percentage. The POE means the probability of a *Market Participant's* MCL being exceeded by its *outstandings* at the end of the *reaction period* following the *Market Participant* exceeding its OSL on any day and failing to rectify this breach. Clause 3.3.4A of the NER defines the *prudential standard* as 2%.

1.2. Definitions and interpretation

1.2.1. Glossary

Terms defined in the National Electricity Law or the NER have the same meanings in these Procedures unless otherwise specified in this clause. Terms defined in the NER are intended to be identified in these Procedures by italicising them, but failure to italicise a defined term does not affect its meaning.

The words, phrases, and abbreviations in the table below have the meanings set out opposite them when used in these Procedures.

Term	Definition
ex ante	Describes a *reallocation transaction* that occurs in or after the earliest *trading interval* which it may be processed as an 'ex ante reallocation' based on the time of registration of the applicable *reallocation request* in accordance with the *reallocation timetable*
GST	Goods and Services Tax
LWPR	load weighted price ratio
OSL	*outstandings limit*
MCL	*maximum credit limit*
MLF	*marginal loss factor*
MNSP	*Market Network Service Provider*
NER	National Electricity Rules
PM	*prudential margin*
PM Full Offset	As described in clause 4.3.3
PM Limited Offset	As described in clause 4.3.3
POE	*prudential probability of exceedance*

Term	Definition
PRAF	Participant Risk Adjustment Factor specific to *Market Participant*
Procedures	*credit limit procedures*
RRP	*regional reference price*
SGA	*Market Small Generation Aggregator*
TA	*typical accrual*
TI	*trading interval*
VF	volatility factor

1.2.2. Interpretation

These Procedures are subject to the principles of interpretation set out in Schedule 2 of the National Electricity Law.

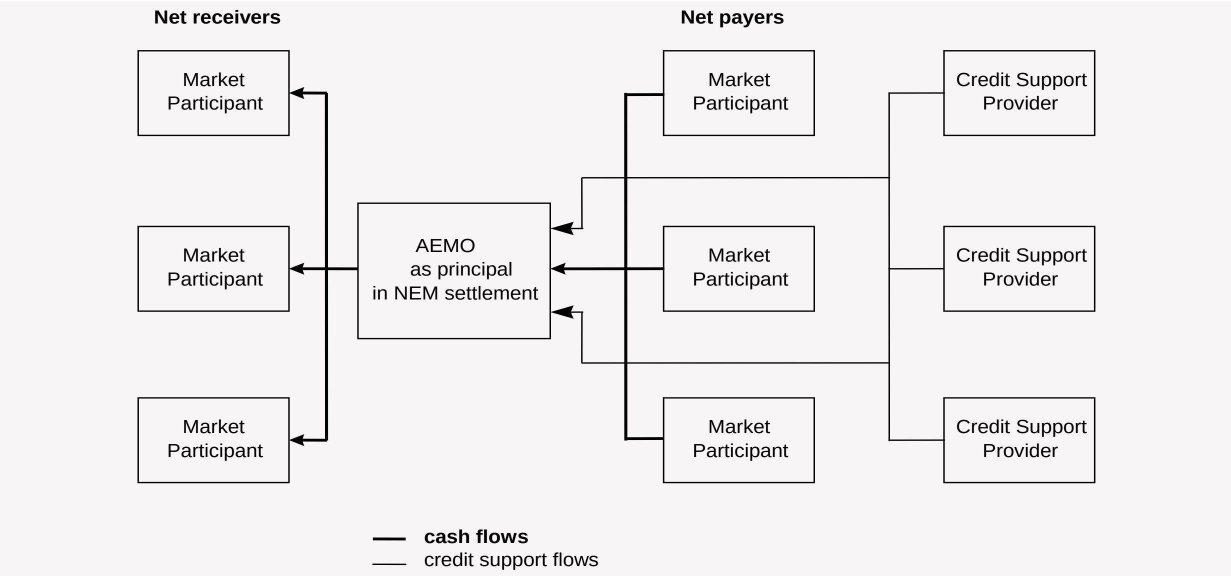
1.3. Related documents

Reference	Title	Location
500-0105	Reallocation Procedure: Swap and Option Offset Reallocations	AEMO website: http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Settlements-and-payments/Prudentials-and-payments/Procedures-and-guides
500-0096	Reallocation Procedure: Energy and Dollar Offset Reallocations	AEMO website: http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Settlements-and-payments/Prudentials-and-payments/Procedures-and-guides

2. CREDIT SUPPORT IN THE NEM

AEMO's obligation to settle payments due to *Market Participants* in relation to a *billing period* is limited to the extent of funds received from *Market Participants* in respect of that *billing period* or provided under *credit support* arrangements. The relationship between *AEMO* and the *Market Participants* is illustrated in the following diagram:

Figure 1 Settlement of NEM transactions



If a *Market Participant* cannot satisfy the *acceptable credit criteria*, that *Market Participant* must provide *AEMO* with an unconditional guarantee in the form specified by *AEMO* from a *credit support* provider that meets the *acceptable credit criteria* for an amount that is greater than or equal to the *Market Participant's* MCL. *AEMO* may draw on the guarantee if payment is not cleared in time to meet a settlement deadline.

Any shortfall in *AEMO*'s recovery from any *Market Participant* in relation to a *billing period* is shared proportionally by *Market Participants* due payments in that billing cycle in accordance with clauses 3.15.22 and 3.15.23 of the NER.

3. PURPOSE AND REQUIREMENTS OF PRUDENTIAL SETTINGS

3.1. Maximum credit limit

(a) Confidence of the *Market Participants* in the financial settlement of spot electricity transactions is critical to the operation of the *NEM* and setting the *spot market* price (*regional reference price* or RRP).

(b) The NER require *Market Participants* to provide *credit support* in the form of an unconditional guarantee from an approved financial institution to pay *AEMO* an amount up to a pre-determined value, which is the MCL.

(c) The MCL is that amount which results in a 2% likelihood of a *Market Participant's credit support* being exceeded by its *outstandings* at the end of the *reaction period* following the *Market Participant* exceeding its OSL on any day, and failing to rectify this breach.

(d) AEMO's processes for determining the MCL have been designed to take account of seasonal differences in RRPs, volatility, and *Market Participants'* particular characteristics.

3.2. Outstandings limit

The purpose of the OSL is to ensure that the NEM is not exposed to a prudential risk inconsistent with the *prudential standard* during the OSL time period (T_{OSL}), which is 35 days.

3.3. Prudential margin

The purpose of the PM is to ensure that the NEM is not exposed to a prudential risk inconsistent with the *prudential standard* during the period of suspending a defaulting *Market Participant* from the *NEM* (the *reaction period,* T_{RP}, which is seven days).

3.4. NER requirements for prudential settings

These Procedures are based on a number of components that *AEMO* must consider in determining *prudential settings*, as set out in clause 3.3.8(d) of the NER:

(a) the RRP for the region for which the *prudential settings* are being calculated;

(b) the time of year;

(c) the volatility of *load* and RRP for the *regions*;

(d) AEMO's estimate of the *generation* and *load* for each *Market Participant*,

(e) the relationship between average *load* and peak *load* for each *Market Participant*;

(f) any ex ante *reallocations* for the period being assessed;

(g) the correlation between *energy*, *reallocations,* and the RRP;

(h) the statistical distribution of any accrued amounts that may be owed to *AEMO*;

(i) the relevant time period for which the *prudential settings* are being calculated; and

(j) any other factors *AEMO* considers relevant having regard to the objective of the Procedures.

4. MEETING THE PRUDENTIAL STANDARD

4.1. Approach to calculating the MCL

(a) The MCL calculation takes into account:

(i) expected *regional load* and RRPs;

(ii) a measure of *regional* volatility consistent with the 2% POE target;

(iii) *Market Participants'* expected *load*, *generation*, and *reallocations*;

(iv) a *Market Participant's* load-weighted price applicable to their *load*, *generation* and *reallocations*; and

(v) the relevant time period, in days.

(b) In undertaking these calculations, there are a number of:

(i) *regional* calculations that establish the *regional* inputs into the calculation of a *Market Participant's* OSL and PM;

(ii) *regional* calculations, common to all *Market Participants*, that are used in the calculation of an individual *Market Participant's* OSL and PM; and

(iii) *Market Participant* specific calculations that result in a *Market Participant's* OSL and PM.

(c) The diagram below provides a high-level schematic of the relationship between the *regional* calculations and the calculation of a *Market Participant's* OSL and PM.

