

# REPORT: EFFECTIVENESS OF THE NEM PRUDENTIAL SETTINGS METHODOLOGY

December 2024

## Credit Limit Procedures

A report for the National Electricity Market





# Important notice

## Purpose

AEMO has prepared this document in accordance with clause 3.3.8(f) of the National Electricity Rules (NER) to provide information about AEMO’s annual review of the effectiveness of the methodology used to determine the prudential settings for Market Participants as described in the credit limit procedures (CLP) in achieving the objective of the CLP as described in clause 3.3.8(b) of the NER. This review analysed AEMO prudentials data from the period 1 September 2023 to 2 September 2024 and is otherwise generally based on information available to AEMO as at the date of publication, unless otherwise indicated.

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## Version control

| Version | Release date | Changes      |
|---------|--------------|--------------|
| 1       | 16/12/2024   | Final Report |

# Executive summary

Under clause 3.3.8(f) of the National Electricity Rules (NER), AEMO is required to annually review and publish its findings on the effectiveness of the credit limit procedures in achieving the objective of establishing a process for setting prudential settings for each market participant so that the prudential standard is met for the NEM. The 2024 review analysed prudentials data from 1 September 2023 to 2 September 2024, assessing whether the Maximum Credit Limits (MCL) were set appropriately and whether the prudential standard was met. The 2024 review found the following:

- The prudential standard was exceeded in all regions, with exceedance in the NSW region at 2.9%, in the QLD region at 2.9%, in the SA region at 2.1% in the VIC region at 3.2% and in the TAS region at 5.2%. These prudential exceedance values were almost unchanged from the previous year. Despite the prudential standard being exceeded, there were no payment shortfalls over the analysis period.
- The prudential exceedance outputs are based on a theoretical calculation, but in actuality, AEMO has highly responsive operational processes that mitigate, in close to real time, the risk of a payment shortfall. These processes, together with the additional credit support provided by participants above their prudential requirements, are not considered as part of the prudential exceedance calculations.
- MCLs were set at a sufficient level for the summer, winter and shoulder seasons in the analysis period, with reasonable alignment between MCLs and actual market conditions in all regions. Participants continued to provide additional bank guarantees above the MCL requirements. There was low use of security deposits for most of the analysis period with higher MCLs and relatively benign market conditions negating the need for additional prudential coverage.
- MCL and guarantee levels have increased to their highest levels (apart from winter 2022 that had an upsurge in guarantees) since 2011. Conversely, outstandings have moderated since the highs of winter 2022, but on average, outstandings are still higher than they have been over the past 10 years. The outstandings levels in the winter seasons were significantly higher than summer seasons in 2021, 2022, 2023 and 2024 showing that currently, winter is the season with higher prudential risks.
- The discrepancy between estimated average future regional reference price (RRP) used in MCL calculations, and actual prices has moderated over the analysis period, with actual prices somewhat above estimated average future RRP in NSW and QLD, and at or slightly below estimated average future RRP for the SA, TAS and VIC regions. This is in contrast to winter 2022, when actual prices were two to three times higher than the estimated average future RRP in all regions.

AEMO will continue to explore additional ways the Regional Model and/or the CLP can be updated to ensure that MCLs are set appropriately, and the prudential standard is met in the future. In 2025, this will include looking at the treatment of negative prices, the use of PRAFs and the calibration mechanism in the Regional Model. For any further enquiries, please email [Prudentials@aemo.com.au](mailto:Prudentials@aemo.com.au).



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# 1 Background

Clause 3.3 of the National Electricity Rules (NER) sets out the framework for the establishment and determination of the prudential settings for market participants in the NEM. AEMO's Credit Limit Procedures (CLP)<sup>1</sup> establish the methodology by which AEMO will determine the prudential settings for each Market Participant so that the prudential standard is met for the National Electricity Market (NEM). The first MCL review conducted in accordance with the CLP was effective on 28 November 2013.

## 1.1 Credit Limit Procedures (CLP)

The CLP establish the methodology for determining the prudential settings and calculating the MCL, and hence credit support requirements for market participants, in a way that allows the 2% prudential standard to be met. The MCL for each market participant for each season is calculated according to the formula:

$$\text{Maximum Credit Limit} = \text{Outstandings Limit} + \text{Prudential Margin}$$

Where:

- Outstandings Limit (OSL) reflects the level of credit support needed to cover liabilities for all trading periods that have occurred but not yet been paid for, assuming no market participant is failing.
- Prudential Margin (PM) reflects the credit support buffer intended to cover accruing liabilities in the NEM during the reaction period (seven days), which relates to the time it may take to curtail any further liabilities accruing from a failing market participant.

