

Reliability Panel AEMC

DRAFT REPORT

Reliability Standard and Settings Review

23 December 2009

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About the AEMC

The Council of Australian Governments, through its Ministerial Council on Energy (MCE), established the Australian Energy Market Commission (AEMC) in July 2005 to be the rule maker for national energy markets. The AEMC is currently responsible for rules and policy advice covering the National Electricity Market and elements of the natural gas markets. We are an independent, national body. Our key responsibilities are to consider rule change proposals, conduct energy market reviews and provide policy advice to the Ministerial Council as requested, or on AEMC initiative.

About the AEMC Reliability Panel

The Panel is a specialist body within the AEMC and comprises industry and consumer representatives. It is responsible for monitoring, reviewing and reporting on the safety, security and reliability of the national electricity system and advising the AEMC in respect of such matters. The Panel's responsibilities are specified in section 38 of the National Electricity Law (NEL).

Disclaimer

The views and recommendations set out in this document are those of the Reliability Panel and are not necessarily those of the Australian Energy Market Commission.

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Abbreviations

AEMC	Australian Energy Market Commission
AER	Australian Energy Regulator
APC	Administered price cap
CPRS	Carbon Pollution Reduction Scheme
CPT	Cumulative price threshold
CRR	Comprehensive Reliability Review
ESOO	Electricity Statement of Opportunities
GWh	Gigawatt hour
LOLE	Loss of load expectation
LOLP	Loss of load probability
MCE	Ministerial Council on Energy
MPC	Market price cap
MRET	Mandatory Renewable Energy Target
MRL	Minimum reserve levels
MWh	Megawatt hour
NEL	National Electricity Law
NEM	National Electricity Market
NEMMCO	National Electricity Market Management Company
NEO	National electricity objective
NGF	National Generators Forum
NSP	Network service provider
OCGT	Open cycle gas turbine
Panel	Reliability Panel
RERT	Reliability and emergency reserve trader
Rules	National Electricity Rules
SAIDI	System Average Interruption Duration Index
SOO	Statement of Opportunities
ToR	Terms of Reference
USE	Unserved energy
VoLL	Value of Lost Load

Summary

In March 2009, the Australian Energy Market Commission (AEMC) provided the Reliability Panel (Panel) with a Terms of Reference for the Reliability Standard and Settings Review. The Reliability Standard and settings includes the Reliability Standard, the market price cap (MPC, formerly VoLL), the cumulative price threshold (CPT), and the market floor price. The Panel is also required under clause 3.9.3A of the National Electricity Rules (Rules) to undertake a review and report on the Reliability Standard and settings that should apply from 1 July 2012.

This Draft Report represents the second stage in the Panel's review of the Reliability Standard and settings.

The objectives of this review are to:

- determine whether the existing Reliability Standard is appropriate for current market arrangements given that the existing annual standard was exceeded as a result of the South Australian/Victorian heatwave in January 2009;
- determine the form and level the Reliability Standard that should apply from 1 July 2012;
- determine, given the Reliability Standard chosen to apply in the National Electricity Market (NEM) from 1 July 2012, the appropriate reliability settings to achieve the Reliability Standard; and
- propose processes for implementing any changes arising from the review.

The Rules provide that the Panel must conduct the review in accordance with the Rules consultation procedures set out in rule 8.9 of the Rules.

On 26 June 2009 the Panel published an Issues Paper that sought initial comments in respect of the Reliability Standard and the Reliability Settings. Submissions closed on Friday 14 August 2009. The Panel received submissions from the National Generators Forum (NGF), the Major Energy Users (MEU) and Origin Energy.

Reliability Standard

The Panel has considered the views expressed in submissions with respect to the Reliability Standard. In this regard, the Panel is proposing in this draft report to:

- retain the unserved energy (USE) form of the reliability standard;
- leave the level of the standard at 0.002% USE per annum for each region, and therefore for the NEM as a whole;
- retain the current scope of the reliability standard in terms of system security events, industrial action and 'acts of God';

- retain the current operational approach of targeting to achieve an expectation of no greater than 0.002% USE each year and in each region, and in the NEM as a whole; and
- consider compliance with the standard each year with the objective of providing continuous improvement to the processes that monitor and maintain reliability in the NEM, rather than the current practice of measuring compliance with the Reliability Standard over a ten year moving average.

In addition, the Panel has considered the cost saving of relaxing the Reliability Standard. ROAM considered the impact of an increase in the USE level from 0.002% to 0.003%. ROAM's advice to the Panel is that relaxing the standard to this extent would reduce the installed capacity requirements by approximately 750 MW. This would represent an approximate capital cost saving of \$750m, based on the cost of open cycle gas turbines (OCGTs). This cost saving is approximately \$75m per annum and could be implemented, over time, by a decrease in the MPC. There may also be other cost savings associated with a lower MPC including lower contracting risk premiums.

The Panel is seeking stakeholder views on its proposed amendments to the Reliability Standard. In addition, while the Panel is not proposing a change to the level of the Reliability Standard, it is seeking stakeholder views as to whether tightening, or slackening, the Reliability Standard is expected to provide benefits to customers that are likely to outweigh the change in generator investment needed to meet the changed standard.

Reliability Settings

The AEMC, on behalf of the Panel, engaged ROAM Consulting (ROAM) to undertake the modelling work to assist the Panel to assess the Reliability Settings. The aim of the modelling is to assist the Panel to form a recommendation as to the levels of the MPC and the CPT to apply in the NEM. These values would take effect from 1 July 2012 and apply for the 2012/13 and 2013/14 financial years. ROAM was also requested to provide the Panel with advice on the impact of any change on the financial risks faced by market participants.

ROAM provided a report on its findings, which is published by the Panel as an accompanying document to this Draft Report. The ROAM modelling:

- includes a benchmarking study against the analysis for the Panel's Comprehensive Reliability Review (CRR), published in December 2007;¹
- a description of the modelling assumptions; and

¹ The CRR contained analysis performed by Charles River Associates (CRA) on possible changes to the MPC (then called VoLL). In its final CRR report the Panel recommended a rise in the MPC from \$10,000/MWh to \$12,500/MWh, based on the analysis provided by CRA. Further information on the CRR and the associated CRA analysis is available at <http://www.aemc.gov.au/Market-Reviews/Completed/Comprehensive-Reliability-Review.html>.

- modelling results.

The ROAM modelling is based on determining whether new entry OCGTs would be sufficiently profitable at a given level of Reliability Standard and MPC. The expected level of profitability of new entry OCGTs is based on Monte Carlo spot market simulations. ROAM and the Panel consider that this approach is a valid proxy for the operation of NEM, where contract prices are derived from expected spot market outcomes. The ROAM modelling considered the values of MPC and CPT that would be expected to be necessary to achieve the Reliability Standard.

