

# National Electricity Market Credit Limit Procedures

**Prepared by:** AEMO Markets

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## Approved for distribution and use by:

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**Date:** TBA

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## Current version release details

Version	Effective date	Summary of changes
10		<ul style="list-style-type: none"> <li>• Amendments to reflect the National Electricity Amendment (Shortening the settlement cycle) Rule 2024.</li> <li>• Amendment to better align market participant credit support requirements with prudential risks, including:                             <ul style="list-style-type: none"> <li>– Improving Regional Model calibration and meeting the prudential standard</li> <li>– Accounting for negative prices in the Regional Model</li> <li>– Correcting TAS region data</li> <li>– Reflecting market participant risk profile in MCL calculations</li> <li>– Using energy and absolute value of price in MCL calculations</li> </ul> </li> </ul>
		<ul style="list-style-type: none"> <li>•</li> </ul>

**Note: There is a full version history at the end of this document.**

# 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. NER 3.3.4A defines the *prudential standard* as 2%.

## 1.2. Definitions and interpretation

### 1.2.1. Glossary

Terms defined in the National Electricity Law and 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.

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

Term	Definition
BDU	bidirectional unit
ACE	adjusted consumed energy - interchanged with load where appropriate
ASOE	adjusted sent-out energy - interchanged with generation where appropriate
Credit energy	Electrical energy (expressed as positive value in MWh) adjusted for DLF and UFEA. Interchanged with generation where appropriate.
Current SAPS settlement price	In relation to a calculation under these Procedures, the SAPS settlement price for the relevant regional reference node for the financial year in which the calculation is undertaken or, if AEMO has not yet published the SAPS settlement price for that financial year at the time of the calculation, the most recently published SAPS settlement price for the regional reference node.
Debit energy	Electrical energy (expressed as negative value in MWh) adjusted for DLF and UFEA. Interchanged with load where appropriate.

Term	Definition
DRSP	<i>demand response service provider</i>
ex ante	Describes a <i>reallocation transaction</i> that occurs in or after the earliest <i>trading interval</i> which it may be processed as an 'ex ante reallocation' based on the time of registration of the applicable <i>reallocation request</i> in accordance with the <i>reallocation timetable</i>
generation	Electrical energy (expressed as positive value in MWh) adjusted for DLF and UFEA - interchanged with credit energy where appropriate
GST	Goods and Services Tax
IRP	<i>integrated resource provider</i>
load	Electrical energy (expressed as negative value in MWh) adjusted for DLF and UFEA. interchanged with debit energy where appropriate.
MCL	<i>maximum credit limit</i>
MLF	<i>marginal loss factor</i>
MNSP	<i>Market Network Service Provider</i>
NER	National Electricity Rules. NER followed by a number indicates that numbered rule or clause of the NER
OSL	<i>outstandings limit</i>
PM	<i>prudential margin</i>
PM Full Offset	As described in clause 4.3.3
PM Limited Offset	As described in clause 4.3.3
POE	<i>prudential probability of exceedance</i>
Procedures	<i>credit limit procedures</i>
RRP	<i>regional reference price</i>
Significant Bidirectional Flows	As described in clause 10.2.2.
TA	<i>typical accrual</i>
TI	trading interval
ToD	Time of Day or a 'time of day' segment as the context requires
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.

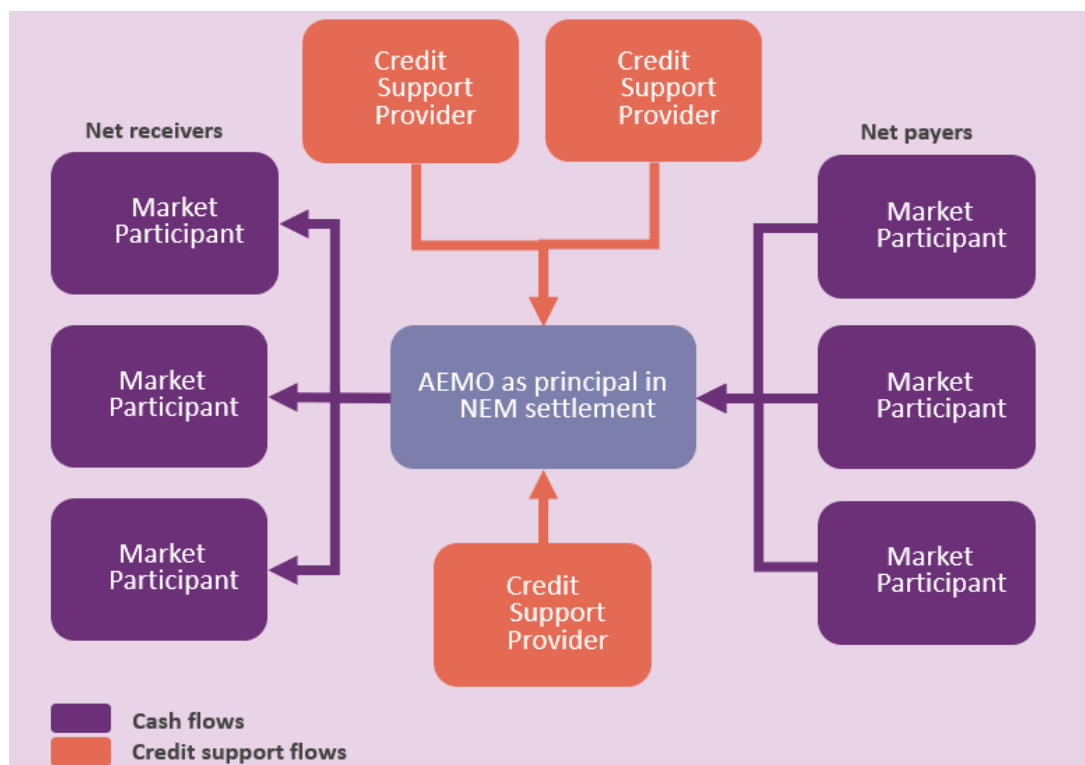
## 1.3. Related documents

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

## 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 NER 3.15.22 and 3.15.23.

## 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 RRP, 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 21 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 NER 3.3.8(d):