The key features of the MCL calculation include:

- MCL typically calculated over three seasons - summer, winter, and shoulder<sup>2</sup>.
- Seasonal differences in regional reference prices (RRP) and price and load volatility in each region are accounted for through volatility factors (VFs).
- The relative risk of a market participant's energy profile is reflected using Participant Risk Adjustment Factors (PRAF) that express the relationship between regional load and a market participant's marginal loss factor (MLF) adjusted load.
- Changes in market participant MCL requirements are smoothed over corresponding seasons, with seasonal data considered as a continuous series, over the lifespan of the NEM.
- For each region, the level of volatility consistent with the prudential standard is calculated using historical regional load, RRP and relevant time period.

Further features of the CLP, together with the applicable prudential settings are summarised in Appendix 1.

<sup>1</sup> See [https://www.aemo.com.au/-/media/files/electricity/nem/settlements\\_and\\_payments/prudentials/credit-limit-procedures.pdf?la=en](https://www.aemo.com.au/-/media/files/electricity/nem/settlements_and_payments/prudentials/credit-limit-procedures.pdf?la=en)

<sup>2</sup> Summer (December to March), winter (April to September), shoulder (October to November)

## 1.2 Prudential standard

A key aspect of the CLP is the prudential standard. The prudential standard set at 2% under clause 3.3.4A of the NER. In practical terms, this means the prudential arrangements establish a target of no payment shortfall in the market in 98 out of 100 instances of a market participant (e.g. a retailer) defaulting on their market payments, that is, the market participant exceeds their outstandings limit, subsequently defaults, and is removed from the market. In the remaining 2 of 100 instances, AEMO would hold insufficient prudential collateral, resulting in a payment shortfall to the remaining market participants who are net creditors in the market (considering both energy and reallocations).

## 1.3 Regional model recalibration

The regional model was recalibrated in mid-2023 to reflect market conditions more accurately, through an adjustment of the Volatility Factor (VF) percentiles. The VF percentiles are adjustable variables that can be used to recalibrate the regional model, with the aim of meeting the 2% prudential standard. The VF percentiles were set at 100% (the maximum) for all regions. The current VF percentiles are shown in Table 2.

**Table 1 Volatility factor percentiles**

| Region | Current VF percentiles |
|--------|------------------------|
| NSW    | 100%                   |
| QLD    | 100%                   |
| SA     | 100%                   |
| TAS    | 100%                   |
| VIC    | 100%                   |

## 1.4 CLP changes in 2024

In 2024, AEMO consulted on and published a new version of the CLP (v 9.0), with the following changes:

- Amendments to reflect the terminology changes under the National Electricity Amendment (Integrating energy storage systems into the NEM) Rule 2021.
- Amendments to account for ancillary services payments and costs in prudential settings.
- Amendments to improve prudential determinations for new participants with bidirectional energy flows.
- Minor drafting improvements and error fixes.



## 2 Analysis

Under the NER, AEMO is required to annually review and publish its findings on the effectiveness of Credit Limit Procedures. The analysis period for this review encompassed data from 1 September 2023 to 2 September 2024, which included the 2023 shoulder, 2024 summer and 2024 winter seasons. The review assessed whether:

- MCL levels were set appropriately.
- The prudential standard was met.

### 2.1 Setting of MCL levels

This analysis reviews key prudential indicators in aggregate for the market, including the minimum credit support requirements as calculated by AEMO (total MCL), the total participant outstandings, and the total bank guarantees and security deposits provided to AEMO by market participants. The analysis examines trends over both the short and long terms, the relationship between these indicators and what can be concluded about the effectiveness of prudential settings overall.