The initial finding from ROAM is that a significant increase in the level of the MPC to approximately \$20 000/MWh may be required from 1 July 2012 in order to meet the Reliability Standard. This increase is attributed to:

- increased capital costs for new entrant open cycle gas turbines;
- peakier demand; and
- more detailed representation of interconnector capacity assumptions, resulting in reduced inter-regional capabilities at times of high demand.

In addition, another initial finding from ROAM shows that the level of the CPT is likely to need to be increased to \$300 000/MWh. ROAM is not recommending a change to the market floor price from the current level of -\$1 000/MWh.

The Panel's consideration of the Reliability Settings is required to have regard for the potential impact of any increase in the MPC on spot prices, investment and the reliability of the power system.²

The Panel considers that a substantial increase in the level of the MPC would be likely to affect the behaviour of participants. Therefore, it is not possible to fully assess the impact of such an increase and hence the resultant impact on reliability. In addition the Panel has identified a number of consequential issues that may also be affected by a substantial increase to the MPC. The issues that the Panel is seeking stakeholders' views on include:

- whether a higher MPC would attract additional demand side responses, thus capping the price below the higher MPC when it is dispatched;
- the increased prudential requirements and the impact on retail competition;
- the impact of additional risk premiums in the contract market on market customers, including retailers;
- the impact of reduced liquidity of the contract market on risk premiums for generators;
- the impact of increased level of MPC on transient market power;

² This requirement is identified in clause 3.9.4 of the National Electricity Rules.

- whether in fact the market is currently working at the existing level of MPC; and
- whether a significant increase should be implemented in a series of steps.

Stakeholder Consultation

The Panel is seeking stakeholder views on its review of the Reliability Standard and the Reliability Settings. In particular, the Panel seeks comments on:

- the Panel's proposed amendments to the Reliability Standard;
- whether stakeholders see value in changing the level of the Reliability Standard;
- the ROAM analysis and its associated recommendation to raise the level of the MPC and CPT; and
- whether there is a need to change the market floor price.

Stakeholder Forum

The Panel intends to hold a Public Forum in Melbourne in the morning of Monday, 8 February 2010 to discuss the results and findings presented in this Draft Report of the Panel's Review of the Reliability Standard and Settings.

Further details on the venue and time of the Panel meeting will be published by the Panel on the AEMC's website. Stakeholders will also be advised by an AEMC stakeholder email.

Submissions on the draft report

The Panel invites submissions from interested parties in response to the draft report by 5pm (Australian Eastern Standard Time) on Tuesday, 23 February 2010. Submissions may be submitted electronically on the AEMC website at www.aemc.gov.au or sent by mail to:

Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

or by fax: (02) 8296 7899. Submissions should include the reference number REL0034.

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1 Background to this review

1.1 Context of the review

In March 2009, the Australian Energy Market Commission (AEMC) provided the Reliability Panel (Panel) with the Terms of Reference (ToR) for a review entitled “Review of the operational arrangements of the reliability settings and Reliability Standard and Settings Review”.³

In addition, following publication of the AEMC’s *National Electricity Amendment (NEM Reliability Settings: VoLL, CPT and Future Reliability Review) Rule 2009 No.13*,⁴ the Panel is required to undertake a biennial review of the Reliability Standard and settings. Publication of the first biennial review, which pertains to the Reliability Standard and reliability settings to apply from 1 July 2012, must be completed by 30 April 2010.

Those aspects of the ToR pertinent to the Reliability Standard and Settings Review are:

- whether the wording of the standard be changed as published by the Panel in the Comprehensive Reliability Review (CRR) to give better guidance to the Australian Energy Market Operator (AEMO) as to how to operationalise the standard; and
- test the appropriateness for the future of the Reliability Standard and settings, including the form and level of the Reliability Standard, the Market Price Cap (formerly Value of Lost Load, or VoLL), the cumulative price threshold (CPT), and the market floor price.

In respect of the first dot point above, as part of the Panel’s “Review of the Operational Arrangements for the Reliability Standard”,⁵ the Panel has reviewed the wording of the existing Reliability Standard in consultation with AEMO in order to ensure that the policy intent in the CRR has been clearly implemented. Changes made to the Reliability Standard as a result of this review took effect immediately and should be used by AEMO for its current process to recalculate the medium-term Minimum Reserve Levels (MRLs).

1.2 Consultation process

This review is being undertaken in accordance with the Rules consultation procedures outlined in rule 8.9 of the National Electricity Rules (Rules). Given that this review is likely to have important implications for National Electricity Market

³ For ease of reference, the Terms of Reference is included in Appendix A of this Draft Report.

⁴ AEMC 2009, *National Electricity Amendment (NEM Reliability Settings: VoLL, CPT and Future Reliability Review) Rule 2009 No.13*, Final Rule Determination, (28 May 2009, Sydney), p.32.

⁵ For more information about this review, see: www.aemc.gov.au/Market-Reviews/Open/Review-of-Operationalisation-of-the-Reliability-Standards.html

(NEM) stakeholders, including generators, retailers, market customers, network service providers (NSPs), AEMO and the Australian Energy Regulator (AER), stakeholder consultation will be a key element of the review. The Panel has considered stakeholders comments and submissions on its Issues Paper and is seeking further comment on its Draft Report.

The following key dates outline the intended Rules consultation process leading up to the delivery of the Panel's Final Report to the AEMC.

Date	Milestone
Friday, 26 June 2009	Publication of Issues Paper
Monday, 13 July 2009	Public forum in Sydney for both the Reliability Standard and Settings Review and Review of Operationalisation of the Reliability Standards
Friday, 14 August 2009	Close of submissions on Issues Paper
Tuesday, 22 December 2009	Publication of Draft Report
Monday, 8 February 2010	Hold Public Meeting in Melbourne
Tuesday, 23 February 2010	Close of submissions on Draft Report
Friday, 26 March 2010	Submit Final Report to AEMC
By Friday, 30 April 2010	Publication of Final Report

1.3 Consultation on the Issues Paper

The Panel published its Issues Paper on 26 June 2009 and sought stakeholder comments on the review. In addition the Panel held a stakeholder forum on the review and the Panel's "Review of the Operational Arrangements for the Reliability Standard" on 13 July 2009.

Submissions on the Issues Paper closed on 14 August 2009. The Panel received submissions from the Major Energy Users (MEU), the National Generators Forum (NGF) and Origin Energy. A copy of these submissions can be found on the AEMC website.⁶

1.4 Public Meeting on the Draft Report

The Panel published this Draft Report in December 2009. The Panel intends to hold a Public Meeting in Melbourne in the morning of Monday, 8 February 2010 to discuss the results and findings presented in this Draft Report of the Panel's Review of the Reliability Standard and Settings.