- (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

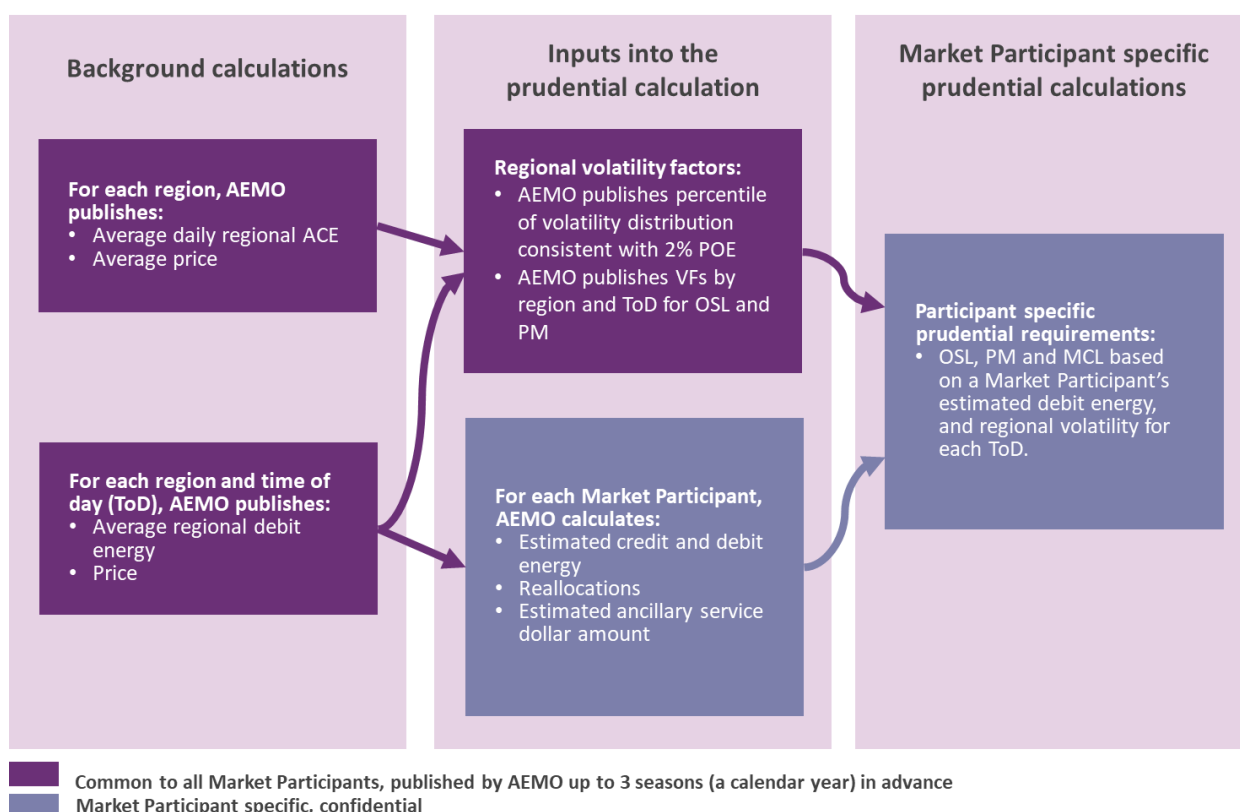
- (a) The MCL calculation takes into account:

- (i) expected *regional* load (ACE) and RRP;
  - (ii) a measure of *regional* volatility consistent with the 2% POE target;
  - (iii) Market Participants' expected debit energy, credit energy, *reallocations* and *ancillary service transactions* related *trading amounts*; and
  - (iv) the relevant time period, in days.
- (b) When undertaking MCL calculations, the absolute value<sup>1</sup> of estimated average future RRP and a credit/debit energy determination is used, where:
- (i) Credit energy refers to electrical energy (expressed as positive value in MWh) adjusted for DLF and UFEA. Interchanged with *generation* where appropriate.
  - (ii) Debit energy refers to electrical energy (expressed as negative value in MWh) adjusted for DLF and UFEA. Interchanged with *load* where appropriate.
- (c) 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.
- (d) 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.

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<sup>1</sup> The absolute value of estimated price is used in conjunction with the credit/debit energy determination as it allows for an accurate determination of prudential risk under a variety of circumstances (i.e. generation at a negative price is considered equivalent to a load at a positive price from a prudential point of view).

Figure 2 Calculating MCL



- (e) There are also a number of elements common to the calculation for *Market Participants* in all *regions*, which include:
- the seasonal calendar used for the three identified seasons – summer, winter, and shoulder;
  - the time periods used in the OSL and the PM; and
  - where appropriate, goods and services tax (GST).
- (f) This clause 4 lists the elements in each part of the MCL calculation for *Market Participants* other than *Market Network Service Providers* (MNSPs) and *Demand Response Service Providers* (DRSPs)<sup>2</sup>. The specific equations are discussed in clauses 5 to 8 of these Procedures.
- (g) Periods of extreme market volatility, with sustained high *spot prices*, may result in significant misalignment of the *prudential settings* with the *prudential standard*. Clause 9.3 provides for substituted OSL calculations to be used on a temporary basis if these conditions arise.
- (h) Many of the inputs and calculations described in this clause cannot be readily applied to the determination of *prudential settings* for MNSPs. In order to meet the *prudential standard*, the MCL for MNSPs will be determined in accordance with clause 10.3.

<sup>2</sup> For the purposes of calculating MCL under this Procedure, a DRSP is defined as a person who offers and provides qualifying *load* as *wholesale demand response* in respect of a *wholesale demand response unit*. It **does not** include a person who offers and provides *market ancillary services*.

- (i) Many of the inputs and calculations described in this clause cannot be readily applied to the determination of *prudential settings* for DRSPs. In order to meet the *prudential standard*, the MCL for DRSPs 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 available data, using all the relevant<sup>3</sup> RRP and load (ACE) data available for each of the *regions* of the *NEM*; and
  - (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 RRP and *regional* volatility, while responding to longer-term trend changes;
- (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<sup>4</sup>. AEMO is required to publish an annual report of the performance of these Procedures in meeting the *prudential standard* (NER 3.3.8(f)).

### 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) All calculations are performed at a Time of Day (ToD) level (see Section 8 for description of ToD segmentation methodology).
  - (ii) The historical *regional* load (ACE), 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*.
  - (iii) Estimated *regional* load (ACE) 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.
  - (iv) 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 (ACE), estimated *regional* RRP, estimated volatility factors (VFs) for the PM and OSL and the appropriate time periods ( $T_{OSL}, T_{RP}$ ).

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<sup>3</sup> AEMO will inform market participants if any RRP or load data is excluded from the modelling due to data errors or other extenuating circumstances.

<sup>4</sup> Note: provision for adjustment in extreme market conditions has been included in clause 9.3

- (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*. This process is referred to as calibration.
  - (ii) The calibration methodology ensures that the prudential standard is met for each ToD segment.
  - (iii) The volatility factor percentile consistent with a 2% POE differs by each ToD segment and *region*.
  - (iv) AEMO publishes the volatility factor percentile consistent with a 2% POE for each *region* and ToD segment annually in advance.

#### 4.2.3. Approach to calculating OSL and PM

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

- (a) *regional* parameters such as estimated RRP and estimated volatility; and
- (b) an estimate of a Market Participant's future debit energy, credit energy, *reallocations* and *ancillary service transactions* related *trading amounts*<sup>5</sup>.

### 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 in the NER as seven days; and
- (ii) the *payment period*, which is estimated to be 14 days.

Accordingly, the OSL time period ( $T_{OSL}$ ) is 21 days.

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

- (c) Goods and Services Tax rate (GST)

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<sup>5</sup> *Ancillary service transactions* related *trading amounts* are only considered for the OSL calculations and not the PM calculations.