(d) There are also a number of elements common to the calculation for *Market Participants* in all *regions*, which include:

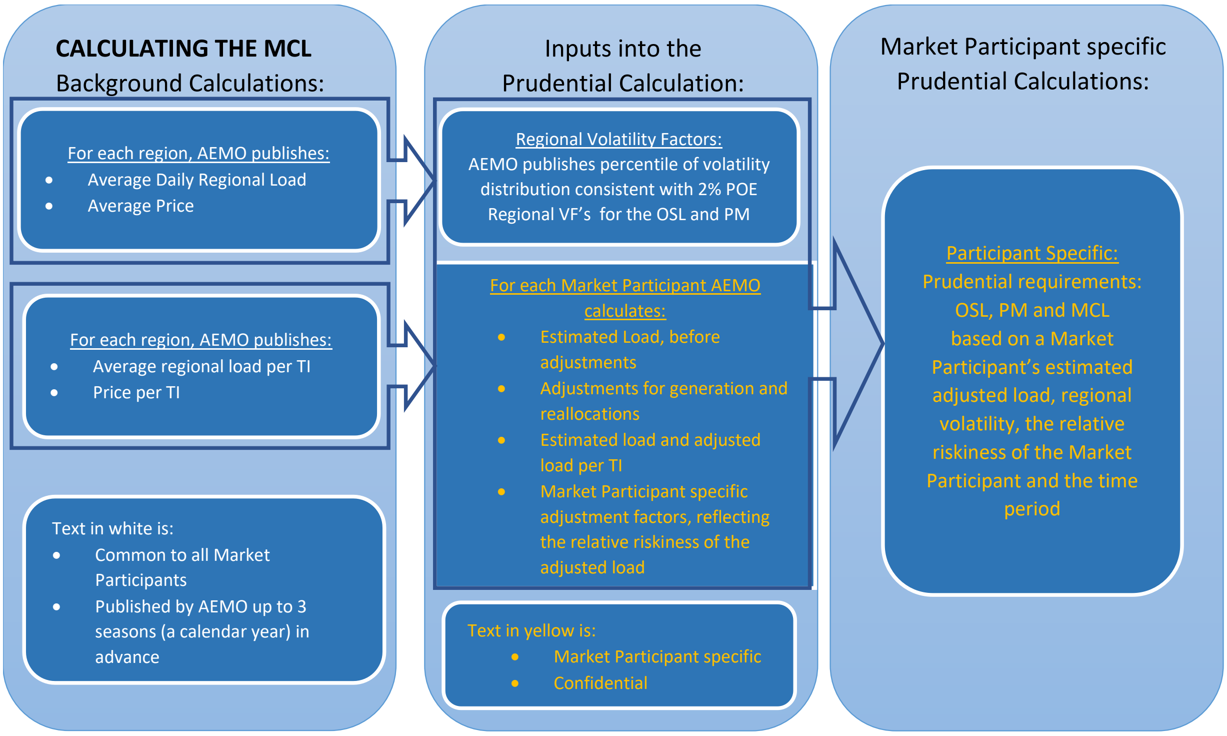
(i) the seasonal calendar used for the three identified seasons – summer, winter, and shoulder;

(ii) the time periods used in the OSL and the PM; and

(iii) where appropriate, goods and services tax (GST).

(e) This clause 0 lists the elements in each part of the MCL calculation for *Market Participants* other than *MNSPs*, while the specific equations are discussed in clauses 5 to 9 of these Procedures.

(f) Many of the inputs and calculations described in this clause cannot be readily applied to the determination of *prudential settings* for *Market Network Service Providers* (MNSPs). In order to meet the *prudential standard*, the MCL for MNSPs will be determined in accordance with clause 10.3.



4.2. Statistical approach to the development of these Procedures

4.2.1. Overview

(a) The Procedures have been designed to:

(i) take account of all the available data, using all the RRP and *load* data available for each of the *regions* of the *NEM*;

(ii) smooth changes in *Market Participants'* required MCLs from one season to the corresponding season in the following year resulting from one-off changes to average RRPs and *regional* volatility, while responding to longer-term trend changes; and

(iii) provide for *Market Participant* specific factors to be taken into account where these characteristics differ from those of the *region*.

(b) *AEMO* intends that the application of the Procedures will meet the *prudential standard* on average over time, with no systematic or persistent bias in the estimated MCL for any category of *Market Participants*. Given the nature of the estimation process and the information used in calculating these Procedures – both of which are backwards-looking – from time to time it can be expected that the *prudential standard* may not be met or may be exceeded. While *AEMO* is required to publish an annual report of the performance of these Procedures in meeting the *prudential standard* (Clause 3.3.8(f) of the NER), several years' experience of operating the Procedures will be required before a detailed evaluation of their performance can be undertaken.

4.2.2. Approach to calculating the level of volatility consistent with a 2% POE

(a) Regional inputs used in the volatility factor calculation

(i) The historical *regional load*, RRP and the relevant time period are used to calculate the level of total *outstandings* for a given *region*, without adjusting for *generation* or *reallocations*.

(ii) Estimated *regional load* and estimated RRP are calculated on a seasonal basis, using an exponential weighted moving average process that considers all available data for the relevant season. This approach considers the seasonal data as a continuous series over the entire period for which data is available.

(iii) The level of OSL and PM required to meet a 2% POE for each *region* is assessed against the historical *regional outstandings*. The OSL and PM requirements are determined with regard to estimated *regional loads*, estimated *regional* RRPs, estimated volatility factors (VFs) for the PM and OSL and the appropriate time periods (T_{OSL},T_{RP}).

(b) Calculating the appropriate level of volatility

(i) The distribution from one day to the next in the level of *outstandings* (volatility) is used to establish the point on that distribution consistent with a 2% POE for a given *region*. The point on the distribution consistent with a 2% POE differs by *region*.

(ii) *AEMO* publishes its calculation of the percentile of the volatility distribution consistent with a 2% POE for each *region* annually in advance.

4.2.3. Approach to calculating OSL and PM

(a) The approach to calculating a *Market Participant's* OSL and PM considers:

(i) *regional* parameters such as estimated RRP and estimated volatility;

(ii) an estimate of a *Market Participant's* future *load*, *generation* and *reallocations*; and

(iii) a *Market Participant's* specific characteristics, through the use of a load-weighted price ratio (LWPR) for *load*, *generation* and *reallocations*.

(b) The LWPR is:

(i) based on the *Market Participant's* expected profile for *load* (adjusted for MLFs), *generation* (adjusted for MLFs), or *reallocations* per TI as appropriate, as well as expected *regional* RRPs; and

(ii) expressed as an index relative to the expected RRP, where a value greater than one indicates that a *Market Participant's* load-weighted price is higher than that for the *region*.

4.3. Parameters used in these Procedures

4.3.1. Elements common to all regions

(a) Season definitions

There are three seasons used for all *regions*:

(i) Summer, which is the period beginning 1 December and ending 31 March;

(ii) Winter, which is the period beginning 1 April and ending 31 August; and

(iii) Shoulder, which is the period from 1 September to 30 November.

Unless explicitly stated, all factors and calculated items are performed for each season.

(b) *Outstandings Limit* Time Period (T_{OSL}) and *Reaction Period* Time Period (T_{RP})

The OSL time period (T_{OSL}) is the typical number of trading days used to calculate a *Market Participant*'s OSL. It has two components, namely:

(i) the *billing period*, which is defined as seven days; and

(ii) the *payment period*, which is estimated to be 28 days.

Accordingly, the OSL time period (T_{OSL}) is 35 days.

The *reaction period* time period (T_{RP}) is seven days.

(c) Goods and Services Tax rate (GST)

(i) The GST rate is the value of the GST which is applicable for the three month period following the date of the OSL and PM calculation.

(ii) GST applies to *energy* purchases and sales in the NEM. Accordingly, the OSL and PM calculation allows for the additional liability due to GST on the value of *AEMO*'s estimate of *energy* trading. As *reallocation transaction* amounts do not attract GST, it is not applied to the *reallocation* elements of the calculation.

4.3.2. Regional level calculations

(a) The parameters resulting from the *regional* level calculations are identical for all *Market Participants*. *AEMO* publishes the seasonal parameters in advance for all *regions*.

(b) Calculations used in determining VF for the OSL ($VFOSL_R$) and the PM ($VFPM_R$)

(i) *Regional* level parameters are calculated for each season:

(A) estimated average RRP for the *region* (P_R); and

(B) estimated average daily *regional load* (ERL_R).

(ii) These parameters are used to derive the Outstandings Limit Volatility Factor ($VFOSL_R$) and the Prudential Margin Volatility Factor ($VFPM_R$). The $VFOSL_R$ and the $VFPM_R$ are derived from the distribution of the estimated *load* (ERL_R) and estimated RRP (P_R) and are set at a level to ensure that, for each *region*, the *prudential standard* is met.

(c) Calculations used in determining a *Market Participant*'s OSL and PM

(i) *Regional* level parameters calculated for each season per TI:

(A) estimated RRP ($P_{TI,R}$) for the *region*;

(B) estimated capped average RRP for the *region* for cap value C ($P_{TI,R,C}$); and

(C) estimated average *regional load* ($ERL_{TI,R}$).

(ii) These parameters are used to adjust a *Market Participant's* characteristics for its behaviour relative to that of the relevant *region*. These parameters are the same for all *Market Participant*s in a given *region*.