⁶ The submissions are available at www.aemc.gov.au/Market-Reviews/Open/Review-of-the-Reliability-Standard-and-Settings.html.

Further details on the venue and time of the Panel meeting will be published by the Panel on the AEMC's website. Stakeholders will also be advised by an AEMC stakeholder email.

1.5 Submissions on the Draft Report

The Panel invites submissions from interested parties in response to the Draft Report by 5pm (Australian Eastern Standard Time) on Tuesday, 23 February 2010. Submissions may be uploaded on the AEMC website electronically or sent by mail in accordance with the following requirements.

1.5.1 Lodging a submission electronically

Comments must be lodged online through the AEMC's homepage at www.aemc.gov.au using the link entitled "online lodgement".

The submission must be on letterhead (if an organisation), signed and dated by the proponent, and the submission must be in PDF format.

Upon receipt of the electronic version of the submission, the Panel will issue a confirmation email. If this confirmation email is not received within 3 business days, it is the submitter's responsibility to ensure successful delivery of the submission has occurred.

1.5.2 Lodging a submission by mail

The submission must be on letterhead (if an organisation), signed and dated by the respondent. The submission should be sent by mail to:

The Reliability Panel
Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

or by Fax: (02) 8296 7899.

The envelope or fax must be clearly marked with the project reference code: "REL0034".

Except in circumstances where the submission has been submitted electronically, upon receipt of the hardcopy submission the Panel will issue a confirmation letter. If this confirmation letter is not received within 3 business days, it is the submitter's responsibility to ensure successful delivery of the submission has occurred.

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2 Reliability Standard and Settings Review

2.1 The need for the Reliability Standard and Settings Review

The Panel is required under clause 3.9.3A of the Rules to review the Reliability Settings every two years. Regularly reviewing the settings balances the need for certainty for consumers and investors on the one hand; and the need to maintain appropriate and timely consideration of overall NEM reliability performance. The Reliability Settings together align with the National Electricity Objective (NEO), as it promotes the long term interest of consumers and electricity because it ensures that the Reliability Standard is met.

2.2 The requirements under the Rules for reviewing the Reliability Standard and Settings

By 30 April 2010, the Panel is required under clause 3.9.3A of the Rules to undertake a review and report on the Reliability Standard and settings that should apply from 1 July 2012.⁷

2.3 The existing Reliability Standard and the Reliability Settings

Reliability Standard

The Reliability Standard is the primary mechanism for encouraging the market to deliver enough capacity to meet consumer demand for electricity. The Reliability Standard is a measure of the maximum amount of energy that can be at risk of not being delivered to consumers due to a lack of available capacity. Currently under the Reliability Standard, the level of expected unserved energy (USE) should not exceed 0.002% of the annual energy consumption per region.

Reliability Settings

The level of the MPC, the market floor price and the CPT are the key price envelopes within which the wholesale spot market seeks to balance supply and demand, and deliver capacity to meet the Reliability Standard, i.e. 0.002% USE in the case of the NEM, with the aim of avoiding unmanageable risks for market participants.⁸ The level of the MPC and the market floor price are crucial because they provide key signals for supply and demand-side investment and usage. For example, if the MPC is set too high, Market Customers (retailers or consumers that are directly exposed to the spot price) and generators can be exposed to very large financial risks. However, if set too low, there may be insufficient incentives to invest in new generation capacity and demand-side response to meet the Reliability Standard.

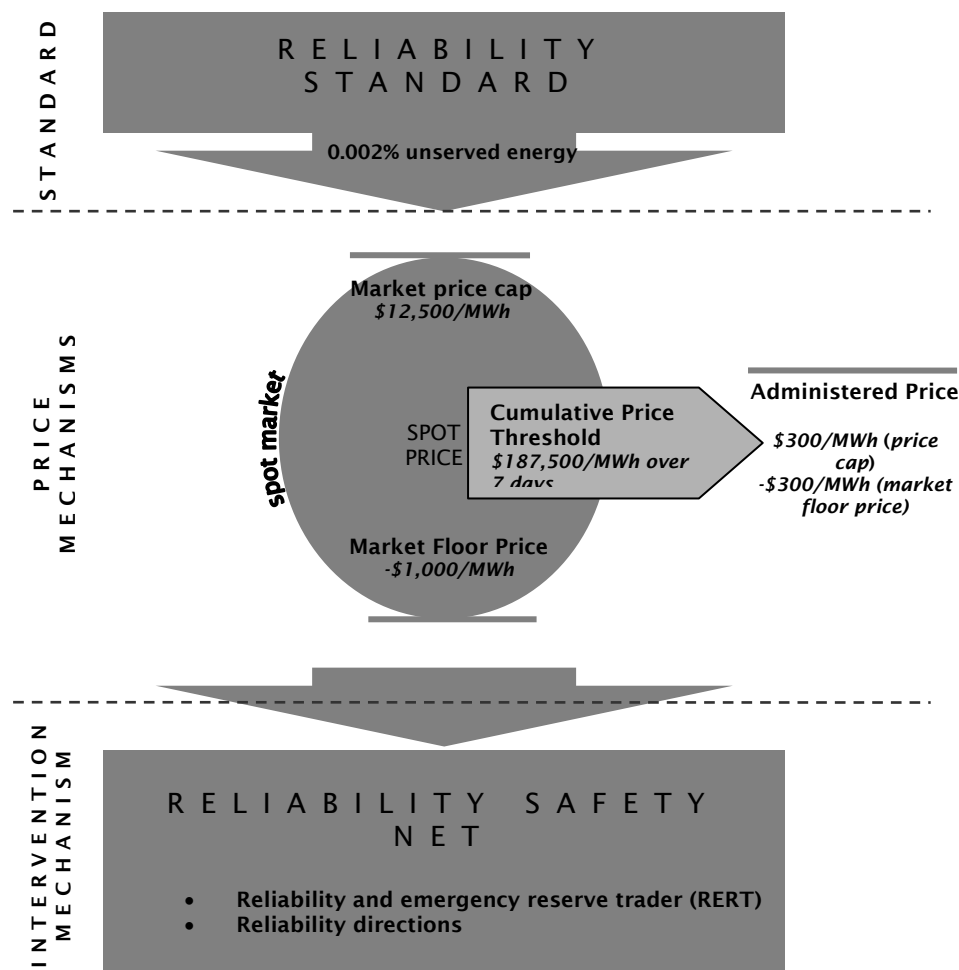
⁷ An excerpt of the Panel's obligations under the Rules is provided in Appendix B of this Draft Report.

⁸ AEMC Reliability Panel, *NEM Reliability Settings: VoLL, CPT and Future Reliability Review Rule Change Proposal* (December 2008, Sydney), p.1.