#### 2.1.1 Short term prudential trends

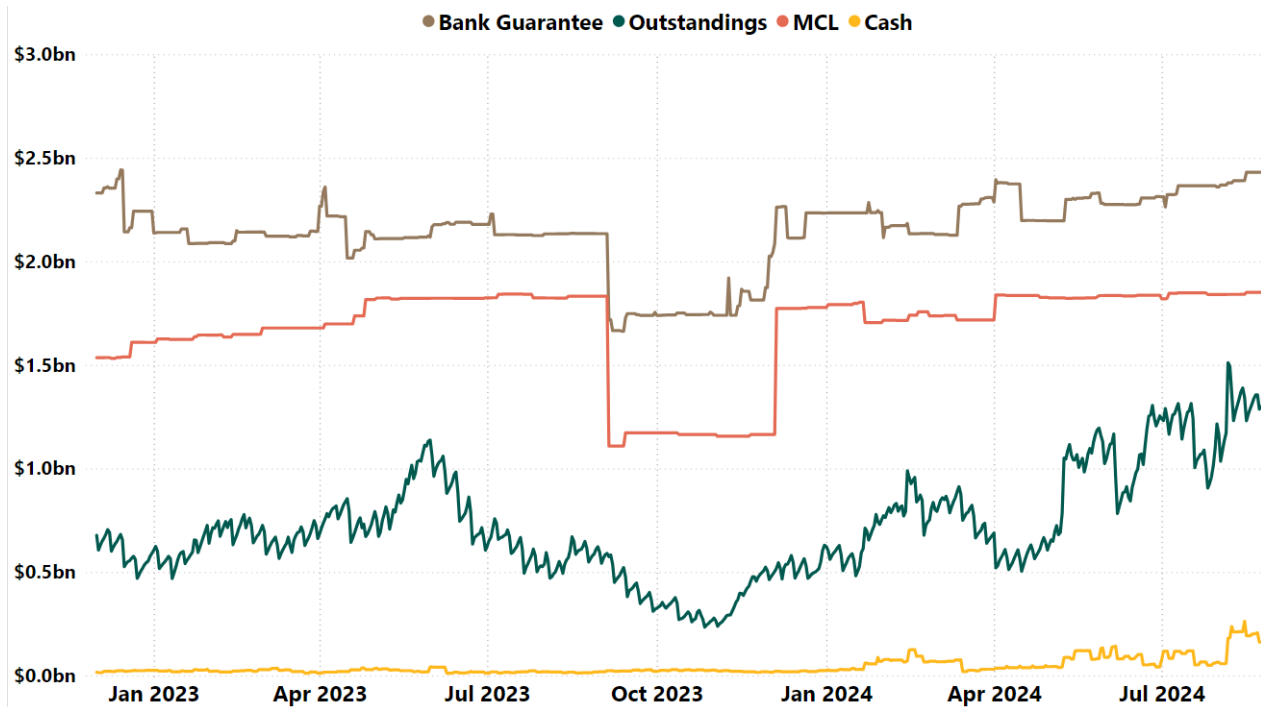
Figure 1 shows the total MCL<sup>3</sup> and total outstandings<sup>4</sup> as well as total guarantees and security deposits provided by market participants over the past one and a half years.

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<sup>3</sup> Sum of calculated MCLs for all market participants.

<sup>4</sup> Sum of outstandings for all market participants.

Figure 1 Key prudential indicators (1 December 2022 to 2 September 2024)



Key observations:

- **MCL exceedance** - there were no times during the analysis period (1 September 2023 to 2 September 2024) where outstandings levels exceeded the MCL levels. This indicates that MCL levels were adequately set for all seasons during the analysis period.
- **Summer MCL** - total MCL levels for the 2024 summer season were slightly higher (by approximately \$100 million) compared to the previous summer season. Market participants provided additional guarantees above their MCL requirements, indicating that they believed that additional prudential support would be required.
- **Summer prudential risk** - from a prudential standpoint, the 2024 summer season was relatively uneventful. There was a rise in outstandings over summer (with just over \$1.0 Billion in outstandings in mid-February), with MCLs adequately covering outstandings and minimal use of security deposits.
- **Winter MCL** - total MCL levels for the 2024 winter season were very similar to the previous winter. Some market participants provided additional guarantees above their MCL requirements, indicating that they may have believed that additional prudential support would be required.
- **Winter prudential risk** - as has been the case since 2021, the outstandings levels in the 2024 winter season were significantly higher than summer season (with just over \$1.5 Billion in outstandings in early August). This shows that winter continues to be the season of higher prudential risks. MCLs did adequately cover outstandings for the winter season, with some increase in the use of security deposits in August 2024.