- (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 volatility factors for the OSL ( $VFOSL_{R,ToD}$ ,  $VFOSL_{R,avg}$ ) and the PM ( $VFPM_{R,ToD}$ ,  $VFPM_{R,avg}$ )
  - (i) *Regional* level parameters are calculated for each season:
    - (A) estimated average RRP per ToD for the *region* ( $P_{R,ToD}$ ); and
    - (B) estimated average ToD *regional* load ( $ERL_{R,ToD}$ ).
  - (ii) These parameters are used to derive the Outstandings Limit Volatility Factors ( $VFOSL_{R,ToD}$ ) and the Prudential Margin Volatility Factors ( $VFPM_{R,ToD}$ ) per ToD. The  $VFOSL_{R,ToD}$  and the  $VFPM_{R,ToD}$  are derived from the distribution of the estimated load ( $ERL_{R,ToD}$ ) and estimated ToD RRP ( $P_{R,ToD}$ ) and are set at a level to ensure that, for each *region*, the *prudential standard* is met.
  - (iii)  $VFOSL_{R,avg}$  and  $VFPM_{R,avg}$  are the average OSL and PM volatility factors (across all ToDs) for each region R.

#### 4.3.3. Market Participant specific calculations

- (a) The calculation of a *Market Participant's* OSL considers:
  - (i) the *Market Participant's* ToD level trading behaviour in the NEM, including debit *energy* ( $ED_{R,ToD}$ ), credit *energy* ( $EC_{R,ToD}$ ) and *reallocations* ( $RC_{R,ToD}$ ,  $RCS_{R,ToD}$ ,  $RCC_{R,C,ToD}$  where the *Market Participant* is the credit party and  $RD_{R,ToD}$ ,  $RDS_{R,ToD}$ ,  $RDC_{R,C,ToD}$  where the *Market Participant* is the debit party) (refer to clause 9.2.4);
  - (ii) the *Market Participant's* ancillary service transactions related trading amounts;
  - (iii) swap *reallocations* per ToD, valued at the difference between the strike price ( $PCS_{R,ToD}$ ) and the VF adjusted average RRP;
  - (iv) cap *reallocations* (floor *reallocations* are not included in the calculation); and
  - (v) 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 9.2.4.
- (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* debit energy, credit energy and *reallocations*, a *Market Participant's* OSL is calculated as a function of:
  - (i) The *Market Participant's* estimated debit energy, credit energy, *reallocations* per ToD and *ancillary service transactions* related *trading amounts*;
  - (ii) the estimated absolute value of RRP per ToD;
  - (iii) the VF for the OSL applicable to the relevant ToD and *region* ( $VF_{OSL,R,ToD}$ );
  - (iv) GST; and
  - (v) the OSL time period ( $T_{OSL}$ ), which is 21 days.
- (c) A *Market Participant's* PM is calculated on a similar basis (but excluding *ancillary service transactions* related *trading amounts*), 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

PM Full Offset can be applied in determining a *Market Participant's* PM if 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.

- (a) 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.

- (b) 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*.

#### 4.3.6. Stand-alone power systems

Energy transactions for *connection points* in a *regulated SAPS* are accounted for in the *prudential settings* of the *financially responsible Market Participant* using the relevant estimated *SAPS energy* (debit or credit) and the current *SAPS settlement price* for the applicable *regional reference node*.

## 5. The outstandings limit calculation

The OSL Calculation is represented by:

$$OSL = \sum_R [ \text{MAX}(OSL_{R,I} , OSL_{R,U}) ] - (EAS\$ \times T_{OSL})$$

$$OSL_{R,U} = T_{OSL} \times [ (VED_R - VEC_R + VRD_R - VRC_R + RD\$_R - RC\$_R) ]$$

$$OSL_{R,I} = T_{OSL} \times [ (VED_R - VEC_R + VRD_R - VRC_R) \div VFOSL_{R,avg} + (RD\$_R - RC\$_R) ]$$

$$VED_R = [ \sum_{ToD} (ED_{R,ToD} \times P_{R,ToD} \times VFOSL_{R,ToD}) \quad (\text{value of debit energy}) \\ + (ED_{RS} \times SAPSSP_R) ] \times (GST + 1) \quad (\text{value of debit energy - SAPS})$$

$$VEC_R = [ \sum_{ToD} (EC_{R,ToD} \times P_{R,ToD} \times VFOSL_{R,ToD}) \quad (\text{value of credit energy}) \\ + (EC_{RS} \times SAPSSP_R) ] \times (GST + 1) \quad (\text{value of credit energy - SAPS})$$

$$VRD_R = \sum_{ToD} [ RD_{R,ToD} \times P_{R,ToD} \times VFOSL_{R,ToD} \quad (\text{value of debit energy reallocations}) \\ + RDS_{R,ToD} \times ((P_{R,ToD} \times VFOSL_{R,ToD}) - PDS_{R,ToD}) \quad (\text{value of debit swap reallocations}) \\ + \sum_C (RDC_{R,C,ToD} \times \text{MAX}(((P_{R,ToD} \times VFOSL_{R,ToD}) - P_C), 0))] \quad (\text{value of debit cap reallocations})$$

$$VRC_R = \sum_{ToD} [ RC_{R,ToD} \times P_{R,ToD} \times VFOSL_{R,ToD} \quad (\text{value of credit energy reallocations}) \\ + RCS_{R,ToD} \times ((P_{R,ToD} \times VFOSL_{R,ToD}) - PCS_{R,ToD}) \quad (\text{value of credit swap reallocations}) \\ + \sum_C (RCC_{R,C,ToD} \times \text{MAX}(((P_{R,ToD} \times VFOSL_{R,ToD}) - P_C), 0))] \quad (\text{value of credit cap reallocations})$$

where:

### Regional Parameters:

GST	Represents the applicable rate for the Goods and Services Tax.
$P_{R,ToD}$	Represents the absolute value of the estimated average future RRP per ToD for each <i>region R</i> .
$SAPSSP_R$	Represents the current <i>SAPS settlement price</i> for each <i>region R</i> .
$T_{OSL}$	Is the OSL time period, which is 21 days.
$VFOSL_{R,ToD}$	Is a volatility factor, which is a scaling factor specific to the OSL used to achieve the <i>prudential standard</i> per ToD for each <i>region R</i> .
$VFOSL_{R,avg}$	Is the average OSL volatility factor (across all ToDs) for each <i>region R</i> .

### Market Participant Specific Parameters:

$OSL_{R,U}$	Represents the <i>regional OSL</i> with full allowance for <i>regional</i> volatility.
$OSL_{R,I}$	Represents the <i>regional OSL</i> with no allowance for <i>regional</i> volatility.
$VED_R$	Represents the value of debit energy for a <i>Market Participant</i> in <i>region R</i> .
$VEC_R$	Represents the value of credit energy for a <i>Market Participant</i> in <i>region R</i> .