4.3.3. Market Participant specific calculations

(a) The calculation of a *Market Participant*'s OSL considers:

(i) the *Market Participant's* trading behaviour in the *NEM*, including *energy* purchases (EL_R), *generation* sales (EG_R) and *reallocation* (RC_R, RCS_R, $RCC_{R,C}$ where the *Market Participant* is the credit party and RD_R, RDS_R, $RDC_{R,C}$ where the *Market Participant* is the debit party) (refer to clause 9.4.5);

(ii) swap *reallocations*, valued at the difference between the strike price (PCS_R) and the VF adjusted average RRP;

(iii) cap *reallocations* (floor *reallocations* are not included in the calculation);

(iv) the relationship between *regional load* and the *Market Participant's* MLF adjusted *load*, expressed in a Participant Risk Adjustment Factor ($PRAF_{L,R}$) that adjusts the OSL to reflect the *Market Participant's* relative risk of their *load*;

(v) the relationship between *regional load* and the *Market Participant's* MLF adjusted *generation*, expressed in a Participant Risk Adjustment Factor ($PRAF_{G,R}$) that adjusts the OSL to reflect the *Market Participant's* relative risk of their *generation*;

(vi) the relationship between *regional load* and the *Market Participant's* net energy and swap *reallocations*, expressed in a Participant Risk Adjustment Factor ($PRAF_{R,R}$) that adjusts the OSL to reflect the *Market Participant's* relative risk of their swap and energy *reallocations*;

(vii) the relationship between *regional load* and the *Market Participant's* net cap *reallocations*, expressed in a Participant Risk Adjustment Factor ($PRAF_{R,R,C}$) that adjusts the OSL to reflect the *Market Participant's* relative risk of their cap *reallocations*; and

(viii) the distribution of credit and debit amounts across *regions*. In cases where there is more credit amount than debit amount in a given region, the OSL reduction attributable to the credit in excess of the debit amount (up to the amount of the total of debit amount in excess of credit amount in each of the other *regions*) is calculated without the VF. This approach is based on an assumption that high prices are not correlated across *regions*.

(b) In calculating a PM for a *Market Participant*, AEMO applies one of two methodologies:

(i) PM Full Offset (applicable to a *Market Participant* that has opted to apply PM Full Offset under clause 4.3.5 for the period to which the calculation applies). The calculation methodology for PM Full Offset is based on components that correspond with the OSL calculation described above, with *reallocation amounts* taken into account in accordance with clause 9.4.5.

(ii) PM Limited Offset (applicable in all other cases). The calculation methodology for PM Limited Offset is based on components that correspond with the OSL calculation, but excluding the *Market Participant's*:

(A) quantity and pattern of *trading amounts* where the estimate of the aggregate of all *trading amounts* for the period being assessed is a positive amount; and

(B) quantity and pattern of *reallocation amounts* where the estimate of the aggregate of all *reallocation* amounts for the period being assessed is a positive amount.

(c) The PM is always assessed over a period equal to the *reaction period* (T_{RP}, defined as seven days).

4.3.4. General calculation principles for OSL and PM

(a) A scaling factor is used to account for GST.

(b) After adjustments to a *Market Participant's* estimated *load*, *generation* and *reallocations*, a *Market Participant's* OSL is calculated as a function of:

(i) *The Market Participant's* estimated *load*, *generation*, and *reallocations*;

(ii) the estimated RRP, adjusted by a PRAF specific to that *Market Participant*; and

(iii) the VF for the OSL applicable to the relevant *region* ($VFOSL_R$);

(iv) GST; and

(v) the OSL time period (T_{OSL}), which is 35 days.

(c) A *Market Participant's* PM is calculated on a similar basis, using parameters specific to the *reaction period*, T_{RP}.

(d) The OSL may be negative but no less so than the absolute value of the PM. The PM may not be less than zero.

(e) Rounding is applied to the OSL and PM to eliminate insignificant changes and to simplify the management of credit support.

4.3.5. Application of Full Offset

(a) PM Full Offset can be applied in determining a *Market Participant's* PM if:

(i) the PM is to apply for a period commencing on or after 30 November 2017; and

(ii) the Market Participant has opted to apply PM Full Offset under this clause for the period to which the PM calculation applies, and that option has been recorded in AEMO's prudential systems.

(b) A *Market Participant* may at any time opt to:

(i) apply PM Full Offset; or

(ii) disable PM Full Offset (in which case PM Limited Offset will apply),

using the request form specified by AEMO for that purpose, with an effective date not less than 10 *business days* after submitting the form.

(c) After successful validation of an application, the option will be recorded in AEMO's prudential systems and confirmation will be sent to the *Market Participant*.

5. THE OUTSTANDINGS LIMIT CALCULATION

The OSL Calculation is represented by:

$OSL = \Sigma_R \; MAX(OSL_{R,I} , OSL_{R,U})$

$OSL_{R,U} = (VEL_R + VRD_R + RD\$_R) \times T_{OSL}$ (OSL increased by debit)

$- (VEG_R + VRC_R + RC\$_R) \times T_{OSL}$ (OSL decreased by credit)

$OSL_{R,I} = (VEL_R + VRD_R) \times T_{OSL} / VFOSL_R$

$- (VEG_R + VRC_R) \times T_{OSL} / VFOSL_R$

$+ (RD\$_R - RC\$_R) \times T_{OSL}$

$VEL_R = EL_R \times P_R \times PRAF_{L,R} \times VFOSL_R \times (GST + 1)$ (value of *energy load*)

$VEG_R = EG_R \times P_R \times PRAF_{G,R} \times VFOSL_R \times (GST + 1)$ (value of *energy generation*)

$VRD_R = RD_R \times P_R \times PRAF_{R,R} \times VFOSL_R$ (value of debit *energy reallocations*)

$+ RDS_R \times (P_R \times PRAF_{R,R} \times VFOSL_R - PDS_R)$ (value of debit swap *reallocations*)

$+ \Sigma_C \; [RDC_{R,C} \times$

$(P_R \times PRAF_{R,R} \times VFOSL_R - P_R \times PRAF_{R,R,C} \times VFOSL_R)]$ (value of debit cap *reallocations*)

$VRC_R = RC_R \times P_R \times PRAF_{R,R} \times VFOSL_R$ (value of credit *energy* reallocations)

$+ RCS_R \times (P_R \times PRAF_{R,R} \times VFOSL_R - PCS_R)$ (value of credit swap *reallocations*)

$+ \Sigma_C \; [RCC_{R,C} \times$

$(P_R \times PRAF_{R,R} \times VFOSL_R - P_R \times PRAF_{R,R,C} \times VFOSL_R)]$ (value of credit cap *reallocations*)

where:

Regional Parameters:

GST Represents the applicable rate for the Goods and Services Tax.

P_R Represents *AEMO's* estimate of the average future RRP for each *region* R.

T_{OSL} Is the OSL time period, which is 35 days.

$VFOSL_R$ Is a volatility factor, which is a scaling factor specific to the OSL used to achieve the *prudential standard* for each *region* R.

Market Participant Specific Parameters:

$OSL_{R,U}$ Represents the *regional* OSL with full allowance for *regional* volatility.

$OSL_{R,I}$ Represents the *regional* OSL with no allowance for *regional* volatility.

VEL_R Represents the value of *load* for a *Market Participant* in *region* R.

VEG_R Represents the value of *generation* for a *Market Participant* in *region* R.

VRD_R Represents the value of debit energy *reallocations* for a *Market Participant* in *region* R.

VRC_R	Represents the value of credit energy *reallocations* for a *Market Participant* in *region* R.
$PRAF_{L,R}$	Is a Participant Risk Adjustment Factor (*load*) used to adjust the OSL and PM for a *Market Participant* to reflect their relative *load* risk and achieve the *prudential standard* in *region* R for the *Market Participant*.
$PRAF_{G,R}$	Is a Participant Risk Adjustment Factor (*generation*) used to adjust the OSL and PM for a participant to reflect their relative *generation* risk and achieve the *prudential standard* in *region* R for the *Market Participant*.
$PRAF_{R,R}$	Is a Participant Risk Adjustment Factor (energy and swap reallocations) used to adjust the OSL and PM for a *Market Participant* to reflect their relative energy and swap reallocation risk and achieve the *prudential standard* in *region* R for the *Market Participant*.
$PRAF_{R,R,C}$	Is a Participant Risk Adjustment Factor (cap reallocations) for a cap value of C used to adjust the OSL and *PM* for a *Market Participant* to reflect their relative risk of cap *reallocations* and achieve the *prudential standard* in *region* R for the *Market Participant*.
EL_R	Represents *AEMO*'s estimate of the *Market Participant's* average daily *load* in *region* R.
EG_R	Represents *AEMO*'s estimate of the *Market Participant's* average daily *generation* in *region* R.
RC_R	Represents the average daily *energy* of ex ante energy *reallocation transactions*, for which the *Market Participant* is the credit party in *region* R.
RD_R	Represents the average daily *energy* of ex anteenergy *reallocation transactions* for which the *Market Participant* is the debit party in *region* R.
RCS_R	Represents the average daily *energy* of ex ante swap *reallocation transactions*, for which the *Market Participant* is the credit party in *region* R.
RDS_R	Represents the average daily *energy* of ex anteswap *reallocation transactions* for which the *Market Participant* is the debit party in *region* R.
PCS_R	Represents the swap energy-weighted average strike price for ex ante swap *reallocation transactions* for which the *Market Participant* is the credit party in *region* R.
PDS_R	Represents the swap energy-weighted average strike price for ex anteswap *reallocation transactions* for which the *Market Participant* is the debit party in *region* R.
$RCC_{R,C}$	Represents the average daily *energy* of ex ante cap *reallocation transactions* for which the *Market Participant* is the credit party, for a cap value C in *region* R.
$RDC_{R,C}$	Represents the average daily *energy* of ex antecap reallocation transactions for which the *Market Participant* is the debit party, for a cap value C in *region* R.
$RC\$_R$	Represents the average daily dollar amount of ex ante dollar *reallocation transactions* for which the *Market Participant* is the credit party, in *region* R.
$RD\$_R$	Represents the average daily dollar amount of ex antedollar *reallocation transactions* for which the *Market Participant* is the debit party, in *region* R.