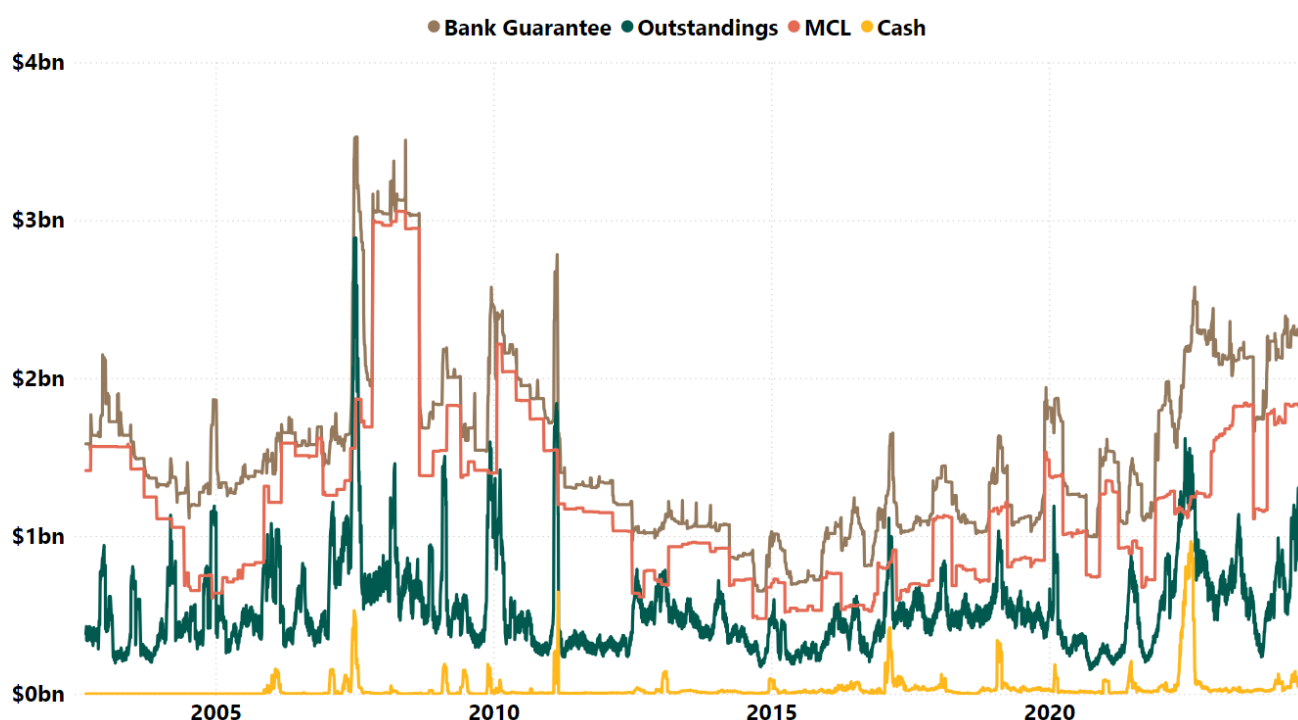


- **Bank guarantees** – the total value of bank guarantees provided trended upwards over the analysis period from under \$1.7 billion in September 2023 to over \$2.4 billion in August 2024. This trend was in line with MCL levels, which went from under \$1.1 billion in September 2023 to above \$1.8 billion in August 2024.
- **Guarantees levels vs MCL requirements** - as has been the case for many years, guarantee levels were well above the MCL requirements. The gap between MCL and guarantee levels over the analysis period was between \$300 to \$600 million. This indicates that on the whole, MCL levels were somewhat below market expectations and participants felt that they needed to provide additional credit support.
- **Outstandings** - the highest outstandings over the analysis period occurred in early August, with outstandings returning to the normal range in late August 2024.
- **Trading margin breaches** - there were relatively few trading margin breaches over the analysis period (with most occurring in August). Consistent with this, the use of security deposits was low throughout the analysis period, with an uptick over the winter season. At its peak in mid-August, AEMO held just over \$260 million in security deposits. As a comparison the maximum amount of security deposits ever held by AEMO was just under a billion dollars in winter 2022.
- **Negative prices** - market changes including shifts in the generation mix and the implementation of 5-minute settlements have been reflected by an increase in the frequency of trading intervals with negative prices. This has resulted in more renewable energy generators (usually with an MCL of zero) having trading margin breaches.

### 2.1.2 Long term prudential trends

Figure 2 looks at the levels of total MCL, guarantees, cash and outstandings over the entire life of the NEM.