$VRD_R$	Represents the value of debit energy <i>reallocations</i> for a <i>Market Participant</i> in <i>region R</i> .
$VRC_R$	Represents the value of credit energy <i>reallocations</i> for a <i>Market Participant</i> in <i>region R</i> .
$ED_{R,ToD}$	Represents <i>AEMO's</i> estimate of the <i>Market Participant's</i> average ToD debit energy in <i>region R</i> .
$ED_{RS}$	Represents <i>AEMO's</i> estimate of the <i>Market Participant's</i> average daily debit energy in a <i>regulated SAPS</i> in <i>region R</i> <sup>7</sup> .
$EC_{R,ToD}$	Represents <i>AEMO's</i> estimate of the <i>Market Participant's</i> average ToD credit energy in <i>region R</i> .
$EC_{RS}$	Represents <i>AEMO's</i> estimate of the <i>Market Participant's</i> average daily credit energy in a <i>regulated SAPS</i> in <i>region R</i> <sup>8</sup> .
$RC_{R,ToD}$	Represents the average ToD <i>energy</i> of ex ante energy <i>reallocation transactions</i> , for which the <i>Market Participant</i> is the credit party in <i>region R</i> .
$RD_{R,ToD}$	Represents the average ToD <i>energy</i> of ex ante energy <i>reallocation transactions</i> for which the <i>Market Participant</i> is the debit party in <i>region R</i> .
$RCS_{R,ToD}$	Represents the average ToD <i>energy</i> of ex ante swap <i>reallocation transactions</i> , for which the <i>Market Participant</i> is the credit party in <i>region R</i> .
$RDS_{R,ToD}$	Represents the average ToD <i>energy</i> of ex ante swap <i>reallocation transactions</i> for which the <i>Market Participant</i> is the debit party in <i>region R</i> .
$PCS_{R,ToD}$	Represents the swap energy-weighted average strike price per ToD for ex ante swap <i>reallocation transactions</i> for which the <i>Market Participant</i> is the credit party in <i>region R</i> .
$PDS_{R,ToD}$	Represents the swap energy-weighted average strike price per ToD for ex ante swap <i>reallocation transactions</i> for which the <i>Market Participant</i> is the debit party in <i>region R</i> .
$RCC_{R,C,ToD}$	Represents the average ToD <i>energy</i> of ex ante cap <i>reallocation transactions</i> for which the <i>Market Participant</i> is the credit party, for a cap value <i>C</i> in <i>region R</i> .
$RDC_{R,C,ToD}$	Represents the average ToD <i>energy</i> of ex ante cap <i>reallocation transactions</i> for which the <i>Market Participant</i> is the debit party, for a cap value <i>C</i> in <i>region R</i> .
$RC\$_R$	Represents the average daily dollar amount of ex ante dollar <i>reallocation transactions</i> for which the <i>Market Participant</i> is the credit party, in <i>region R</i> .
$RD\$_R$	Represents the average daily dollar amount of ex ante dollar <i>reallocation transactions</i> for which the <i>Market Participant</i> is the debit party, in <i>region R</i> .
$P_C$	Represents the predefined cap value of cap <i>reallocations</i> (\$100, \$200 or \$300).
$EAS\$$	Represents <i>AEMO's</i> estimate of the dollar value of the <i>Market Participant's</i> average daily <i>ancillary service transactions</i> related <i>trading amounts</i> , for all regions.

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:

$$\mathbf{PM = PM_L \text{ or } PM_F} \quad \text{(either PM Limited Offset (PM_L) or PM Full Offset (PM_F))}$$

$$\mathbf{PM_L = MAX [\sum_R (PM_{R,E}), 0] + MAX[\sum_R (PM_{R,R}), 0]} \quad \text{(PM Limited Offset)}$$

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

$$PM_{R,E} = T_{RP} \times MAX [ (VED_R - VEC_R), (VED_R - VEC_R) \div VFPM_R ]$$

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

$$PM_{R,U} = T_{RP} \times [ (VED_R - VEC_R + VRD_R - VRC_R + RD\$_R - RC\$_R) ]$$

$$PM_{R,I} = T_{RP} \times [ (VED_R - VEC_R + VRD_R - VRC_R) \div VFPM_{R,avg} \\ + (RD\$_R - RC\$_R) ]$$

$$VED_R = [ \sum_{ToD} (ED_{R,ToD} \times P_{R,ToD} \times VFPM_{R,ToD}) \\ + (ED_{RS} \times SAPSSP_R) ] \times (GST + 1) \quad \begin{array}{l} \text{(value of debit energy)} \\ \text{(value of debit energy - SAPS)} \end{array}$$

$$VEC_R = [ \sum_{ToD} (EC_{R,ToD} \times P_{R,ToD} \times VFPM_{R,ToD}) \\ + (EC_{RS} \times SAPSSP_R) ] \times (GST + 1) \quad \begin{array}{l} \text{(value of credit energy)} \\ \text{(value of credit energy - SAPS)} \end{array}$$

$$VRD_R = \sum_{ToD} [ RD_{R,ToD} \times P_{R,ToD} \times VFPM_{R,ToD} \\ + RDS_{R,ToD} \times ((P_{R,ToD} \times VFPM_{R,ToD}) - PDS_{R,ToD}) \\ + \sum_C (RDC_{R,C,ToD} \times MAX(((P_{R,ToD} \times VFPM_{R,ToD}) - P_C), 0) ] \quad \begin{array}{l} \text{(value of debit energy reallocations)} \\ \text{(value of debit swap reallocations)} \\ \text{(value of debit cap reallocations)} \end{array}$$

$$VRC_R = \sum_{ToD} [ RC_{R,ToD} \times P_{R,ToD} \times VFPM_{R,ToD} \\ + RCS_{R,ToD} \times ((P_{R,ToD} \times VFPM_{R,ToD}) - PCS_{R,ToD}) \\ + \sum_C (RCC_{R,C,ToD} \times MAX(((P_{R,ToD} \times VFPM_{R,ToD}) - P_C), 0) ] \quad \begin{array}{l} \text{(value of credit energy reallocations)} \\ \text{(value of credit swap reallocations)} \\ \text{(value of credit cap reallocations)} \end{array}$$

where:

### Regional Parameters:

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

**P<sub>R,ToD</sub>** Represents the absolute value of the estimated average future RRP per ToD for each *region R*.

**SAPSSP<sub>R</sub>** Represents the current *SAPS settlement price* for each *region R*.

**T<sub>RP</sub>** Is the *reaction period*, which is seven days.

$VFPM_{R,ToD}$  Is a volatility factor, which is a scaling factor specific to the PM used to achieve the *prudential standard* per ToD for each *region R*.

$VFPM_{R,avg}$  Is the average PM volatility factor (across all ToDs) 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*.

$VED_R$  Represents the value of debit energy for a *Market Participant* in *region R*.

$VEC_R$  Represents the value of credit energy 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*.

$ED_{R,ToD}$  Represents AEMO's estimate of the *Market Participant's* average ToD debit energy in *region R*.

$ED_{RS}$  Represents AEMO's estimate of the *Market Participant's* average daily debit energy in a *regulated SAPS* in *region R*.

$EC_{R,ToD}$  Represents AEMO's estimate of the *Market Participant's* average ToD credit energy in *region R*.

$EC_{RS}$  Represents AEMO's estimate of the *Market Participant's* average daily credit energy in a *regulated SAPS* in *region R*.

$RC_{R,ToD}$  represents the average ToD *energy* of *ex ante energy reallocation transactions*, for which the *Market Participant* is the credit party in *region R*.