The calculated value is rounded in accordance with clause 10.1.

Detailed definitions of each term are provided in clause 9.

6. THE PRUDENTIAL MARGIN CALCULATION

The PM calculation is represented by:

$PM = PM_L$ or PM_F (either PM Limited Offset (PM_L) or PM Full Offset (PM_F))

$PM_L = MAX\ [\boldsymbol{\Sigma}_R\ (PM_{R,E}),0] + MAX[\boldsymbol{\Sigma}_R\ (PM_{R,R}),0]$ (PM Limited Offset)

$PM_F = MAX\ [\ \sum_R MAX(PM_{R,U}\ ,\ PM_{R,I}),\ 0\ ]$ (PM Full Offset)

$PM_{R,E} = MAX\ [\ (VEL_R – VEG_R) \times T_{RP}, (VEL_R – VEG_R) \times T_{RP}/\ VFPM_R\ ]$

$PM_{R,R} = MAX\ [\ (VRD_R – VRC_R + RD\$_R – RC\$_R) \times T_{RP},$

$(VRD_R – VRC_R)\ /\ VFPM_R \times T_{RP} + (RD\$_R – RC\$_R) \times T_{RP}\ ]$

$PM_{R,U} = (VEL_R + VRD_R + RD\$_R) \times T_{RP}$ (PM increased by debit)

$– (VEG_R + VRC_R + RC\$_R) \times T_{RP}$ (PM decreased by credit)

$PM_{R,I} = (VEL_R + VRD_R) \times T_{RP}\ /\ VFPM_R$

$– (VEG_R + VRC_R) \times T_{RP}/\ VFPM_R$

$+ (RD\$_R – RC\$_R) \times T_{RP}$

$VEL_R = EL_R \times P_R \times PRAF_{L,R} \times VFPM_R \times (GST + 1)$ (value of energy *load*)

$VEG_R = EG_R \times P_R \times PRAF_{G,R} \times VFPM_R \times (GST + 1)$ (value of energy *generation*)

$VRD_R = RD_R \times P_R \times PRAF_{R,R} \times VFPM_R$ (value of debit energy *reallocations*)

$+ RDS_R \times (P_R \times PRAF_{R,R} \times VFPM_R– PDS_R)$ (value of debit swap *reallocations*)

$+ \Sigma_C\ [RDC_{R,C} \times$

$(P_R \times PRAF_{R,R} \times VFPM_R – P_R \times PRAF_{R,R,C} \times VFPM_R)]$ (value of debit cap *reallocations*)

$VRC_R = RC_R \times P_R \times PRAF_{R,R} \times VFPM_R$ (value of credit energy *reallocations*)

$+ RCS_R \times (P_R \times PRAF_{R,R} \times VFPM_R – PCS_R)$ (value of credit swap *reallocations*)

$+ \Sigma_C\ [RCC_{R,C} \times$

$(P_R \times PRAF_{R,R} \times VFPM_R – P_R \times PRAF_{R,R,C} \times VFPM_R)]$ (value of credit cap *reallocations*)

Where:

Regional Parameters:

GST	Represents the applicable rate for the Goods and Services Tax.
P_R	Represents *AEMO's* estimate of the average future RRP for each *region* R.
T_{RP}	Is the *reaction period*, which is seven days.
$VFPM_R$	Is a volatility factor, which is a scaling factor specific to the PM used to achieve the *prudential standard* for each *region* R.

Market Participant Specific Parameters:

$PM_{R,E}$ Represents the value of *energy* in the *regional* PM with no allowance for *regional volatility* on net credit amounts.

$PM_{R,R}$ Represents the value of *reallocations* in the *regional* PM with no allowance for *regional volatility* on net credit amounts.

$PM_{R,U}$ Represents the *regional* PM (full offset) with full allowance for *regional* volatility.

$PM_{R,I}$ Represents the *regional* PM with no allowance for *regional* volatility.

VEL_R Represents the value of *load* for a *Market Participant* in *region* R.

VEG_R Represents the value of *generation* for a *Market Participant* in *region* R.

VRD_R Represents the value of debit energy *reallocations* for a *Market Participant* in *region* R.

VRC_R Represents the value of credit energy *reallocations* for a *Market Participant* in *region* R.

$PRAF_{L,R}$ Is a Participant Risk Adjustment Factor (*load*) used to adjust the OSL and PM for a *Market Participant* to reflect their relative *load* risk and achieve the *prudential standard* in *region* R for the *Market Participant*.

$PRAF_{G,R}$ is a Participant Risk Adjustment Factor (generation) used to adjust the OSL and PM for a *Market Participant* to reflect their relative generation risk and achieve the *prudential standard* in *region* R for the *Market Participant*.

$PRAF_{R,R}$ is a Participant Risk Adjustment Factor (energy and swap reallocations) used to adjust the OSL and PM for a *Market Participant* to reflect their relative energy and swap reallocation risk and achieve the *prudential standard* in *region* R for the *Market Participant*.

$PRAF_{R,R,C}$ is a Participant Risk Adjustment Factor (cap reallocations) for a cap value of C used to adjust the OSL and PM for a *Market Participant* to reflect their relative risk of cap *reallocations* and achieve the *prudential standard* in *region* R for the *Market Participant*.

EL_R represents *AEMO*'s estimate of the *Market Participant's* average daily *load* in *region* R.

EG_R represents *AEMO*'s estimate of the *Market Participant's* average daily *generation* in *region* R.

RC_R represents the average daily *energy* of ex ante energy *reallocation transactions*, for which the *Market Participant* is the credit party in *region* R.

RD_R represents the average daily *energy* of ex anteenergy *reallocation transactions* for which the *Market Participant* is the debit party in *region* R.

RCS_R represents the average daily *energy* of ex ante swap *reallocation transactions*, for which the *Market Participant* is the credit party in *region* R.

RDS_R represents the average daily *energy* of ex anteswap *reallocation transactions* for which the *Market Participant* is the debit party in *region* R.

PCS_R represents the swap energy-weighted average strike price for ex ante swap *reallocation transactions* for which the *Market Participant* is the credit party in *region* R.

PDS_R represents the swap energy-weighted average strike price for ex anteswap *reallocation transactions* for which the *Market Participant* is the debit party in *region* R.

$RCC_{R,C}$ represents the average daily *energy* of ex ante cap *reallocation transactions* for which the *Market Participant* is the credit party, for a cap value C in *region* R.

$RDC_{R,C}$	represents the average daily *energy* of ex antecap reallocation transactions for which the *Market Participant* is the debit party, for a cap value C in *region* R.
$RC\$_R$	represents the average daily dollar amount of ex ante dollar *reallocation transactions* for which the *Market Participant* is the credit party, in *region* R.
$RD\$_R$	represents the average daily dollar amount of ex antedollar *reallocation transactions* for which the *Market Participant* is the debit party, in *region* R.

The calculated value is rounded in accordance with clause 10.1.

Detailed definitions of each term are provided in clause 9.

7. THE TYPICAL ACCRUAL

A *typical accrual* amount is calculated for the purposes of determining a *call amount* under NER clause 3.3.11(a)(2), for all Market Participants except MNSPs. As it is not feasible to determine a *typical accrual* for an MNSP, the *call amount* will always be determined as (*outstandings* – *trading limit*), as defined in that clause.

It is assumed that under typical conditions cap and floor *reallocations* will not take effect.

The *typical accrual* calculation is represented by:

$TA = DTA \times T$

$DTA = \Sigma_R \, DTA_R$ (daily *typical accrual*)

$DTA_R = EL_R \times P_R \times (GST + 1)$ (typical daily value of energy *load*)

$- EG_R \times P_R \times (GST + 1)$ (typical daily value of energy *generation*)

$+ RD_R \times P_R$ (typical daily value of debit energy *reallocations*)

$- RC_R \times P_R$ (typical daily value of credit energy *reallocations*)

$+ RDS_R \times (P_R - PDS_R)$ (typical daily value of debit swap *reallocations*)

$- RCS_R \times (P_R - PCS_R)$ (typical daily value of credit swap reallocations)

$+ (RD\$_R - RC\$_R)$ (typical daily net value of dollar *reallocations*)

Where:

Regional Parameters:

GST	Represents the applicable rate for the Goods and Services Tax.
P_R	Represents *AEMO's* estimate of the average future RRP for each *region* R.
T	Is the number of days over which the corresponding *outstandings* are calculated.

Market Participant Specific Parameters

EL_R	Represents *AEMO*'s estimate of the *Market Participant's* average daily *load* in *region* R.
EG_R	Represents *AEMO*'s estimate of the *Market Participant's* average daily *generation* in *region* R.
RC_R	Represents the average daily *energy* of ex ante energy *reallocation transactions*, for which the *Market Participant* is the credit party in *region* R.
RD_R	Represents the average daily *energy* of ex anteenergy *reallocation transactions* for which the *Market Participant* is the debit party in *region* R.
RCS_R	Represents the average daily *energy* of ex ante swap *reallocation transactions*, for which the *Market Participant* is the credit party in *region* R.
RDS_R	Represents the average daily *energy* of ex anteswap *reallocation transactions* for which the *Market Participant* is the debit party in *region* R.