The CPT is an explicit risk management mechanism designed to limit participants' exposure to protracted levels of high prices in the wholesale spot market. If the sum of the half-hourly wholesale market spot prices over a rolling seven-day period exceeds this threshold, AEMO must impose the administered price cap (APC). The APC is specified in a schedule that is developed, authorised, published and varied by the AEMC. The APC is currently $\pm\$300/\text{MWh}$ for all regions of the NEM, for all time periods.⁹

The NEM Reliability Settings as they apply from 1 July 2010 are depicted graphically in Figure 2.1 below.

Figure 2.1 NEM Reliability Settings that apply from 1 July 2010



The reliability safety net, which includes the reliability and emergency reserve trader (RERT) and reliability directions are also important interventions utilised by AEMO to reduce USE that accrues. Clause 4.8.9 of the Rules explicitly outlines AEMO's obligations in respect of reliability directions and is not subject to a sunset.

⁹ AEMC 2009, *National Electricity Amendment (NEM Reliability Settings: VoLL, CPT and Future Reliability Review)* Rule 2009 No.13, Final Rule Determination, 2009, Sydney, p.1.

Reliability directions are not included in the Panel's assessment of the Reliability Settings for this review. The RERT on the other hand, under clause 3.20.1(a) of the Rules, is subject to a sunset of 30 June 2012. Furthermore, under clause 3.20.9(a) the Panel is required to complete a review of the RERT by 30 June 2011. Given that the Panel must conduct its review of the RERT prior to the commencement date of the outcomes from this review, the RERT is not included in the Panel's assessment of the Reliability Settings.

Within the existing energy market design framework, the mechanisms that can be adjusted to provide investment signals are limited to the MPC, the CPT and the market floor price.¹⁰ Other mechanisms that deliver investment signals were considered and consulted on as part of the CRR, but were not considered further by the Panel at that time. The Panel notes that new mechanisms were considered during the AEMC's Review of the Effectiveness of Energy Market Frameworks in light of Climate Change, and may also result from other Ministerial Council on Energy (MCE) initiatives.¹¹ The Panel recognises that if new mechanisms arise, the levels of the MPC, the CPT and the market floor price may need to be re-examined at a later stage.¹²

2.4 The reasons for changing the Reliability Settings to apply from 1 July 2010

Since the publication of the CRR, the Commonwealth Government has announced plans for a Carbon Pollution Reduction Scheme (CPRS), and an expansion of the existing Mandatory Renewable Energy Target. At the request of the MCE, the AEMC reviewed the implications of the introduction of the CPRS and expanded renewable energy target on the energy market frameworks and the Rules.¹³

In a Rule change proposal¹⁴ to the AEMC, the Panel highlighted the prior intention for the CPRS to be introduced on 1 July 2010. In light of this, the Panel noted that it had sought views from stakeholders on the appropriateness of 1 July 2010 as the date for the increases in the MPC and the CPT to become effective, and that responses on this issue had been mixed. Nevertheless, the Panel decided that, taking into account all relevant factors, it was appropriate to propose to raise the MPC and maintain the CPT level relative to the MPC with effect from 1 July 2010.¹⁵ The AEMC concluded

¹⁰ AEMC Reliability Panel, *NEM Reliability Settings: VoLL, CPT and Future Reliability Review Rule Change Proposal*, (December 2008, Sydney), p.2.

¹¹ Ibid.

¹² Ibid.

¹³ More information on this Review can be found at www.aemc.gov.au/Market-Reviews/Completed/Review-of-Energy-Market-Frameworks-in-light-of-Climate-Change-Policies.html

¹⁴ AEMC Reliability Panel, *NEM Reliability Settings: VoLL, CPT and Future Reliability Review Rule Change Proposal*, (December 2008, Sydney), p.14.

¹⁵ Note that introduction of the CPRS has been delayed for a least one year, and is expected to start at or after the 1 July 2011.

in its final Rule determination that the MPC and the CPT be raised at the same date, namely 1 July 2010.¹⁶

The AEMC's reasoning for changing the MPC was that although other factors may influence the levels of contracting and contract prices, within the existing energy market design framework the mechanisms that can be adjusted to provide investment signals are limited to the MPC, the CPT and the market floor price. The AEMC therefore considered that a given level of NEM reliability – 0.002% USE in the case of the NEM – can best be targeted by raising the MPC, as this would expose retailers to additional risk and create incentives for greater levels of contracting.¹⁷ In respect of the CPT, the AEMC considered that, given its determination to increase the level of the MPC to \$12 500/MWh, failure to increase the absolute level of the CPT would result in an increase in the number of CPT breaches, thereby frustrating the aim of the increase in the MPC. The AEMC considered that the CPT should be set at such a level to protect market participants by limiting their exposure to extreme price events and that it should not act to inhibit or blunt the investment signals given by the MPC. However, the AEMC determined to set the CPT at an absolute level of \$187 500/MWh, rather than “hard wire” a ratio of 15 times VoLL, as proposed by the Panel.¹⁸

The AEMC considered that the Panel's Rule change proposal was likely to contribute to achievement of the NEO. The AEMC anticipated that:

- increasing the MPC to \$12 500/MWh will promote efficient investment and that this will further the long term interests of consumers of electricity in terms of representing an efficient balance between the price and reliability of supply of electricity;¹⁹
- increasing the level of the CPT to an absolute value of \$187 500/MWh would allow for an efficient level of investment in electricity services. This would be in the long term interest of consumers with respect to reliability, while providing an appropriate level of protection to such consumers with respect to the price of electricity through the prevention of extended periods of very high prices that might result in certain extreme circumstances;²⁰ and
- reviewing the Reliability Standard and all the Reliability Settings (i.e. the MPC, CPT, and the market floor price) together would promote the long term interest of consumers as it improved the ability of the NEM to meet the Reliability Standard.²¹

¹⁶ Ibid.

¹⁷ Ibid, p.17.

¹⁸ Ibid, p.24.

¹⁹ Ibid, p.18.

²⁰ Ibid, p.24-25.

²¹ Ibid, p.30 and p.32.

3 Review of the Reliability Standard

3.1 NEM Reliability Standard

3.1.1 Background

The Reliability Standard was set at 0.002% unserved energy (USE) by the Panel at market start in 1998. The Standard describes the minimum acceptable level of bulk electricity supply delivered to consumers in a region measured against the total demand of consumers in that region.

The practice to date has been to measure the Reliability Standard over the long term. Thus, if consumer energy demand was 100 000 MWh over the long term, the Standard would require the supply of no less than 99 998 MWh. Currently, in order to operationalise the Reliability Standard, AEMO calculates MRLs for each region. It then compares forecast and actual reserve levels with the MRLs to manage the risk that the Reliability Standard will not be met at the time of dispatch. Historically, the NEM has performed well against the Reliability Standard.