$RD_{R,ToD}$  represents the average ToD *energy* of *ex ante energy reallocation transactions* for which the *Market Participant* is the debit party in *region R*.

$RCS_{R,ToD}$  represents the average ToD *energy* of *ex ante swap reallocation transactions*, for which the *Market Participant* is the credit party in *region R*.

$RDS_{R,ToD}$  represents the average ToD *energy* of *ex ante swap reallocation transactions* for which the *Market Participant* is the debit party in *region R*.

$PCS_{R,ToD}$  represents the swap energy-weighted average ToD strike price for *ex ante swap reallocation transactions* for which the *Market Participant* is the credit party in *region R*.

$PDS_{R,ToD}$  represents the swap energy-weighted average ToD strike price for *ex ante swap reallocation transactions* for which the *Market Participant* is the debit party in *region R*.

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

$RDC_{R,C,ToD}$	represents the average ToD <i>energy</i> of ex ante cap reallocation transactions for which the <i>Market Participant</i> is the debit party, for a cap value C in <i>region R</i> .
$RC_{R,ToD}^{\$}$	represents the average ToD dollar amount of ex ante dollar <i>reallocation transactions</i> for which the <i>Market Participant</i> is the credit party, in <i>region R</i> .
$RD_{R,ToD}^{\$}$	represents the average ToD dollar amount of ex ante dollar <i>reallocation transactions</i> for which the <i>Market Participant</i> is the debit party, in <i>region R</i> .
$P_C$	Represents the predefined cap value of cap reallocations (\$100, \$200 or \$300).

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 3.3.11(a)(2), for all *Market Participants* except MNSPs and DRSPs. As it is not feasible to determine a *typical accrual* for an MNSP or a DRSP, the *call amount* for these Market Participants 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:

$$TA = DTA \times T$$

$$DTA = [\sum_R DTA_R] - EAS\$ \quad \text{(daily typical accrual)}$$

$$DTA_R = \sum_{ToD} [ (ED_{R,ToD} - EC_{R,ToD}) \times P_{R,ToD} \times (GST+1) \quad \text{(typical net value of energy)}$$

$$+ (RD_{R,ToD} - RC_{R,ToD}) \times P_{R,ToD} \quad \text{(typical net value of energy reallocations)}$$

$$+ RDS_{R,ToD} \times (P_{R,ToD} - PDS_{R,ToD}) \quad \text{(typical value of debit swap reallocations)}$$

$$- RCS_{R,ToD} \times (P_{R,ToD} - PCS_{R,ToD}) ] \quad \text{(typical value of credit swap reallocations)}$$

$$+ (RD\$_R - RC\$_R) \quad \text{(typical daily net value of dollar reallocations)}$$

$$+ (ED_{RS} - EC_{RS}) \times SAPSSP_R \times (GST+1) \quad \text{(typical daily net value of SAPS energy)}$$

where:

### Regional Parameters:

- GST** Represents the applicable rate for the Goods and Services Tax.
- $P_{R,ToD}$**  Represents the absolute value of the estimated average future RRP per ToD for each *region R*.
- $SAPSSP_R$**  Represents the current *SAPS settlement price* for each region *R*.
- T** Is the number of days over which the corresponding *outstandings* are calculated.

### Market Participant Specific Parameters

- $ED_{R,ToD}$**  Represents AEMO's estimate of the *Market Participant's* average ToD debit energy in *region R*.
- $ED_{RS}$**  Represents AEMO's estimate of the *Market Participant's* average ToD debit energy in a *regulated SAPS* in *region R*<sup>9</sup>.
- $EC_{R,ToD}$**  Represents AEMO's estimate of the *Market Participant's* average ToD credit energy in *region R*.
- $EC_{RS}$**  Represents AEMO's estimate of the *Market Participant's* average ToD credit energy in a *regulated SAPS* in *region R*<sup>10</sup>.

$RC_{R,ToD}$	Represents the average ToD <i>energy</i> of ex ante energy <i>reallocation transactions</i> , for which the <i>Market Participant</i> is the credit party in <i>region R</i> .
$RD_{R,ToD}$	Represents the average ToD <i>energy</i> of ex ante energy <i>reallocation transactions</i> for which the <i>Market Participant</i> is the debit party in <i>region R</i> .
$RCS_{R,ToD}$	Represents the average ToD <i>energy</i> of ex ante swap <i>reallocation transactions</i> , for which the <i>Market Participant</i> is the credit party in <i>region R</i> .
$RDS_{R,ToD}$	Represents the average ToD <i>energy</i> of ex ante swap <i>reallocation transactions</i> for which the <i>Market Participant</i> is the debit party in <i>region R</i> .
$PCS_{R,ToD}$	Represents the swap energy-weighted average ToD strike price for ex ante swap <i>reallocation transactions</i> for which the <i>Market Participant</i> is the credit party in <i>region R</i> .
$PDS_{R,ToD}$	Represents the swap energy-weighted average ToD strike price for ex ante swap <i>reallocation transactions</i> for which the <i>Market Participant</i> is the debit party in <i>region R</i> .
EAS\$	Represents AEMO's estimate of the dollar value of the <i>Market Participant's</i> average daily <i>ancillary service transactions</i> related <i>trading amounts</i> , for all regions.

Detailed descriptions of each term are provided in clause 9.

## 8. Time of Day methodology

The Time of Day (ToD) methodology refers to a process for dividing the day into five ‘time of day’ segments, in order to undertake prudential calculations.

The ToD methodology is used to determine:

- *regional* volatility factors  $VFOSL_{R,ToD}$  and  $VFPM_{R,ToD}$ .
- debit energy and credit energy for a *Market Participant*, in each *region*, used in OSL and PM calculations.
- debit and credit *reallocations* for a *Market Participant*, in each *region* used in OSL and PM calculations.

The five ToD segments for each *region* R are shown in the table below. All times shown are in market time.

ToD Segment	Early Morning (EM)	Morning Peak (MP)	Middle of day (MD)	Afternoon Peak (AP)	Late Evening (LE)
<b>NSW</b>	00:00 to 05:59	06:00 to 09:59	10:00 to 15:59	16:00 to 19:59	20:00 to 23:59
<b>QLD</b>	00:00 to 05:59	06:00 to 09:59	10:00 to 15:59	16:00 to 19:59	20:00 to 23:59
<b>SA</b>	00:00 to 05:59	06:00 to 09:59	10:00 to 15:59	16:00 to 19:59	20:00 to 23:59
<b>TAS</b>	00:00 to 05:59	06:00 to 09:59	10:00 to 15:59	16:00 to 19:59	20:00 to 23:59
<b>VIC</b>	00:00 to 05:59	06:00 to 09:59	10:00 to 15:59	16:00 to 19:59	20:00 to 23:59

The ToD segmentation is periodically reviewed by *AEMO* and adjusted following consultation with *Market Participants*.

## 9. Details of the OSL and PM components of the MCL

### 9.1. Regional level factors used in calculating OSL and PM

The following factors are calculated at the *regional* level for each ToD (see Section 8 for description of ToD segmentation methodology).