PCS_R	Represents the swap energy-weighted average strike price for ex ante swap *reallocation transactions* for which the *Market Participant* is the credit party in *region* R.
PDS_R	Represents the swap energy-weighted average strike price for ex anteswap *reallocation transactions* for which the *Market Participant* is the debit party in *region* R.

Detailed definitions of each term are provided in clause 9.

8. CALCULATION OF PARTICIPANT RISK ADJUSTMENT FACTOR

Participant Risk Adjustment Factor (PRAF) is a *Market Participant* specific factor calculated by *AEMO* and used to adjust the PM and OSL for a *Market Participant* to reflect their relative risk.

A separate PRAF is calculated for a *Market Participant's load*, *generation*, energy and swap *reallocations* and cap *reallocations*.

The PRAFs are based on the following calculations:

$PRAF_{L,R} = MAX[LWPR_{L,R},(LWPR_{L,R})^2]$ (PRAF - *load*)

$PRAF_{G,R} = MAX[LWPR_{G,R},(LWPR_{G,R})^2]$ (PRAF - *generation*))

$PRAF_{R,R} = MAX[LWPR_{R,R},(LWPR_{R,R})^2]$ (PRAF - energy and swap *reallocations*)

$PRAF_{R,R,C} = MAX[LWPR_{R,R,C},(LWPR_{R,R,C})^2]$ (PRAF cap *reallocations* for a cap value of C)

$LWPR_{L,R} = PLWP_R / RLWP_R$ (Load-weighted price ratio - *load*)

$LWPR_{G,R} = PGWP_R / RLWP_R$ (Load-weighted price ratio - *generation*)

$LWPR_{R,R} = PRWP_R / RLWP_R$ (Load-weighted price ratio - energy and swap *reallocations*)

$LWPR_{R,R,C} = PLWP_{R,C} / RLWP_{R,C}$ (Load-weighted price ratio - cap *reallocations*)

$PLWP_R = \Sigma_{TI} (P_{TI,R} \times EL_{TI,M,R}) / (\Sigma_{TI} EL_{TI,R})$ (*Market Participant load*-weighted price)

$PGWP_R = \Sigma_{TI} (P_{TI,R} \times EG_{TI,M,R}) / (\Sigma_{TI} EG_{TI,R})$ (*Market Participant generation*-weighted price)

$PRWP_R = \Sigma_{TI} (P_{TI,R} \times R_{TI,R}) / (\Sigma_{TI} R_{TI,R})$ (*Market Participant* energy and swap *reallocation*-weighted price)

$PLWP_{R,C} = \Sigma_{TI} (P_{TI,R,C} \times R_{TI,R,C}) / (\Sigma_{TI} R_{TI,R,C})$ (*Market Participant load*-weighted price cap *reallocations*)

$RLWP_R = \Sigma_{TI} (P_{TI,R} \times ERL_{TI,R}) / (\Sigma_{TI} ERL_{TI,R})$ (*Regional load*-weighted price)

$R_{TI,R} = (RD_{TI,R} – RC_{TI,R})$ (Net energy *reallocation* position per TI)
$+ (RDS_{TI,R} – RCS_{TI,R})$ (Net swap *reallocation* position per TI)

$R_{TI,R,C} = (RDC_{TI,R,C} – RCC_{TI,R,C})$ (Net cap *reallocation* position per TI for a Cap Value of C)

where:

Regional Parameters:

$ERL_{TI,R}$	Represents *AEMO's* estimate of the expected *load* per TI for each *region R.*
$P_{TI,R}$	Represents *AEMO's* estimate of a future RRP for each *region* R.
$P_{TI,R,C}$	Represents *AEMO's* estimate of a capped future RRP for each *region* R for a cap value of C.

$RLWP_{R}$	Represents AEMO's estimate of the *regional* load-weighted price in each region R.
$RLWP_{R,C}$	Represents AEMO's estimate of the regional load-weighted capped price in each region R.

Market Participant Specific Parameters:

$EL_{TI,M,R}$	Represents *AEMO*'s estimate of the *Market Participant's* load per TI adjusted for *marginal loss factors* in each *region* R.
$EG_{TI,M,R}$	Represents *AEMO*'s estimate of the *Market Participant's* generation per TI adjusted for *marginal loss factors* in each *region* R.
$EL_{TI,R}$	Represents *AEMO*'s estimate of the *Market Participant's* load per TI in each *region* R.
$EG_{TI,R}$	Represents *AEMO*'s estimate of the *Market Participant's* generation per TI in each *region* R.
$LWPR_{L,R}$	Represents *AEMO's* estimate of the *Market Participant's* Load-Weighted Price Ratio (*load*) in *region* R.
$LWPR_{G,R}$	Represents *AEMO's* estimate of the *Market Participant's* Load-Weighted Price Ratio (*generation*) in *region* R.
$LWPR_{R,R}$	Represents *AEMO's* estimate of the *Market Participant's* (Load-Weighted Price Ratio (energy and swap *reallocations*) in *region* R.
$LWPR_{R,R,C}$	Represents *AEMO's* estimate of the *Market Participant's* Load-Weighted Price Ratio (cap reallocations) in *region* R.
$PLWP_{R}$	Represents *AEMO's* estimate of the *Market Participant's* Participant Load-Weighted Price in *region* R.
$PGWP_{R}$	Represents *AEMO's* estimate of the *Market Participant's* Participant Generation-Weighted Price in *region* R.
$PRWP_{R}$	Represents *AEMO's* estimate of the *Market Participant's* Participant Energy and Swap Reallocation-Weighted Price in region R.
$PLWP_{R,C}$	Represents *AEMO's* estimate of the *Market Participant's* Participant Load-Weighted Price Cap Reallocations in *region* R.
$R_{TI,R}$	Represents *AEMO*'s estimate of the *Market Participant's* net energy and swap reallocation per TI in each *region* R.
$R_{TI,R,C}$	Represents *AEMO*'s estimate of the *Market Participant's* net cap *reallocation* position per TI for each *region* R for a cap value of C.
$RC_{TI,R}$	Represents the *energy* of ex ante energy *reallocation transactions* per TI for which the *Market Participant* is the credit party of *region* R.
$RD_{TI,R}$	Represents the *energy* per *TI* of ex anteenergy *reallocation transactions* for which the *Market Participant* is the debit party in *region* R.
$RCS_{TI,R}$	Represents the *energy* per TI of ex ante swap *reallocation transactions*, for which the *Market Participant* is the credit party in *region* R.
$RDS_{TI,R}$	Represents the *energy* per TI of ex anteswap *reallocation transactions* for which the *Market Participant* is the debit party in *region* R.
$RCC_{TI,R,C}$	Represents the *energy* per TI of ex ante cap *reallocation transactions* for which the *Market Participant* is the credit party, for a cap value C in *region* R.

$RDC_{TI,R,C}$	Represents the *energy* of ex antecap *reallocation transactions* per TI for which the *Market Participant* is the debit party, for a cap value C in *region* R.

Detailed definitions of each term are provided in clause 9.

9. DETAILS OF THE OSL AND PM COMPONENTS OF THE MCL

9.1. Adjustment for the introduction and repeal of a carbon price

On 1 July 2012, the *Clean Energy Act 2011* (Commonwealth) was introduced and was subsequently repealed effective from 1 July 2014, to reflect the impact on pricing in of these changes between 1 July 2012 and 30 June 2014 an adjustment was applied to decrease historical RRPs by $21 per MWh[1] for regions on the mainland and $12 per MWh[1] for Tasmania for each *trading interval*.

9.2. Regional Level Factors

The following factors are calculated at the *regional* level.

9.2.1. Average daily regional load (ERL_R)

(a) The average daily *regional load* for the region (ERL_R) is *AEMO*'s estimate of the average daily *regional load* for a *region* R to be used as an input for the purposes of achieving the desired *prudential standard* at a *regional* level.

(b) The ERL_R is calculated by season, using an exponential weighted moving average approach based on the previous value $ERL_{R(previous)}$ and the most recent *regional loads* for that season. The calculation is outlined below:

(i) For each season calculate last year's actual average daily *regional load* ($AERL_R$) using actual daily *regional loads*.

(ii) Calculate the current ERL_R

$$ERL_R = ERL_{R(previous)} \times (1 - W_{L,R}) + AERL_R \times W_{L,R}$$

Where:

$ERL_{R(previous)}$ is the previously calculated value of the relevant seasons ERL_R.

$W_{L,R}$ is the weighting factor for average *regional loads*.

(c) The current value of $W_{L,R}$ is 70%. This weighting factor value is derived based on historic analysis of actual *regional loads* and chosen to best fit average *regional loads* with the exponential moving average approach. The weighting factor will be periodically reviewed by *AEMO* and adjusted following consultation with *Market Participant*s.