The Reliability Standard does not reflect the reliability performance of the distribution network. Distribution networks are subject to performance standards that are set and monitored by jurisdictional bodies.

The current definition of the Reliability Standard, its form, level and compliance are outlined below and are part of the Panel's *power system security and reliability standards*.

3.1.2 Form of the Reliability Standard

The NEM Reliability Standard is expressed in terms of the maximum expected level of electricity at risk of not being supplied to consumers, per financial year. The USE is measured in GWh and should be expressed as a percentage of the annual energy consumption for the associated region or regions.

In the CRR²², a number of alternative definitions of reliability were raised, which included the following:²³

- how frequently supply is interrupted – for example, the number of days per year in which an interruption occurs;

²² Further discussions is on page xi of the Final Report of the Panel's "Comprehensive Reliability Review", published December 2007, and on page 9 of the Panel's 2008 Annual Market Performance Review.

²³ See pages 22-26 of the Final Report of the Panel's "Comprehensive Reliability Review", published December 2007.

- the cumulative duration of interruptions – for example, the total number of hours per year that interruption to any (not necessarily the same) consumer occurs; and
- the amount of energy that is not supplied in a period – for example, the NEM’s Reliability Standard, or the System Average Interruption Duration Index (SAIDI) for distribution.

As part of the CRR, the Panel made an international comparison of reliability standards that showed many international jurisdictions that are comparable to the NEM use the first of the above three measures. This is known either as loss of load expectation (LOLE) or loss of load probability (LOLP):²⁴

- LOLE is the expected number of days per year in which available generating capacity is insufficient to serve demand, or the half-hours per year in which capacity is insufficient to serve half-hourly load.
- LOLP is the proportion in percentage (probability) of days per year, half-hours per year, or events per season, in which available generating capacity is insufficient to serve demand.

In its CRR, the Panel noted that there was general support for retaining the USE form of the Reliability Standard from stakeholders. The reasons given were that it:

- has been used since the NEM commenced;
- is relatively easy to measure;
- reflects the economic impact on typical end users; and
- applies equally to each of the NEM regions.

3.1.3 Level of the Reliability Standard

The expected level of USE is required to be no greater than 0.002% of the annual energy consumption for the associated region or regions per financial year. This has been the level of the Reliability Standard since the start of the NEM.

The Panel considered the level of the Reliability Standard as part of its CRR. At that time, no stakeholder submissions put forward an alternative level for the Reliability Standard. The Panel also made an international comparison of the level of the NEM Reliability Standard with the standard in similar markets.

The Panel concluded in its CRR that the level of the NEM Reliability Standard should remain at 0.002% USE. This was based on the Panel’s view that:

- there had been no call from stakeholders, particularly those of consumer representative groups, for a change to the standard’s level;

²⁴ Ibid.

- countries that appear to have more stringent standards generally have characteristics (such as larger system size and high levels of interconnectedness) that would make a higher standard less costly to achieve;
- reliability events are responsible for a very small proportion of actual or forecast interruptions; and
- any tightening of the level of the standard would likely have a substantial cost in terms of required new investment.

3.1.4 Compliance with the Reliability Standard

Currently compliance with the Reliability Standard is measured over the long-term using a moving average of the actual observed levels of annual USE for the most recent ten financial years.²⁵

Operationally, it should be planned to achieve an expected USE that is within the Reliability Standard in each financial year, for each region and for the NEM as a whole.

3.1.5 Scope of the Reliability Standard

Prior to publication of the CRR, load shedding due to industrial action was included in calculations of USE, which resulted in South Australia and Victoria falling outside the Reliability Standard in 2000.²⁶ The South Australian and Victorian USE for the January 2009 reliability events on an annual energy basis were estimated at 0.0032% and 0.004%²⁷ respectively.²⁸ With the inclusion of USE from industrial action, averages for USE due to capacity adequacy shortfalls for the past ten financial years show that New South Wales and Queensland remain within the Reliability Standard. However, over the same period South Australia (0.0021%) and Victoria (0.0075%) fell outside the Reliability Standard.

Following publication of the CRR, the scope of the Reliability Standard was amended to exclude USE associated with “power system incidents that results from industrial actions or ‘acts of God’ at existing generating or inter-regional transmission facilities”.²⁹ When the USE resulting from the industrial action in South Australia and Victoria in the 1999/2000 and 2000/2001 financial years is excluded, the

²⁵ Section 3.3.6 of this report discusses the changes that the Panel is proposing to these arrangements.

²⁶ The failure of South Australia and Victoria to meet the Reliability Standard in 2000 is attributable to a coincidence of industrial action, high demand and temporary unavailability of generating units in Victoria. Due to this single event, Victoria’s long term averages remain outside the Standard: AEMC Reliability Panel 2008, *Annual Market Performance Review – Final Report*, December 2008, p.9.

²⁷ Note that the security event in Victoria on 30 January 2009 due to the unplanned outages of the South Morang to Keilor and South Morang to Sydenham 500 kV lines is not included in the total USE for Victoria, but has been estimated at 0.006% on an annual energy basis.

²⁸ NEMMCO, *Power System Incident Report – Actual Lack of Reserve (LOR3) in Victoria and South Australia Regions on 29-30 January 2009*, May 2009, p.4.

²⁹ The Reliability Standard as published in the AEMC Reliability Panel’s Power system security and reliability standards review is reproduced in Appendix C.

recalculated USE values for the past ten financial years for South Australia (0.00051%) and Victoria (0.00044%) remain within the Reliability Standard.³⁰ New South Wales and Queensland also remain within the Reliability Standard and since Tasmania joined the NEM in May 2005, it has not experienced a breach of the Reliability Standard.

3.2 Issues for stakeholder consultation

In its Issues Paper the Panel sought comments from stakeholders on the Reliability Standard. In particular, the Panel asked:

- Is the current form of the Reliability Standard appropriate for current and projected market arrangements or should it be replaced by another form such as LOLE or LOLP?
- If the current form of the Reliability Standard is considered acceptable, is:
 - the level considered appropriate?
 - the current practice of judging compliance over a long term (10 year) timeframe appropriate?
 - the operational practice of planning to achieve expected USE each financial year that is within the Standard appropriate?

Submissions on the Issue Paper closed on 14 August 2009 and the Panel received submissions from the National Generators Forum (NGF), Origin Energy and the Major Energy Users (MEU).