#### 9.1.1. Average regional load ( $ERL_{R,ToD}$ )

- (a) The average *regional* load per ToD for the region ( $ERL_{R,ToD}$ ) is AEMO's estimate of the average *regional* load per ToD 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  $ERL_{R,ToD}$  is calculated by season, using an exponential weighted moving average approach based on the previous value  $ERL_{R,ToD(previous)}$  and the most recent *regional* loads (ACE) for that season. The calculation is outlined below:

- (i) For each season calculate last year's actual average *regional* load per ToD ( $AER_{R,ToD}$ ) using actual ToD *regional* loads (ACE).
- (ii) Calculate the current  $ERL_{R,ToD}$

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

where:

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

$W_{L,R}$  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 (ACE) and chosen to best fit average *regional* loads (ACE) with the exponential moving average approach. The weighting factor is periodically reviewed by AEMO and adjusted following consultation with *Market Participants*.

#### 9.1.2. Average price for the region ( $P_{R,ToD}$ )

- (a) The average price for the *region* per ToD ( $P_{R,ToD}$ ) is the absolute value of AEMO's estimate of the average seasonal RRP per ToD expected to prevail for a *region* R for the purposes of the OSL and PM calculation only. The  $P_{R,ToD}$  will be the same for all *Market Participants* in that *region*.
- (b) The  $P_{R,ToD}$  is calculated by season using an exponential weighted moving average approach based on the previous value  $P_{R,ToD(previous)}$  and the most recent RRP for that season. The calculation is outlined below:

- (i) For each season calculate last year's actual average price per ToD ( $AP_{R,ToD}$ ) using the absolute value of actual RRP.
- (ii) Calculate the current  $P_{R,ToD}$ :

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

Where:

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

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

- (iii) Where the change in the  $P_{R,ToD}$  from one season to the corresponding season in the following year is more than 20%, then the change in the value of  $P_{R,ToD}$  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 Participants*.
- (c) The change constraint in  $P_{R,ToD}$  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 RRP's will be taken from a proxy region as outlined in clause 9.1.5.

### 9.1.3. Outstandings limit volatility factor ( $VFOSL_{R,ToD}$ )

- (a) The outstandings limit volatility factor ( $VFOSL_{R,ToD}$ ) 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.
- (b) The  $VFOSL_{R,ToD}$  is calculated by season using an exponential weighted moving average approach based on the previous value  $VFOSL_{R,ToD(previous)}$  and the most recent RRP's and *regional* loads (ACE) for the season. The calculation is outlined below:
  - (i) For each season calculate last year's actual ToD level volatility factors ( $AVFOSL_{R,ToD}$ ) using actual RRP and *regional* load (ACE).
    - (A) For the relevant season, calculate values of the product of RRP and total load (ACE) in the *region* per TI.
    - (B) Calculate the sum of these values on a daily and ToD basis.
    - (C) Using the results of step b, calculate a rolling 21-day average payment for each ToD segment within the relevant season. This gives a distribution of the rolling 21-day average ToD 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  $AVFOSL_{R,ToD}$ , as:
    - (G)  $AVFOSL_{R,ToD} = X / M$
  - (ii) Calculate the current  $VFOSL_{R,ToD}$ :

$$VFOSL_{R,ToD} = VFOSL_{R,ToD(previous)} \times (1 - W_{VF,R}) + AVFOSL_{R,ToD} \times W_{VF,R}$$

where:

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

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

- (iii) Where the change in the  $VFOSL_{R,ToD}$  from one season to the corresponding season in the following year is more than 20%, then the change in the value of  $VFOSL_{R,ToD}$  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 Participants*.
- (d) The change constraint in  $VFOSL_{R,ToD}$  is designed to increase stability in the OSL.
- (e) Where a new region is created, the historical RRP and loads (ACE) will be taken from a proxy region, see clause 9.1.5.

#### 9.1.4. Prudential margin volatility factor ( $VFPM_{R,ToD}$ )

- (a) The prudential margin volatility factor  $VFPM_{R,ToD}$  is a number derived from the distribution of estimated load (ACE) by estimated price and is used as an input to a *Market Participant's PM*.
- (b) The  $VFPM_{R,ToD}$  is calculated by season using an exponential weighted moving average approach based on the previous value  $VFPM_{R,ToD(previous)}$  and the most recent RRP and *regional* loads (ACE) for the season. The calculation is outlined below:
  - (i) For each season calculate last year's actual ToD level volatility factors ( $AVFPM_{R,ToD}$ ) using actual RRP and *regional* load (ACE).
    - (A) For the relevant season, calculate values of the product of RRP and total customer load (ACE) per TI in the *region*.
    - (B) Calculate the sum of these values on a ToD and daily basis.
    - (C) Using the results of step b, calculate a rolling seven-day average payment for each ToD segment within the relevant season. This gives a distribution of the rolling seven-day average ToD 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  $AVFPM_{R,ToD}$ , as:
    - (G)  $AVFPM_{R,ToD} = X / M$
  - (ii) Calculate the current  $VFPM_{R,ToD}$ :
 
$$VFPM_{R,ToD} = VFPM_{R,ToD(previous)} \times (1 - W_{VF,R}) + AVFPM_{R,ToD} \times W_{VF,R}$$

Where:

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

$W_{VF,R}$  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 Participants*.
- (d) The change constraint in  $VFPM_{R,ToD}$  is designed to increase stability in the PM.
- (e) Where a new *region* is created, the historical RRP and loads (ACE) will be taken from a proxy *region*, see clause 9.1.5.

### 9.1.5. Regions with insufficient historical data

- (a) The approach for determining the  $VFOSL_{R,ToD}$  and  $VFPM_{R,ToD}$  for a *region* with less than 12 months historical data or less than an entire historical like season is to reference the  $VFOSL_{R,ToD}$  and  $VFPM_{R,ToD}$  for a *region* selected by AEMO as a proxy 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*.

## 9.2. Market Participant specific calculations

The following factors are calculated by AEMO for each *Market Participant* and are specific to that *Market Participant*. Some factors are calculated for each ToD (see Section 8 for description of ToD segmentation methodology).

### 9.2.1. Estimated debit energy ( $ED_{R,ToD}$ ), ( $ED_{RS}$ )

The estimated debit energy ( $EL_{R,ToD}$ ) for each *Market Participant* is a positive *energy* amount that represents the estimated value of the *Market Participant's* average ToD debit energy within *region R* for each season. The average ToD debit energy is estimated by reference to historical ToD debit energy 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 Participants*, the estimate will be agreed between AEMO and the *Market Participant* using any relevant information available.

The estimated debit energy in a regulated SAPS ( $ED_{RS}$ ) is the estimated value of the *Market Participant's* average debit energy in a regulated SAPS within *region R* for each season, estimated on the same basis as described above.