9.2.2. Average price for the region (P_R)

(a) The average price for the *region* (P_R) is *AEMO*'s estimate of the average seasonal RRP expected to prevail for a *region* R for the purposes of the OSL and PM calculation only. The estimated RRP will be the same for all *Market Participants* in that *region*.

(b) The P_R is calculated by season using an exponential weighted moving average approach based on the previous value $P_{R(previous)}$ and the most recent RRPs for that season. The calculation is outlined below:

(i) For each season calculate last year's actual average price (AP_R) using actual RRP.

(ii) Calculate the current P_R:

$$P_R = P_{R(previous)} \times (1 - W_{P,R}) + AP_R \times W_{P,R}$$

Where:

[1] This is AEMO's estimate of the direct impact of the carbon price from 1 July 2012 until 30 June 2014.

$P_{R(previous)}$ is the previously calculated value of the relevant season's P_R.

$W_{P,R}$ is the weighting factor for average prices.

(iii) Where the change in the P_R from one season to the corresponding season in the following year is more than 20%, then the change in the value of P_R is restricted to an increase/decrease of +/- 20%.

(iv) The current value of the $W_{P,R}$ is 20%. The weighting factor value is derived based on historic analysis of actual RRP and chosen to best fit average prices with the exponential moving average approach. The weighting factor is periodically reviewed by *AEMO* and adjusted following consultation with *Market Participant*s.

(c) The change constraint in P_R is designed to increase the stability in the MCL whilst maintaining the 2% POE *prudential standard*.

(d) Where a new *region* is created, the historical RRPs will be taken from a proxy region as outlined in clause 9.3.6.

9.3. Regional level factors used in calculating OSL and PM

9.3.1. Regional load ($ERL_{TI,R}$) profile

(a) The calculation of average *regional loads* per TI ($ERL_{TI,R}$) for the region is required to determine a *regional load* profile as an input into the PRAF calculation only. The average TI *regional load* profile will be the same for all *Market Participants* in that *region*.

(b) The $ERL_{TI,R}$ is calculated per TI by season using an exponential weighted moving average approach based on the previous value $ERL_{TI,R\ (previous)}$ and the most recent *regional loads* for that TI and season. The calculation is outlined below and repeated for each TI in a day:

(i) For each season calculate last year's actual average regional load for the TI (AERLTI,R) using actual TI regional loads.

(ii) Calculate the current ERLTI,R:

$$ERL_{TI,R} = ERL_{TI,R(previous)} \times (1 - W_{L,R}) + AERL_{TI,R} \times W_{L,R.}$$

Where:

$ERL_{TI,R(previous)}$ is the previously calculated value of the relevant seasons $ERL_{TI,R}$.

$W_{L,R}$ is the weighting factor for average *regional loads* (see 9.2.1).

9.3.2. Regional price ($P_{TI,R}$) profile

(a) The calculation of average prices per TI for the *region* ($P_{TI,R}$) is required to determine a regional price profile as an input into the PRAF calculations only. The average TI *regional* price profile will be the same for all *Market Participants* in that *region*.

(b) The $P_{TI,R}$ is calculated per TI by season using an exponential weighted moving average approach based on the previous value $P_{TI,R(previous)}$ and the most recent RRPs for that TI and season. The calculation is outlined below and repeated for each TI in a day:

(i) For each season, calculate last year's actual average regional price for the TI ($AP_{TI,R}$) using actual RRP.

(ii) Calculate the current $P_{TI,R}$:

$$P_{TI,R} = P_{TI,R(previous)} \times (1 - W_{P,R}) + AP_{TI,R} \times W_{P,R.}$$

Where:

$P_{TI,R(previous)}$ is the previously calculated value of the relevant seasons $P_{TI,R}$

$W_{P,R}$ is the same as the weighting factor for average prices (see 9.2.2).

(iii) Where the change in the $P_{TI,R}$ from one season to the corresponding season in the following year is more than 20%, then the change in the value of $P_{TI,R}$ is restricted to an increase/decrease of +/- 20%.

(c) The change constraint in $P_{TI,R}$ is designed to increase the stability in the PRAF.

(d) Where a new *region* is created, the historical RRPs will be taken from a proxy *region* as outlined in clause 9.3.6.

9.3.3. Regional price ($P_{TI,R,C}$) profile for cap value C

(a) The calculation of average capped prices per TI for the *region* ($P_{TI,R,C}$) is required to determine a regional price profile as an input into the PRAF calculations for cap *reallocations* only. The average *regional* capped price profile will be the same for all *Market Participants* in that *region*.

(b) The $P_{TI,R,C}$ is calculated per TI by season using an exponential weighted moving average approach based on the previous value $P_{TI,R,C(previous)}$ and the most recent capped RRPs for that TI and season. The calculation is outlined below and repeated for each TI in a day.

(i) For each season calculate last year's actual average price for the TI ($AP_{TI,R,C}$) using actual RRP, but limiting any actual RRP to the cap value C.

(ii) Calculate the current $P_{TI,R,C}$

$$P_{TI,R,C} = P_{TI,R,C(previous)} \times (1 – W_{P,R}) + AP_{TI,R,C} \times W_{P,R}$$

Where:

$P_{TI,R,C(previous)}$ is the previously calculated value of the relevant seasons $P_{TI,R,C}$

$W_{P,R}$ is the same as the weighting factor for average prices (see 9.2.2).

(iii) Where the change in the $P_{TI,R,C}$ from one season to the corresponding season in the following year is more than 20%, then the change in the value of $P_{TI,R,C}$ is restricted to an increase of +/- 20%.

(c) The change constraint in $P_{TI,R,C}$ is designed to increase the stability in the PRAF.

(d) Where a new *region* is created, the historical RRPs will be taken from a proxy *region* as outlined in clause 9.3.6.

9.3.4. Outstandings limit volatility factor ($VFOSL_R$)

(a) The outstandings limit volatility factor ($VFOSL_R$) is a number derived from the distribution of estimated *load* by estimated price and is used as an input to a *Market Participant's* OSL. The $VFOSL_R$ is calculated on a *regional* basis.

(b) The $VFOSL_R$ is calculated by season using an exponential weighted moving average approach based on the previous value $VFOSL_{R(previous)}$ and the most recent RRPs and *regional loads* for the season. The calculation is outlined below:

(i) For each season calculate last year's actual volatility factor ($AVFOSL_R$) using actual RRP and *regional load*.

(A) For the relevant season, calculate values of the product of RRP and total *load* in the *region* per *TI*.

(B) Calculate the sum of these values on a daily basis.

(C) Using the results of step b, calculate a rolling 35-day average payment for each day within the relevant season. This gives a distribution of the rolling 35-day average daily purchase (RADP).

(D) Calculate the mean (M) of the distribution RADP.

(E) Use the relevant percentile value (X) of the distribution RADP required to calibrate the regional level MCL to meet the *prudential standard*.

(F) Calculate the $AVFOSL_R$ to 1 decimal place, as:

(G) $AVFOSL_R = X / M$

(ii) Calculate the current $VFOSL_R$:

$VFOSL_R = VFOSL_{R(previous)} \times (1 – W_{VF,R}) + AVFOSL_R \times W_{VF,R}$

Where:

$VFOSL_{R(previous)}$ is the previously calculated value of the relevant season's $VFOSL_R$.

$W_{VF,R}$ is the weighting factor for volatility factors.

(iii) Where the change in the $VFOSL_R$ from one season to the corresponding season in the following year is more than 20%, then the change in the value of $VFOSL_R$ is restricted to an increase/decrease of +/- 20%.

(c) The current value of the $W_{VF,R}$ is 20%. The weighting factor value is derived based on historic analysis of actual VFs and chosen to best fit VFs with the exponential moving average approach. The weighting factor is periodically reviewed by *AEMO* and adjusted following consultation with *Market Participant*s

(d) The change constraint in $VFOSL_R$ is designed to increase stability in the OSL.

(e) Where a new region is created, the historical RRPs and loads will be taken from a proxy region as outlined in clause 9.3.6.

9.3.5. Prudential margin volatility factor ($VFPM_R$)

(a) The prudential margin volatility factor $VFPM_R$ is a number derived from the distribution of estimated load by estimated price and is used as an input to a *Market Participant's* PM. The $VFPM_R$ is calculated on a *regional* basis.

(b) The $VFPM_R$ is calculated by season using an exponential weighted moving average approach based on the previous value $VFPM_{R(previous)}$ and the most recent RRPs and *regional loads* for the season. The calculation is outlined below:

(i) For each season calculate last year's actual volatility factor ($AVFPM_R$) using actual RRP and *regional load*.

(A) For the relevant season, calculate values of the product of RRP and total customer *load* per TI in the *region*.

(B) Calculate the sum of these values on a daily basis.

(C) Using the results of step b, calculate a rolling seven-day average payment for each day within the relevant season. This gives a distribution of the rolling seven-day average daily purchase (RADP).

(D) Calculate the mean (M) of the distribution RADP.

(E) Use the relevant percentile value (X) of the distribution RADP that has been chosen by AEMO to calibrate the regional level MCL to achieve the desired *prudential standard*.

(F) Calculate the $AVFPM_R$ to 1 decimal place, as:

(G) $AVFPM_R = X / M$

(ii) Calculate the current $VFPM_R$:

$VFPM_R = VFPM_{R(previous)} \times (1 – W_{VF,R}) + AVFPM_R \times W_{VF,R}$

Where:

$VFPM_{R(previous)}$ is the previously calculated value of the relevant season's $VFPM_R$.