3.3 Issues Raised by Stakeholders

3.3.1 The Entity to Determine the Reliability Standard

The NGF questioned whether the Panel is the right entity to determine the form of the Reliability Standard. The NGF suggested that this core policy decision may better be made by the MCE.³¹

At present, the Panel is the organisation that is currently required to determine the Reliability Standard, in accordance with the Rules.³²

The Panel notes the concerns of the NGF and will refer them to the “Review of the Effectiveness of NEM Security and Reliability Arrangements in light of Extreme

³⁰ This assumes USE in South Australia and Victoria for the 2008/2009 financial year of 0.0032% and 0.004% respectively, with no further USE observed through to 30 June 2009.

³¹ NGF submission “Reliability Standards and Settings Review (REL0034)”, 14 August 2009 p.1.

³² Clause 3.9.3A requires the conduct a review of the Reliability Standard every two years.

Weather Events". This review is being undertaken by the AEMC at the direction of the MCE.³³

3.3.2 Scope of the Reliability Standard

The MEU considers that consumers are not concerned with the reason for a lack of supply, rather they are concerned with the overall level of reliability. Therefore, the MEU considers that all sources of supply interruption should be counted against the Reliability Standard, including industrial action and multiple contingencies.³⁴

The Panel agrees that the cause of supply interruptions does not directly affect the impact on individual consumers. However, the different links in the supply chain (from generators to consumers) operate differently and their performances are regulated with different mechanisms. This is summarised in the table below.

Link in supply chain	Type of market	Causes of customer lack of supply	Management of unreliability
Generation (plus bulk transmission)	Competitive wholesale market	Lack of generation and interconnector capacity	Reliability settings (MPC and CPT), plus AEMO interventions as a safety net
Transmission networks	Regulated monopoly	System security events and local network reliability issues	Economic regulation of transmission network service provider
Distribution networks ³⁵	Regulated monopoly	local network security and reliability issues	Economic regulation of distribution network service provider

Therefore, the Panel considers that the Reliability Standard that applies to the operation of the competitive wholesale market should only consider unserved energy that can be managed by adjusting the Reliability Settings.³⁶ That is, the level of investment in new capacity in the NEM, and hence the resulting reliability, is regulated through the process of setting the MPC and the CPT.

³³ Further information on the "Review of the Effectiveness of NEM Security and Reliability Arrangements in light of Extreme Weather Events" is available on the AEMC's website at <http://www.aemc.gov.au/Market-Reviews/Open/Review-of-the-Effectiveness-of-NEM-Security-and-Reliability-Arrangements-in-light-of-Extreme-Weather-Events.html>

³⁴ MEU submission "Review of the Operational Arrangements for the Reliability Standard (REL0035) and Review of the Reliability Standard and Settings (REL0034)", August 2009, p.37.

³⁵ Some large customers connect directly to the transmission network and are, therefore, unaffected by interruptions in the distribution network.

³⁶ The Reliability Settings are the MPC, the CPT and the market floor price.

In addition, the Panel considers that unserved energy due to industrial action and “acts of God” should not be included against the Reliability Standard. The implications of including such unserved energy would require the Panel to raise the level of the MPC and CPT to target the Reliability Standard based on its view of the likely level of industrial action. This would lead to increased price volatility and costs to consumers. In the same way, AEMO would need to increase the MRLs to allow for possible industrial action, which would lead to increased market interventions.

Similarly, the Panel also considers that increasing the MPC and CPT is not the appropriate mechanism to manage the unserved energy caused by system security events such as multiple contingencies. The Panel considers that such incidents are better managed through operating procedures, technical compliance programs and the economic regulation of the networks.

At present the Panel is the entity responsible for reviewing the Reliability Settings for the wholesale market, and recommending changes, as required. The Panel is not currently responsible for the reliability standards for transmission and distribution networks.³⁷

The process for determining the Reliability Settings is discussed in Chapter 4.

3.3.3 Form of the Reliability Standard

Origin Energy is supportive of the Reliability Standard being an output based form and expressed in terms of a targeted permissible level of USE in each region.³⁸

The MEU supports the Reliability Standard being in the form of a USE standard but considers that there should be a composite form of Reliability Standard that also considers the frequency and duration of the supply interruptions.³⁹ The MEU suggests that frequency and duration of the supply interruptions should be measured using indices such as SAIDI and the System Average Interruption Frequency Index (SAIFI).

Panel Recommendation

In its CRR the Panel acknowledged that one form alone does not provide perfect information about interruption to supply and, in particular, the USE standard provides no information about the frequency of supply interruptions nor about the depth of any single interruption. However, at that time the Panel considered that introducing a hybrid standard is likely to create conflicting objectives that cannot readily be incorporated into the energy only market design. For instance,

³⁷ Clause 8.8.1(b) explicitly forbids the Panel from monitoring, reviewing or reporting on the performance of the market in terms of the reliability of distribution networks.

³⁸ Origin Energy submission “Reliability Standards and Settings Review (REL0034)”, 21 August 2009, p.2.

³⁹ MEU submission “Review of the Operational Arrangements for the Reliability Standard (REL0035) and Review of the Reliability Standard and Settings (REL0034)”, August 2009, p.40.

introducing parameters to limit the frequency or depth of individual events may unavoidably affect the cumulative, long-term energy shortfall.⁴⁰

Since the start of the NEM there have been very few instances of USE caused by reliability incidents.⁴¹ Measures such as SAIDI and SAIFI are more applicable to distribution networks where there are many small localised outages, making it meaningful to consider these statistical indices. In addition, the Panel notes that the interruptions to individual customers that occur during reliability incidents are generally rotated between affected customers – rolling blackouts. This means that the interruptions to individual customers are of the same length, thus fixing the value of the Customer Average Interruption Duration Index (CAIDI) index.⁴²

Therefore, the Panel remains of the view that the form of the Reliability Standard should continue to be based on a USE limit. In addition, the Panel considers that adding other dimensions to the standard, such as SAIDI and SAIFI, would add to the complexity of its implementation without adding sufficient value to participants.

The Panel does, however, see value in AEMO calculating the expected distribution of reliability outcomes on a regional basis, which could be estimated as part of the Monte Carlo simulations used to determine the MRLs. AEMO could then estimate other reliability statistics such as LOLE and LOLP from this distribution of possible reliability outcomes.

3.3.4 Level of the Reliability Standard

Origin Energy do not consider there is any rationale to change the level of the Reliability Standard from its current level of 0.002% USE.⁴³

The NGF consider that the definition of the Reliability Standard should be improved to “better manage the tension between the economic and political consequences” of the current standard, although the NGF were not specific on how this could be achieved. However, the Panel believes that it considered this tension when it undertook its CRR and this tension is part of this review.⁴⁴

The MEU considers that the cost of meeting the standard should also be considered when determining the Reliability Settings. The Panel considers that this cost needs to be considered when determining the level of the Reliability Standard. The MEU also

⁴⁰ AEMC Reliability Panel 2007, *Comprehensive Reliability Review, Final Report*, December 2007, Sydney, p.23.