**Figure 2 Key prudential indicators (1999 to 2024)**



### Key observations:

- **Participant behaviour** - the general behaviour of market participants in managing their prudentials has been fairly consistent over the years since the introduction of the CLP. The key behaviours are:
  - Provision of guarantees significantly above MCL levels for all seasons.
  - Using cash to manage periods of high outstandings.
- **Trends in prudential settings** – MCL and guarantee levels have increased to their highest levels (apart from winter 2022 that had an upsurge in guarantees) since 2011. The outstandings levels in the winter seasons were significantly higher than summer seasons in each of 2021, 2022, 2023 and 2024, making winter the season with higher prudential risks.
- **Trends in outstandings** - outstandings reached their highest level under the CLP between May and August 2022, with a peak of approximately \$1.6 billion in June 2022. They have since moderated but, again over winter 2024, outstandings reached a peak of \$1.5 billion. On average, outstandings are significantly (and consistently) higher than they have been over the past 10 years.
- **MCL vs outstandings** - MCL levels have been changing at a slower rate than outstandings. This is due to the design of the CLP which aims to shield market participant's MCLs from one-off changes to prices and volatility, whilst enabling them to respond to longer-term trends. There have been only a few occasions where total MCL was below outstandings; in winter 2016, summer 2017 and winter 2022.

### **2.1.3 Estimated average future RRP vs actual average prices**

Figure 3 shows the estimated average future RRP (used in MCL calculations) in comparison to actual prices over MCL seasons, during the past 10 years. As shown, estimated average future RRPs are steady and slowly changing over time (as is the intention under the CLP methodology), while actual prices exhibit volatility over various MCL seasons.

Figure 3 Estimated average future RRP compared to actual prices (2014 to 2024)



Key observations:

- Actual price trends** - in all regions, actual prices were at a low point in 2014 and early 2015, started to trend up from mid-2015 and continued to climb until 2019. After 2019, actual prices remained moderate, then spiking dramatically in all regions in 2022, beyond all previously seen price spikes. Actual prices have since moderated returning to be in line with long term averages.
- Estimated average future RRP trends** - estimated average future RRP movements lag behind actual price changes in all regions under the current CLP price forecasting methodology. The methodology in the CLP has been designed to smooth changes in market participants’ MCLs resulting from one-off changes to estimated average future RRP and volatility from one season to the corresponding season in the following year, while responding to longer-term trend changes. This, in practical terms, has meant that the regional model<sup>5</sup> is slow to respond to price rises and it takes significant time for estimated average future RRP to “catch-up” with step changes in actual prices. This limitation in the CLP resulted in a mismatch between the estimated average future RRP and actual prices over the 2022 winter season.
- Actual prices vs estimated average future RRP** - since 2016, average actual prices have constantly been higher than the estimated average future RRP in most years. This was especially acute over winter 2022, when actual prices were 2 to 3 times higher than the estimated average future RRP in all regions. This discrepancy has since moderated, with actual prices above estimated average future RRP in NSW and QLD and below or at estimated average future RRP for the SA, TAS and VIC regions over the analysis period.

<sup>5</sup> The regional model is used by AEMO to estimate the average future RRP and volatilities based on past NEM data.

## 2.2 Meeting the prudential standard

The prudential standard is the value of the prudential probability of exceedance (POE), expressed as a percentage and is set at 2% (NER 3.3.4A). It is a theoretical calculation which does not consider AEMO's responsive prudential processes or the significant level of credit support provided by some participants in addition to their MCL requirements.


Exceeding the prudential standard does not mean that there is a payment shortfall in any given year. The purpose of the prudential standard is to provide a target within which AEMO seeks to maintain the risk of loss in the event of market participant default. The POE over the past five years, for each NEM region is shown Table 1. As shown, at the end of the current analysis period (2 September 2024), the prudential standard was exceeded in all regions.

**Table 2 POE for the past 5 years**

| Prudential data used | NSW  | QLD  | SA   | TAS  | VIC  |
|----------------------|------|------|------|------|------|
| To 31 August 2020    | 2.0% | 1.5% | 1.3% | 4.7% | 2.6% |
| To 31 August 2021    | 2.3% | 1.8% | 1.3% | 4.4% | 2.6% |
| To 31 August 2022    | 2.8% | 2.7% | 1.9% | 5.2% | 3.1% |
| To 31 August 2023    | 3.0% | 2.9% | 2.0% | 5.2% | 3.2% |
| To 2 September 2024  | 2.9% | 2.9% | 2.1% | 5.2% | 3.2% |