### 9.2.2. Estimated credit energy ( $EC_{R, ToD}$ ), ( $EC_{RS}$ )

- (a) The estimated credit energy ( $EC_R$ ) for each *Market Participant* is a positive *energy* amount that represents the estimated value of average ToD credit energy within *region R* for each season. The average ToD credit energy is estimated based on historical ToD credit energy patterns. *AEMO* may take into consideration information from the *Market Participant* when estimating this value. For new *Market Participants*, 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* production units exhibit material variations in average credit energy levels between two or more 21 day OSL time periods ( $T_{OSL}$ ) in the previous twelve months, *AEMO* may estimate average credit energy commensurate with a  $T_{OSL}$  period corresponding to a lower credit energy 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 credit energy from the relevant *production units*.
- (d) The estimated credit energy in a regulated SAPS ( $EC_{RS}$ ) is the estimated value of average daily credit energy in a regulated SAPS within *region R* for each season, estimated on the same basis as described in (a) to (c) above.

### 9.2.3. Estimated ancillary services dollar amount (EAS\$)

The estimated ancillary service dollar amount (EAS\$) for each *Market Participant* is a *dollar* amount that represents the estimated value of the *Market Participant's* average daily trading amounts with respect to *ancillary service transactions*, for all *regions* for each season<sup>12</sup>. The estimated ancillary service dollar amount is estimated by reference to historical average daily trading amounts with respect to *ancillary service transactions* and evident trends in the *Market Participant's* ancillary service transactions patterns. *AEMO* may take into consideration information from the *Market Participant* when estimating this value. For new *Market Participants*, the EAS\$ amount will be set to zero.

### 9.2.4. Reallocation amounts ( $RC_{R,ToD}/RD_{R,ToD}$ ), ( $RCS_{R,ToD}/RDS_{R,ToD}$ ), ( $PCS_{R,ToD}/PCS_{R,ToD}$ ), ( $RCC_{R,C,ToD}/RDC_{R,C,ToD}$ ), ( $RC\$_R/RD\$_R$ )

- (a) NER 3.3.8 requires that OSLs and PMs are determined after taking into account the effect of *reallocations*. Substantial *reallocation*, debit energy 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* ToD energy credit/debit ( $RC_{R,ToD}/RD_{R,ToD}$ ) for each *Market Participant* is a positive *energy* amount that represents the estimated average ToD *energy* of ex ante energy

<sup>12</sup> Please note that positive average daily trading amounts with respect to ancillary service transactions represents a payment to the *Market Participant* and a negative daily trading amounts with respect to ancillary service transactions represents a payment by the *Market Participant*.

*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 ( $RCS_{R,ToD}/RDS_{R,ToD}$ ) for each *Market Participant* is a positive *energy* amount that represents the estimated average ToD *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 ( $PCS_{R,ToD}/PDS_{R,ToD}$ ) 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 ( $RCC_{R,C,ToD}/RDC_{R,C,ToD}$ ) for each *Market Participant* is a positive *energy* amount that represents the estimated average ToD *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) There are three predefined cap values (\$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. If a cap *reallocation* request has a strike price above \$300, it will not be included in the calculation. The predefined cap values may 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 timetable for either the PM Full Offset or PM Limited Offset calculation. All ex ante debit *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) 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 RRP. 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 9.4.5.

### 9.2.5. 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.

### 9.2.6. Limits on return of credit support

AEMO will not return any *credit support* if a *trading limit* breach would be caused by the return.

## 9.3. Managing extreme market conditions

Extended periods of extreme high *spot prices* can create the potential for significant misalignment between a *Market Participant's* MCL and its accrued liabilities, resulting in repeated OSL breaches and failure to meet the *prudential standard*. AEMO monitors *Market Participants'* current accrued liabilities against their current level of *credit support* and may undertake an MCL review for a *Market Participant* under the conditions and with the modifications set out in this clause.

### 9.3.1. Current accrued liabilities precondition for review

- (a) If, on any day, a *Market Participant's* average current accrued liabilities (determined under paragraph (b)) over the previous 21 days exceeds the total *credit support* held by AEMO for the *Market Participant*, AEMO may reassess the *Market Participant's* MCL to reflect the average current accrued liabilities, in accordance with clause 9.3.2.
- (b) For the purposes of this clause 9.5, the amount of a *Market Participant's* **current accrued liabilities** is the aggregate of:
  - (i) net *settlement amounts* payable in respect of *billing periods* prior to the current *billing period*, which remain unpaid by, or to, the *Market Participant*, whether or not the payment date has yet been reached; and
  - (ii) net *settlement amount* payable by, or to, the *Market Participant* in respect of *transactions* for *trading intervals* that have already occurred in the current *billing period*.

### 9.3.2. Substituted calculation methodology

- (a) If AEMO reviews a *Market Participant's* MCL under this clause, the OSL is to be calculated as the average of the *Market Participant's* current accrued liabilities over the 21 days immediately preceding the date of the review (and not in accordance with clause 5).
- (b) AEMO will not change a *Market Participant's* MCL under this clause if it would be less than the sum of the OSL and PM determined under clauses 5 and 6.
- (c) A *Market Participant* whose MCL has been increased under this clause may request AEMO to conduct a further MCL review, using a recalculated OSL under paragraph (a), if the *Market Participant's* current accrued liabilities:
  - (i) are less than the value of the OSL used for the MCL calculation at the time of the request; and

- (ii) have been decreasing day on day in the previous 7 days.

### 9.3.3. Effect on existing security deposits

Once AEMO has received *credit support* that is greater than or equal to the *Market Participant's* revised MCL, any security deposits not required to maintain the *Market Participant's* *outstandings* below their *trading limit* can be applied to payment of monies owing by that *Market Participant* to AEMO according to NER 3.3.13A.

## 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 Participants*.

### 10.2. Maximum Credit Limit for new entrants

#### 10.2.1. Market participants without Significant Bidirectional Flows

- (a) Where a new *Market Participant* registers as a *Market Customer*, *Market Generator* and/or an *Integrated Resource Provider* without Significant Bidirectional Flows, 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 debit energy during the relevant period based on expected customer acquisition and transfer activity;
  - (ii) for *Market Generators* and *Integrated Resource Providers*, the expected capacity and output of *production units* being registered, and projected debit energy during construction and commissioning; and
  - (iii) intention to utilise *reallocations* to cover part or all of traded *energy*.
- (b) 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* without Significant Bidirectional Flows. Individual *Market Participant* calculations may vary.

Participant TYPE	Requirement	OSL	PM
<b>New Market Generator - not yet generating</b>	Auxiliary/ commissioning load coverage	\$2,000 per 1 MW	\$500 per 1 MW
<b>New Market Customer – planning to acquire customers</b>	3 month growth estimates available	As per clause 5, \$7,000 minimum	As per clause 6, \$3,000 minimum

- (c) Where a new active *Market Customer* is not able to provide any data on their expected debit energy a default OSL of \$70,000 and PM of \$30,000 may be applied.
- (d) Any new *Market Participant* wishing to have *reallocations* taken into account in its MCL calculation must consult with AEMO on its expected credit energy and debit energy.
- (e) Where a *Market Participant's* actual debit energy 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.

### 10.2.2 Market participants with Significant Bidirectional Flows

- (a) The following table is a guide to the nominal OSL and PM values that AEMO may determine as part of the assessment of a new *Market Participant* with Significant Bidirectional Flows<sup>14</sup>. Individual *Market Participant* calculations may vary.