⁴¹ Since the start of the NEM there were 3 days in 1999/2000 when there was USE in Victoria and SA, 1 day in 2004/05 in NSW and 2 days in 2008/09 in Victoria and SA. This ignores the USE due to industrial action in the early 2000s.

⁴² The Customer Average Interruption Duration Index (CAIDI) is the sum of the duration of each sustained customer interruption (in minutes) divided by the total number of sustained customer interruptions. The CAIDI index one of the indices that are usually used to report the reliability of distribution networks.

⁴³ Origin Energy submission “Reliability Standards and Settings Review (REL0034)”, 21 August 2009, p.1.

⁴⁴ NGF submission “Reliability Standards and Settings Review (REL0034)”, 14 August 2009, p.1.

suggests that there would only be a small impact on consumers overall reliability from raising the level of the Reliability Standard from 0.002% to 0.004% USE.⁴⁵ This is based on the MEU's comparison of the 0.002% USE with the stated reliability of 99.25% and 98% for transmission and distribution networks respectively.

The Panel notes that this is not an appropriate comparison of reliability statistics. The 0.002% USE for the Reliability Standard relates to situations (actual or possible) where demand in a region exceeds supply and customer load cannot be fully met. However, the transmission and distribution statistics relate to outages of individual network elements, leading to reduced network capability, but usually without any loss of supply.

Implications of the level of the Reliability Standard

Currently the level of the Reliability Standard is set at 0.002% USE per annum. This is equivalent to:

- a system wide outage of 10.5 minutes at an average level of system demand;
- an outage of approximately 18% of the demand for 1 hour at an average level of system demand;
- a system wide outage of approximately 7 minutes at peak demand;⁴⁶ or
- approximately 12% of the demand for 1 hour at peak demand.

Another important consideration of reliability in the NEM is that the level of USE is randomly distributed. The current specification of the Reliability Standard is in terms of an expected level of USE in a given year. This means that when a level of 0.002% USE is targeted it is possible to have actual USE outcomes of more than 0.002%, with a low probability of several times 0.002% actually occurring.⁴⁷ Therefore, to achieve a very low probability of exceeding 0.002% USE it would be necessary to target a level of expected USE that is significantly less than 0.002%.

Change in the MRLs for a change of the Reliability Standard

The Panel agrees with the NGF and the MEU that the setting of the level of the Reliability Standard should take into account the economic costs associated with meeting that level of the standard. Therefore, to inform the debate, the Panel sought advice on the costs of changing the Reliability Standard from ROAM Consulting (ROAM). ROAM consulting is:

⁴⁵ MEU submission "Review of the Operational Arrangements for the Reliability Standard (REL0035) and Review of the Reliability Standard and Settings (REL0034)", August 2009, p.19.

⁴⁶ The peak demand across the NEM is approximately 1.5 times the average demand, although this varies from region to region.

⁴⁷ The ROAM analysis discussed in Chapter 4 of this review shows that for a hot summer (10% POE) the level of USE usually exceeds 0.002% when the target is 0.002%.

- performing the market simulation studies necessary for the Panel to review the Reliability Settings;⁴⁸ and
- recalculating the MRLs for AEMO⁴⁹.

ROAM Consulting advised the Panel on the costs saving of a change to the Reliability Standard.⁵⁰ Figure 7.8 of the ROAM Consulting report shows that a reduction of the generation capacity across the NEM of approximately 750 MW would be expected to increase the expected level of USE from 0.002% to 0.003%. If this reduction in generation capacity was provided by open-cycle gas turbines (OCGT) then the capital cost savings would be approximately \$750m, at 2009 price levels. This represents annual cost savings of approximately \$75m.

A reduction in the installed OCGT capacity of 750 MW would be implemented over time under the existing NEM market arrangements by reducing the level of the MPC, thus reducing the signal for new peaking generator investment. There may also be other cost savings associated with a lower MPC including lower contracting risk premiums.

Implications of tightening the Reliability Standard

The relationship between the level of the Reliability Standard and the level of installed generator capacity is not linear. Consequently, tightening the level of the Reliability Standard from 0.002% to 0.001% USE would require significantly more than 750 MW of additional generation capacity across the NEM.

To implement a tightening of the Reliability Standard would require the MPC to be raised to a level that is sufficient to encourage the required additional generator investment. Such an increase in the MPC is likely to result in higher spot price volatility and thus increase risk premiums in the electricity contract market.

Panel Recommendation

The Panel did not receive any compelling evidence to consider changing the level of the Reliability Standard in the submissions to its Issues Paper for this review. Similarly, when undertaking its CRR, the Panel concluded that there was not a case to change the level of the standard.

⁴⁸ The ROAM Consulting studies are discussed in Chapter 4 of this reports and ROAM Consulting's report to the Panel is published as an accompanying document.

⁴⁹ The minimum reserve levels and the process to calculate them is discussed in the Panel's "Review of the Operational Arrangements for the Reliability Standards". Details of this review, including the Panel's Issues Paper and Draft Report are available on the AEMC website at <http://www.aemc.gov.au/Market-Reviews/Open/Review-of-Operationalisation-of-the-Reliability-Standards.html>.

⁵⁰ ROAM Consulting Report, *Reliability Standard and Setting Review*, 8 November 2009, Section 6.5. {DN: check the reference, including the section and date}

The Panel is not proposing a change to the level of the Reliability Standard in this Draft Report. The Panel is, however, seeking stakeholder feedback on the advice it obtained from ROAM Consulting. That is, whether:

- tightening the Reliability Standard is expected to provide benefits to customers that would outweigh the cost of the required additional generator investment; or
- slackening the Reliability Standard is expected to reduce the cost of generator investment by more than the reduction to the benefits to customers.

3.3.5 Applying the Reliability Standard operationally

The MEU consider that the Reliability Standard should be targeted over the long-term rather than each year. The MEU considers that a “more aggressive” level of USE may be required to achieve the long-term average. The MEU considers that achievement of an aggressive level of USE could be made more viable by the implementation of a program of allowing voluntary curtailment rather than consistently seeking supply side options.⁵¹

Applying the Reliability Standard operationally

Unserved energy due to a reliability event occurs when the demand in a region (or regions) exceeds the available generation in that region (or region), including generation capacity available from adjacent regions. The level of USE that actually occurs on any given occasion will depend on the inherent system conditions that occur, including:

- the ambient temperatures over the period in question, and the resulting impact on demand; and
- the pattern of random forced generator outages; and
- availability of the transmission network, particularly interconnector outages.