### Key observations:

- **POE exceedance** - the POE almost remained virtually unchanged (with very slight up and down variations) over the analysis period indicating that prudential exceedances were close to the 2% prudential standard for the year.
- **POE trends** - There was an uplift in the POE for all regions in 2022, due to the high price events in winter 2022. The POE has remained at that heightened level into 2023 and now 2024. As the POE calculation is additive, the increases from 2022 continue to be included in the calculation. Under the current methodology, it would take many years of low prudential exceedance levels for the POEs to reduce to below 2022 levels.
- **POE in the future** - AEMO cannot recalibrate the regional mode any further to reach the 2% target, with the VF percentiles already set to the maximum in all regions (see Section 1.3). With higher estimated average future RRP (especially over winter seasons) flowing through to MCL calculations, the POE is likely to fall in all regions over the next few years. However, due to the prudential exceedances already included in the POE calculation, unless changes are made to the way MCLs are calculated and/or to the Regional Model, AEMO does not anticipate the POEs will return to 2% in the NSW, QLD, VIC and TAS regions in the near future.
- **Implications of not meeting the prudential standard** - the POE is theoretical, and is calculated over the life of NEM. In actuality, AEMO has highly responsive operational processes that mitigate, in close to real time, the risk of a payment shortfall. These processes, together with the additional credit support provided



by participants above their prudential requirements, are not considered as part of the POE calculations. Thus, while exceeding the 2% prudential standard may indicate a higher risk of payment shortfall overall, it does not indicate a payment shortfall in any given year. Despite exceeding the prudential standard, there were no payment shortfalls over the analysis period.

- **Improvements to align with the prudential standard** – while the prudential standard was not met over the analysis period, any prudential risks are significantly mitigated by AEMO’s highly responsive operational processes that minimise, in close to real time, the risk of market settlement payment shortfalls. Additionally, AEMO continues to improve its prudential processes and is looking at making some changes to the prudentials methodology to better align it with current market behaviour and conditions and to ensure that the 2% prudential standard is met in the future (see Section 3 for details).

## 2.3 Conclusions

The 2024 review of the CLP has found the following:

### Meeting the prudential standard

The prudential standard was exceeded in all regions, with exceedance in the NSW region, with the POE at 2.9%, in the QLD region at 2.9%, in the SA region at 2.1% in the VIC region at 3.2% and in the TAS region at 5.2%. These prudential exceedance values were almost unchanged from the previous year. Despite the prudential standard being exceeded, there were no payment shortfalls over the analysis period.

### The impact of operational processes

The prudential exceedance outputs are based on a theoretical calculation, but in actuality, AEMO has highly responsive operational processes that mitigate, in close to real time, the risk of a payment shortfall. These processes, together with the additional credit support provided by participants above their prudential requirements, are not considered as part of the prudential exceedance calculations.

### Short term prudential trends

MCLs were set at a sufficient level for the summer, winter and shoulder seasons in the analysis period, with reasonable alignment between MCLs and actual market conditions in all regions. Participants continued to provide additional bank guarantees above the MCL requirements. There was low use of security deposits for most of the analysis period with higher MCLs and relatively benign market conditions negating the need for additional prudential coverage.

### Long term prudential trends

MCL and guarantee levels have increased to their highest levels (apart from winter 2022 that had an upsurge in guarantees) since 2011. Conversely, outstandings have moderated since the highs of winter 2022, but on average, outstandings are still higher than they have been over the past 10 years. The outstandings levels for the winter seasons were significantly higher than summer seasons in 2021, 2022, 2023 and 2024 showing that winter is the season with higher prudential risks.

## Price trends

The discrepancy between estimated average future regional RRP used in MCL calculations and actual prices, has moderated over the analysis period, with actual prices somewhat above estimated average future RRP in NSW, and QLD, and at or slightly below estimated average future RRP for the SA, TAS and VIC regions. This is in contrast to winter 2022, when actual prices were two to three times higher than the estimated average future RRPs in all regions.

# 3 Intended actions

The prudential standard currently being exceeded in most regions is not an artefact of the mismatch between estimated average future RRPs used in MCL calculations and actual prices, as has been the case in previous years. Rather, the cause is the additive nature of the POE calculation, and the level of prudential exceedances already included in the POE from prior years. With the VF percentiles for all regions set at 100%, AEMO has limited options under its current methodology for adjusting the Regional Model and/or the MCL calculations to meet the prudential standard.