$W_{VF,R}$ is the weighting factor for volatility factors.

(iii) Where the change in the $VFPM_R$ from one season to the corresponding season in the following year is more than 20%, then the change in the value of $VFPM_R$ is restricted to an increase/decrease of +/- 20%.

(c) The current value of the weighting factor is 20%. The weighting factor value is derived based on historic analysis of actual VFs and chosen to best fit VFs with the exponential moving average approach. The weighting factor is periodically reviewed by *AEMO* and adjusted following consultation with *Market Participant*s.

(d) The change constraint in $VFPM_R$ is designed to increase stability in the PM.

(e) Where a new *region* is created, the historical RRPs and *loads* will be taken from a proxy *region* as outlined in clause 9.3.6.

9.3.6. Regions with insufficient historical data

(a) The approach for determining the $VFOSL_R$ and $VFPM_R$ for a *region* with less than 12 months historical data or less than an entire historical like season is to reference the $VFOSL_R$ and $VFPM_R$ for a *region* selected by *AEMO* that has sufficient historical data.

(b) The selected proxy region would be:

(i) For existing *regions* that have been modified by the addition or removal of *connection points*, the existing *region*.

(ii) For new *regions* with no *interconnection* history, a *region* with similar electrical size;

(iii) For new *regions* with *interconnection* for more than 12 months, the *interconnected region*.

(iv) For new *regions* created by the division of an existing *region*, the existing *region*.

Once there is sufficient historical data for a new *region*, (i) is to be applied. The second approach, (ii), would apply to any boundary change that affects *regions*.

9.4. Market Participant specific calculations

The following factors are calculated by *AEMO* for each *Market Participant* and are specific to that *Market Participant*.

9.4.1. Estimated load (EL_R)

The estimated *load* (EL_R) for each *Market Participant* is a positive *energy* amount that represents the estimated value of the *Market Participant*'s average daily *load* within *region* R for each season. The average daily *load* is estimated by reference to historical *loads* and evident trends in the *Market Participant*'s usage patterns. AEMO may take into consideration information from the Market Participant when estimating this value. For new *Market Participant*s, the estimate will be agreed between *AEMO* and the *Market Participant* using any relevant information available.

9.4.2. Estimated load per TI ($EL_{TI,R}$), ($EL_{TI,M,R}$)

The estimated *load* ($EL_{TI,R}$) and the *estimated load* ($EL_{TI,M,R}$) adjusted for marginal loss factors for each *Market Participant* is a positive *energy* amount that represents the estimated value of the *Market Participant*'s *load* per TI within *region* R for each season. The *load* per TI is estimated by reference to historical *load patterns*. For new *Market Participant*s, the estimate will be agreed between *AEMO* and the *Market Participant* using any relevant information available.

9.4.3. Estimated generation (EG_R)

(a) The estimated *generation* (EG_R) for each *Market Participant* is a positive *energy* amount that represents the estimated value of average daily sent-out *generation* within *region* R for each season. The average daily sent-out *generation* is estimated based on historical *generation* patterns. AEMO may take into consideration information from the *Market Participant* when estimating this value. For new *Market Participant*s, the estimate will be agreed between *AEMO* and the *Market Participant* using any relevant information available.

(b) To maintain the *prudential standard*, where a *Market Participant's generating units* exhibit material variations in *generation* levels between two or more 35 day OSL time periods (T_{OSL}) in the previous twelve months, AEMO may estimate daily generation commensurate with a T_{OSL} period corresponding to a lower generation level.

(c) In selecting the T_{OSL} period for estimation purposes under paragraph (b), AEMO must take into account any clear seasonal patterns in the levels of *generation* from the relevant *generating units*.

9.4.4. Estimated generation per TI ($EG_{TI,R}$), ($EG_{TI,M,R}$)

The estimated *generation* ($EG_{TI,R}$) and the *estimated generation* ($EG_{TI,M,R}$) adjusted for marginal loss factors for each *Market Participant* is a positive energy amount that represents the estimated value of TI sent-out *generation* within *region* R for each season. The sent-out *generation* per TI is estimated based on historical *generation* patterns. For new *Market Participant*s, the estimate will be agreed between *AEMO* and the *Market Participant* using any relevant information available

9.4.5. Reallocation amounts (RC_R/RD_R), (RCS_R/RDS_R), (PCS_R/PCS_R), ($RCC_{R,C}/RDC_{R,C}$), ($RC\$_R/RD\$_R$)

(a) Clause 3.3.8 of the NER requires that OSLs and PMs are determined after taking into account the effect of *reallocations*. Substantial *reallocation*, *load* or both by a *Market Generator* (at a level approaching the estimated value of *energy* sales) can lead to its MCL being assessed at a value greater than zero.

(b) The *reallocation* energy credit/debit (RC_R/RD_R) for each *Market Participant* is a positive *energy* amount that represents the estimated average daily *energy* of ex ante energy *reallocation* requests (i.e. do not specify a strike price) in the immediate future for which the *Market Participant* is the credit/debit party respectively, for *region* R.

(c) The *reallocation* swap energy credit/debit (RCS_R/RDS_R) for each *Market Participant* is a positive *energy* amount that represents the estimated average daily *energy* of ex ante swap *reallocation* requests in the immediate future for which the *Market Participant* is the credit/debit party respectively, for *region* R.

(d) The reallocation swap price credit/debit (PCS_R/PDS_R) for each *Market Participant* is a positive dollar amount that represents the estimated swap energy-weighted average strike price of ex ante swap *reallocation* requests in the immediate future for which the *Market Participant* is the credit/debit party respectively, for *region* R.

(e) The *reallocation* cap energy credit/debit ($RCC_{R,C}/RDC_{R,C}$) for each *Market Participant* is a positive *energy* amount that represents the estimated average daily energy of ex ante cap *reallocation requests* in the immediate future for which the *Market Participant* is the credit/debit party respectively, for *region* R and a cap value C.

(f) For the purposes of simplifying the calculation, a number of predefined cap values will be chosen, aligned with the cap values of cap *reallocations* that have been registered (initial values were $100, $200 and $300). If a cap *reallocation request* has a strike price that does not align with a predefined cap value, it will be included in the next largest cap value. For example, a cap *reallocation* with an average strike price of $290 would be included in the $300 cap value. The predefined cap values will be reviewed during the annual review of the performance of these Procedures against the *prudential standard* detailed in clause 11.

(g) The *reallocation* dollar credit/debit ($RC\$_R/RD\$_R$) for each *Market Participant* is a positive dollar amount that represents the estimated average daily dollar value of all ex ante dollar *reallocation requests* in the immediate future for which the *Market Participant* is the credit/debit party respectively, for *region* R.

(h) *AEMO* estimates these average values according to one or more of following:

   (i) The quantity and type of *reallocations* proposed for up to 4 weeks in the future from the effective date of the review. Credit *reallocation amounts* will be assessed where they meet the requirements in the ex ante time table for either the PM Full Offset or PM Limited Offset calculation. All ex antedebit *reallocation amounts* will be assessed.

   (ii) Any sudden changes in *reallocation* patterns for periods in the immediate future, including lower credit *reallocation amounts*, higher debit *reallocation amounts*, or changes in the timing of lodgement and authorisation of *reallocation requests*.

   (iii) *AEMO* may consider written advice from *Market Participants* intending to commence regular ex ante *reallocations* in determining the values, where the *reallocation amounts* would increase the MCL.

(i) *Reallocation requests* based on floor offsets are not considered in the OSL and PM calculations.

(j) The *reallocation* PRAFs have been designed to take account of the average daily profile and do not distinguish business and non-business days. Consequently, *reallocation requests* that AEMO considers inconsistent with the average daily valuation approach in these Procedures, for example, where the total of all *reallocations* cover in large part non-business days, may be ignored for the purpose of AEMO's estimation of the average daily *energy* and energy-weighted prices.

(k) Ex post *reallocations* are not considered in the OSL and PM calculations. A demonstrated history of ex post *reallocations* does not give sufficient confidence that the practice will continue during periods of extreme RRPs. Ex post *reallocations* can assist in management of total outstandings, but not in reducing OSLs. Any large changes in *reallocations* at start of seasons may lead to an MCL transitional issue which will be managed in accordance with clause 9.4.9.

9.4.6. Reallocation amounts per TI ($RC_{TI,R}/RD_{TI,R}$), ($RCS_{TI,R}/RDS_{TI,R}$), ($RCC_{TI,R,C}/RDC_{TI,R,C}$)

(a) The *reallocation* amounts per TI are estimated using an approach consistent with the average daily *reallocation* amounts.

(b) The *reallocation* energy credit/debit per TI ($RC_{TI,R}/RD_{TI,R}$) for each *Market Participant* is a positive *energy* amount that represents the estimated *energy* per TI of ex ante energy *reallocation requests* (i.e. do not specify a strike price) in the immediate future for which the *Market Participant* is the credit/debit party respectively, for *region* R.

(c) The *reallocation* swap energy credit/debit per TI ($RCS_{TI,R}/RDS_{TI,R}$) for each *Market Participant* is a positive energy amount that represents the estimated TI energy of ex ante swap *reallocation requests* in the immediate future for which the *Market Participant* is the credit/debit party respectively, for *region* R.