Capacity <sup>15</sup> (MW)	OSL	PM	MCL
Up to 50	\$7,000	\$3,000	\$10,000
50 – 100	\$14,000	\$6,000	\$20,000
100 – 199	\$28,000	\$12,000	\$40,000
200 – 299	\$42,000	\$18,000	\$60,000
300 – 399	\$56,000	\$24,000	\$80,000
400 – 499	\$70,000	\$30,000	\$100,000
500 – 599	\$84,000	\$36,000	\$120,000
600 – 699	\$98,000	\$42,000	\$140,000
700 – 799	\$112,000	\$48,000	\$160,000
800 – 899	\$126,000	\$54,000	\$180,000
900 – 999 <sup>16</sup>	\$140,000	\$60,000	\$200,000

- (b) The above OSL and PM values will only apply to *Market Participants* with *bidirectional units* where difference between the output and consumption attributable to the unit in a relevant period is anticipated to be less than 30% (Significant Bidirectional Flows).

<sup>14</sup> The most likely configuration is a *Market Participant* with a battery (i.e. where consumption is of similar magnitude to generation). Clause 10.2.2 does not apply to *Market Participants* with configurations where although they have bi-directional flows, the potential difference between consumption and generation exceeds 30% (i.e. some hybrid set-ups). For these *Market Participants*, MCL will be calculated according to clause 10.2.1.

<sup>15</sup> Capacity refers to the total nameplate rating of all registering bidirectional units (BDUs).

<sup>16</sup> Each additional 100MW of capacity (or part of), will result in an increase of OSL of \$14,000 and increase in PM of \$6,000 for an MCL increase of \$20,000.

- (c) The *Market Participant* is to provide the following information to AEMO upon registration:
  - (i) expected debit energy during the relevant period;
  - (ii) the expected capacity and output of *production units* being registered, and projected debit energy during construction and commissioning; and
  - (iii) intention to utilise *reallocations* to cover part or all of traded energy.
- (d) Any new *Market Participant* with Significant Bidirectional Flows wishing to have *reallocations* taken into account in its MCL calculation must consult with AEMO about its expected debit energy and credit energy.
- (e) If the actual debit energy of a *Market Participant* with *bidirectional units* is significantly greater than that assumed at the time of registration, an MCL review will be undertaken at the earliest opportunity and a revised MCL issued.
- (f) If the actual credit energy of a *Market Participant* with *bidirectional units* is significantly lower than that assumed at the time of 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 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 30% 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 debit energy (VED) or estimated credit energy (VEC).

### 10.4. Maximum Credit Limit for Demand Response Service Providers

- (a) The MCL for a DRSP is OSL + PM where, subject to paragraph (b):
  - (i) OSL (for  $T_{OSL}$ ) is set at the value of \$7000; and
  - (ii) PM (for  $T_{RP}$ ) is a set at the value of \$3000.

The values of OSL and PM will be adjusted to account for any *reallocation transactions* to which the DRSP 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 debit energy (VED) or estimated credit energy (VEC).

## 10.5. Maximum Credit Limit for inactive Market Participants

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, but is not obliged to, determine both OSL and PM to be zero.

# 11. Review of Procedures and prudential settings

## 11.1. Methodology and calculation factors

NER 3.3.8(f) 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. The weighting factors and the adjustment factors used in the calculation of *Market Participants'* OSL and PM are reviewed approximately every three years under normal market conditions.

## 11.2. Market Participant prudential settings

- (a) NER 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) NER 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. NER 3.3.10 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*.

## Version release history

Version	Effective date	Summary of Changes
10.0		<ul style="list-style-type: none"> <li>• Amendments to reflect the National Electricity Amendment (Shortening the settlement cycle) Rule 2024.</li> <li>• Amendment to better align market participant credit support requirements with prudential risks, including: <ul style="list-style-type: none"> <li>– Improving Regional Model calibration and meeting the prudential standard</li> <li>– Accounting for negative prices in the Regional Model</li> <li>– Correcting TAS region data</li> <li>– Reflecting market participant risk profile in MCL calculations</li> <li>– Using energy and absolute value of price in MCL calculations</li> </ul> </li> </ul>
9.0	3 June 2024	<ul style="list-style-type: none"> <li>• Amendments to reflect the terminology changes under the National Electricity Amendment (Integrating energy storage systems into the NEM) Rule 2021.</li> <li>• Amendments to account for ancillary services payments and costs in prudential settings.</li> <li>• Amendments to improve prudential determinations for new participants with bidirectional energy flows.</li> <li>• Minor drafting improvements and error fixes.</li> </ul>
8.0	12 May 2023	<ul style="list-style-type: none"> <li>• New AEMO Template.</li> <li>• Amendments to add new clause 9.5 for substituted OSL in extreme market conditions and explanatory provision in 4.1.</li> <li>• Minor drafting improvements.</li> </ul>
7.0	9 December 2022	Amendments to incorporate energy transactions for stand-alone power systems into determination of prudential settings from 30 May 2023.
6.1	17 September 2021	Minor update to clarify that Demand Response Service Providers under the Procedure are only those providing wholesale demand response.
6.0	18 January 2021	Amendments to add provisions for determination of a maximum credit limit and typical accrual for Demand Response Service Providers under the Wholesale Demand Response Mechanism.
5.0	3 December 2019	Amendments to: <ul style="list-style-type: none"> <li>• Reflect new AEMO procedures format.</li> <li>• Reflect 5 Minute Settlement Rule Change.</li> <li>• Minor spelling/grammatical error fixes.</li> <li>• Move the month of April to the winter season.</li> </ul>
4.0	1 May 2018	Amendments to: <ul style="list-style-type: none"> <li>• Update weighting factors for average regional price and regional volatility.</li> <li>• Update capping factors for average regional price and regional volatility.</li> <li>• Update clause 10.3, relating to the use of reallocations in calculating MNSP prudential requirements.</li> <li>• Changes effective for <i>prudential settings</i> applicable to periods commencing on or after 1 May 2018.</li> </ul>
3.0	1 July 2017	Amendments to: <ul style="list-style-type: none"> <li>• Include calculation of the prudential margin (PM) with full offsets between reallocation and energy amounts, effective for <i>prudential settings</i> applicable to periods commencing on or after 30 November 2017.</li> <li>• Add provisions for determination of a maximum credit limit (MCL) for Market Network Service Providers (MNSPs).</li> <li>• Add a section for managing prudential risk during transition from one season to the next.</li> <li>• Update the process for estimation of reallocation and generation amounts.</li> <li>• Update the section on the impact of the repealed <i>Clean Energy Act 2011</i>.</li> </ul>
2.0	1 August 2014	Amendments to: <ul style="list-style-type: none"> <li>• Address any repeal of the <i>Clean Energy Act 2011</i>.</li> <li>• Update section 10.2 for new entrants and inactive participants to improve consistency with standard determination of credit support.</li> <li>• Refer to the current version of the Rules.</li> </ul>
1.0	29 January 2013	Initial version