Thus, to ensure that prudential risks continue to be assessed adequately under all conditions, AEMO is exploring potential updates to its prudentials methodology related to:

- the treatment of negative prices both in the Regional Model and MCL calculations.
- the use of participant risk adjustment factors (PRAFs).
- adjustments to the calibration mechanism (i.e. VF percentiles) to allow for the Regional Model to be calibrated.

AEMO will consult market participants on any proposed changes to the Regional Model and /or the CLP through its standard consultation process.

# A1. Key CLP features and relevant data

Table 3 CLP key features

| Feature                                   | Description/value   |
|---|---|
| Definition of standard                    | Prudential Probability of Exceedance (POE)  |
| Relevant time period for MCL              | 42 days (35 days outstanding period plus 7 days reaction period)  |
| Measure of standard                       | 2% POE target   |
| MCL                                       | MCL = Outstandings Limit + Prudential Margin  |
| Basis of OSL and PM                       | Price x load x volatility OSL x 35 days<br>Price x load x volatility PM x 7 days  |
| Variance of MCL over the year             | By season   |
| Regions                                   | MCL calculations are regionally based (NSW, QLD, SA, TAS & VIC)   |
| Regional Reference price (RRP) used       | Average price from NEM start for applicable season in each region   |
| Volatility Factors (VF)                   | Volatility factor from NEM start for applicable season in each region   |
| Volatility Factor percentiles             | Calculated to meet the 2% prudential standard   |
| Participant differentiation               | Participants differentiated by load factor and load profile   |
| PRAF                                      | Express the relationship between regional load/generation/reallocations and the market participant's marginal loss factor (MLF) adjusted load/generation/reallocations. |
| Weighting factor – average regional load  | 70%   |
| Weighting factor – average regional price | 20%   |
| Weighting factor – volatility factors     | 20%   |

The current prudential settings are described in Table 4 to Table 6. They specify the forecast volatility factors and average prices calculated for input to the prudential settings calculations for the 2024 winter, 2024 shoulder and the 2025 summer seasons.

Table 4 Outstandings Limit Volatility Factor (VFOSLR)

| Region | Winter 2024 | Shoulder 2024 | Summer 2025 |
|--------|-------------|---------------|-------------|
| NSW    | 1.54        | 1.35          | 1.48        |
| QLD    | 1.53        | 1.48          | 1.51        |
| SA     | 1.56        | 1.43          | 1.77        |
| TAS    | 1.81        | 1.61          | 1.42        |
| VIC    | 1.57        | 1.43          | 1.71        |

**Table 5 Prudential Margin Volatility Factor (VFPMR)**

| Region | Winter 2024 | Shoulder 2024 | Summer 2025 |
|--------|-------------|---------------|-------------|
| NSW    | 2.34        | 1.85          | 2.94        |
| QLD    | 2.26        | 1.9           | 2.86        |
| SA     | 2.61        | 2.1           | 4.11        |
| TAS    | 2.23        | 1.88          | 1.89        |
| VIC    | 2.22        | 1.82          | 4.12        |

**Table 6 Average Price (PR) - \$/MWh**

| Region | Winter 2024 | Shoulder 2024 | Summer 2025 |
|--------|-------------|---------------|-------------|
| NSW    | \$89        | \$72          | \$73        |
| QLD    | \$81        | \$64          | \$88        |
| SA     | \$90        | \$53          | \$65        |
| TAS    | \$62        | \$55          | \$64        |
| VIC    | \$75        | \$50          | \$52        |

Table 7 specifies the regional Volatility Factor Percentiles consistent with the prudential standard as calculated for input to the prudential settings calculations.

**Table 7 Volatility Factor Percentiles**

| Region | Volatility Factor Percentile |
|--------|------------------------------|
| NSW    | 100%                         |
| QLD    | 100%                         |
| SA     | 100%                         |
| TAS    | 100%                         |
| VIC    | 100%                         |



## A2. Glossary

This document uses many terms that are defined in the National Electricity Rules (NER). These terms have the same meaning in this report unless otherwise specified.

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

| Region | Volatility Factor Percentile         |
|--------|--------------------------------------|
| CLP    | credit limit procedures              |
| MCL    | maximum credit limit                 |
| NEM    | National Electricity Market          |
| NER    | National Electricity Rules           |
| OSL    | outstandings limit                   |
| PM     | prudential margin                    |
| POE    | prudential probability of exceedance |
| VF     | volatility factor                    |