(d) The *reallocation* cap energy credit/debit ($RCC_{TI,R,C}/RDC_{TI,R,C}$) for each *Market Participant* is a positive *energy* amount that represents the estimated energy per TI of ex ante cap *reallocation* requests in the immediate future for which the *Market Participant* is the credit/debit party respectively, for *region* R and a cap value C.

9.4.7. Participant Risk Adjustment Factors ($PRAF_{L,R}$, $PRAF_{G,R}$, $PRAF_{R,R}$)

(a) The Participant Risk Adjustment Factors ($PRAF_{L,R}$ or $PRAF_{G,R}$ or $PRAF_{R,R}$) are factors derived by *AEMO* using historical data. They are used to reflect the relative risk of *Market Participants'* estimated *load*, *generation* and energy and swap *reallocations* respectively.

(b) These PRAFs are based on an analysis of the relationship between *regional load* / *generation* / *energy* and swap *reallocation* profiles, *regional* prices and historic POE per TI.

(c) In determining of a *Market Participant's* PRAFs MLF-adjusted *load* and *generation* amounts are used to account for the impact of this variable on each *Market Participant's prudential settings*. Details of the calculation of the PRAFs are given in clause 8.

(d) The PRAF for each MCL review will be based on data from the previous like season where available and is determined to be representative of the *Market Participant's* current trading behaviour. Where insufficient historical data is available or the *Market Participant's* trading behaviour has changed significantly since the previous like season then a more representative range of historical data may be used. Where no data is available a default PRAF value of 1.05 for load ($PRAF_{L,R}$) and 0.95 for generation ($PRAF_{G,R}$) will be applied.

9.4.8. Participant Capped Risk Adjustment Factor ($PRAF_{R,R,C}$)

(a) The Participant Risk Adjustment Factor ($PRAF_{R,R,C}$) is a factor derived by *AEMO* using historical data. It is used to reflect the relative risk of *Market Participants'* cap reallocations with capped price.

(b) The $PRAF_{R,R,C}$ is based on analysis of the relationship between *regional* cap *reallocation* profiles per TI, capped *regional* prices per TI and historic POE. Details of the calculation of the $PRAF_{R,R,C}$ are given in clause 8.

9.4.9. Managing MCL season transition

The potential for OSL breaches is higher than normal where a *Market Participant's* MCL reduces at the start of a new season. Changes in trading activity or high *spot prices* at the end of the previous season can lead to the *Market Participant's outstandings* exceeding its OSL at the start of the new season. If this situation is anticipated, AEMO will seek to discuss options with the *Market Participant* in advance for reducing the risk of a *trading limit* breach on the MCL effective date. If the *Market Participant* cannot prospectively manage its prudential position, AEMO will exercise its discretion to revise the MCL to reflect estimated *outstandings* over the season transition.

10. MAXIMUM CREDIT LIMIT DETERMINATION

The MCL determination for a *Market Participant* is the sum of the OSL and the PM. The MCL is the minimum value of *credit support* that must be lodged with *AEMO* by the *Market Participant*.

10.1. Rounding

(a) The value of the MCL is determined as the sum of the *Market Participant's* OSL and the *Market Participant's* PM. The MCL and PM can never be less than zero.

(b) The value of the MCL is then rounded up to the next multiple of $10,000 for values up to $250,000 and to the next multiple of $100,000 for values above $250,000 so that minor changes in a *Market Participant*'s average purchased *energy*, typically through contestable customer transfers, is unlikely to affect the end result of the MCL determination.

(c) The value of the PM is rounded up to the nearest $1,000. The value of the OSL is rounded up to the nearest $1,000. This is performed to simplify the management of prudential requirements by *Market Participant*s.

10.2. Maximum Credit Limit for new entrants and inactive Market Participants

(a) Where a new *Market Participant* registers as a *Market Customer*, *Market Generator* or *Market Small Generation Aggregator* (SGA), *AEMO* will assess the OSL and PM that are to apply from the effective date of registration. *AEMO*'s preference is that this calculation is based on information provided by the applicant, including:

(i) expected *load* during the relevant period based on expected customer acquisition and transfer activity;

(ii) for *Market Generators* and SGAs, the expected capacity and output of *generating units* being registered, and projected *load* to be consumed during construction and commissioning; and

(iii) intention to utilise *reallocations* to cover part or all of traded *energy*.

(b) Where an existing *Market Participant* has been inactive in the *market* for six months or more, for example, because they might be planning to exit the *market*, AEMO may determine both OSL and PM to be zero.

(c) The following table has been provided as a guide to the nominal OSL and PM values that *AEMO* may determine as part of the assessment of a new *Market Participant* or an inactive *Market Participant*. Individual *Market Participant* calculations may vary.

Participant TYPE	Requirement	OSL[2]	PM[2]
New *Market Generator* and SGA - not yet generating	Auxiliary/ commissioning load coverage	$2,000 per 1 MW	$500 per 1 MW
New *Market Customer* – planning to acquire customers	3 month growth estimates available	As per clause 5, $8,000 minimum	As per clause 6, $2,000 minimum
Existing *Market Participant* – inactive	6 months inactive trading history available	$0	$0

(d) Where a new active *Market Customer* is not able to provide any data on their expected *load* a default OSL of $80,000 and PM of $20,000 may be applied.

(e) Any new *Market Participant* wishing to have *reallocations* taken into account in its MCL calculation must consult with *AEMO* on its expected *generation* and *load*.

(f) Where a *Market Participant*'s actual *load* appears to be significantly greater than that assumed upon registration, an MCL review will be undertaken at the earliest opportunity and a revised MCL issued.

10.3. Maximum Credit Limit for Market Network Service Providers

(a) The MCL for a *Market Network Service Provider* (MNSP) is OSL + PM where, subject to paragraph (b):

(i) OSL (for T_{OSL}) is set at the value of the highest unpaid liability accrued by the MNSP in the 12 month period preceding the time of calculation, disregarding the impact of reallocations; and

(ii) PM (for T_{RP}) is a value equal to 20% of the OSL.

(b) The values of OSL and PM will be adjusted to account for any *reallocation transactions* to which the MNSP is a party, by applying the adjustment calculations relating to the values of VRD and VRC, and associated values and terms, in clause 5 (for OSL) and clause 6 (for PM). To avoid doubt, no adjustments are to be made in relation to estimated *load* (VEL) or estimated *generation* (VEG).

11. REVIEW OF PROCEDURES AND PRUDENTIAL SETTINGS

11.1. Methodology and calculation factors

Clause 3.3.8(f) of the NER requires that at least once a year *AEMO* must review, prepare and *publish* a report on the effectiveness of the methodology in achieving the objective of these Procedures to ensure the *prudential standard* is met for the NEM, with any recommendations to enhance the methodology. *AEMO* anticipates that the weighting factors and the adjustment factors used in the calculation of *Market Participants'* OSL and PM will be reviewed around every three years under normal market conditions.

[2] For *Market Generators* and SGAs, OSL assumes 2% house *load*, 24 hours per day for 35 days with a $VFOSL_R$ x P_R of $75/MWh and PM assumes 2% house *load*, 24 hours per day for 7 days with a $VFPM_R$ x P_R of $90/MWh for each 1 MW of generating capacity rounded up to the nearest 1 MW.

11.2. Market Participant prudential settings

(a) Clause 3.3.8(l) states that *AEMO* must review the *prudential settings* that apply to each *Market Participant* no later than a year after the last determination or review of the *Market Participant's* prudential settings.

(b) Clause 3.3.8(m) of the NER allows *AEMO* at any time, and for any reason that is consistent with the objective of these Procedures in meeting the *prudential standard, to* change the *prudential settings* that apply to a *Market Participant*, provided that any change to the *Market Participant's prudential settings* applies no earlier than one *business day* after the date *AEMO* notifies the *Market Participant* of changes to its *prudential settings*.

12. TRADING LIMIT

(a) A *Market Participant* may provide *credit support* in excess of that required following application of these Procedures. Clause 3.3.10 of the NER states that the *trading limit* for the *Market Participant* will be determined from the difference between the total value of *credit support* and the PM. Note that where the PM exceeds the total *credit support*, the *trading limit* will be negative.

(b) The following examples illustrate the *trading limit* in different scenarios (rounding has been ignored):

   (i) For a *Market Customer* with *credit support* = \$100 and PM = \$16, then the *trading limit* = \$84. The *Market Customer* must always ensure that the total *outstandings* is less than \$84 (i.e. their debit position must not exceed \$84).

   (ii) For a *Market Customer* with *credit support* = \$50 and PM = \$80, then *trading limit* = \$-30. The *Market Customer* must always ensure that the total *outstandings* is more negative than \$-30 (i.e. they must maintain a credit of more than \$30).

   (iii) For a *Market Generator* with *credit support* = \$0 and PM = \$10, then *trading limit* = \$-10. The *Market Generator* must always ensure that the total *outstandings* is more negative than \$-10 (i.e. they must maintain a credit of more than \$10).

(c) Note that in the above examples, a negative *outstandings* is considered to be a net *settlement* amount owed by *AEMO* to the *Market Participant*.