Unfortunately, AEMO and the other market participants do not get accurate forewarning of the system conditions, so it is not possible to plan to deliver a given level of USE. In fact, if the actual temperature conditions and random plant outages were known sufficiently well enough in advance, then it still may not be possible to achieve a given level of USE due to insufficient investment in new generation and transmission, and the random nature of generator failure.

Operationally, the Reliability Standard is currently targeted to be achieved in each financial year, for each region and for the NEM as a whole. That is, AEMO aims to have sufficient reserves in advance of a given period, usually the summer, so that the expected USE will be within the 0.002% USE standard. The actual USE that results will depend on the system conditions that end up occurring.

⁵¹ MEU submission “Review of the Operational Arrangements for the Reliability Standard (REL0035) and Review of the Reliability Standard and Settings (REL0034)”, August 2009, p.41.

The alternative proposed by the MEU would involve targeting different levels of USE each year in an attempt to produce a long-term average. Presumably this would mean:

- targeting greater levels of USE following years where less than 0.002% USE occurred; or
- targeting very low levels of USE following years where greater than 0.002% USE occurred.

Targeting varying levels of USE from one year to the next would require AEMO to recalculate MRLs and hence change the threshold for intervention through directions, instructions or the RERT. Similarly, the Panel would need to consider adjusting the MPC and CPT in order to target a variable USE standard.

Panel's view

The Panel considers that adjusting the MRLs, MPC and CPT in response to the effects of random weather patterns and plant outages would:

- introduce an arbitrary methodology adjusting the MRLs, MPC and CPT for achieving the long-term average USE;
- increase investment uncertainty for generators and customers as the energy prices vary with the changing MPC and CPT; and
- introduce an inter-temporal equity issue in relation to the cost of achieving the Reliability Standard, as would vary from year to year in response to random events.

The Panel is also concerned that in most years there is little or no USE and then every few years a material level of USE occurs due to higher than average temperature conditions combined with plant outages. If the MRLs are reduced following a few years of low USE then it is likely that very high levels of USE would result if higher than average temperatures occur.

Therefore, the Panel considers that the most appropriate approach to achieving 0.002% USE over the long term is to target 0.002% USE each year. This approach values reliability equally each year and provides the greatest certainty for generators, retailers and market customers.

3.3.6 Compliance with the Reliability Standard

The NGF considers that targeting 0.002% USE each year while monitoring the performance over ten years is inconsistent.⁵² Similarly, Origin Energy considers that

⁵² NGF submission "Reliability Standards and Settings Review (REL0034)", 14 August 2009, p.2.

it is confusing that the Reliability Standard is specified as an annual amount of electricity at risk, but compliance is measured over the long-term (i.e. ten years).⁵³

Compliance following the CRR

Prior to the completion of the CRR, the Reliability Standard was expressed as a target of 0.002% USE defined as being “over the long term”. The Panel was concerned that this timeframe was unclear and proposed that the definition could be more explicit, for example ‘over 10 years’.⁵⁴ To this end, the Panel amended the Reliability Standard such that:

Compliance with this Reliability Standard for Generation and Bulk Transmission should be measured over the long-term using a moving average of the actual observed levels of annual USE for the most recent 10 financial years.⁵⁵

This amendment to the Reliability Standard was made in an attempt to smooth out the year to year variability in the levels of USE. That is, in some years the level of USE may exceed 0.002% even though the outlook from the Projected Assessment of System Adequacy (PASA) showed sufficient medium-term reserves.

Issues with defining a criterion for compliance with the Reliability Standard

The difficulty with defining a criterion for compliance with the Reliability Standard is that:

- looking forward, the projected level of USE for a given set of system conditions is not a single value but a distribution ranging from 0% USE to several times the 0.002% USE standard;
- the distribution of possible USE outcomes for a given year is not known and involves complicated interactions between a number of factors including the demand for each region, random plant outages and network capability;
- the characteristics of the underlying distribution of possible USE outcomes for a given year can be estimated using Monte Carlo simulations⁵⁶. The accuracy of

⁵³ Origin Energy submission “Reliability Standards and Settings Review (REL0034)”, 21 August 2009, p.1.

⁵⁴ AEMC Reliability Panel 2007, *Comprehensive Reliability Review, Final Report*, December 2007, Sydney, p.25.

⁵⁵ The “NEM Reliability Standard – Generation and Bulk Supply” is included as Appendix D of the Final Report for the CRR, which was published in December 2007. The Reliability Standard is also available on the AEMC website at <http://www.aemc.gov.au/Panels-and-Committees/Reliability-Panel/Guidelines-and-standards.html>

⁵⁶ AEMO uses this approach when it calculates the MRLs. The methodology used is discussed in the Panel’s “Review of the Operational Arrangements for the Reliability Standards”. Information on this review is available at <http://www.aemc.gov.au/Market-Reviews/Open/Review-of-Operationalisation-of-the-Reliability-Standards.html>

the estimate of this distribution depends on the quality of the Monte Carlo simulations and associated assumptions; and

- the underlying distribution of possible USE outcomes varies from year to year as the network is augmented, demand grows, new generating units are commissioned, the penetration of intermittent generation increases and the reliability of the generating units changes over time.

It is not possible to measure compliance with the Reliability Standard in a meaningful manner, because of the random nature of USE outcome for a given year. That is, for a given year only a single actual USE value is recorded for each region. Therefore, an actual level of USE that:

- exceeds the 0.002% long-term average does not necessarily mean that the processes in the NEM to ensure reliability are inherently flawed, rather it may be an outlier from the distribution of possible USE values that corresponds to an arduous set, such as extreme temperatures and large generating unit forced outages at the time of the peak demand;
- is less than the 0.002% long-term average does not necessarily mean that the processes in the NEM to ensure reliability are working correctly, rather it may simply be due to system conditions that are not particularly arduous, such as mild temperatures and no large generating unit forced outages at the time of the peak demand.

Considering the USE as a moving average over the past ten financial years has the effect of smoothing out some of the statistical variation from year to year. However, this approach has a number of problems, including:

- more than ten years of data would be required to give a statistically meaningful estimate of compliance with the Reliability Standard;
- the underlying distribution of possible USE outcomes varies from year to year, as demonstrated by AEMO's need to re-assess the MRLs every few years. Therefore, it is not statistically meaningful to use the moving average as a measure of compliance; and
- a ten year delay in measuring compliance is not satisfactory if its purpose is to promote continuous improvement of the processes for meeting the Reliability Standard.

Panel's view

The Panel acknowledges that measuring the effectiveness of the Reliability Standard is not practical. This is because it is not appropriate to assign significant meaning to individual historical outcomes or to average of a number of outcomes over a long period of time.

The Panel considers that it is much more appropriate to review the reliability of the NEM each year, in particular following incidents where there has been one or more incidents that have resulted in USE. Where the level of USE in a year approaches or

exceeds 0.002% it is important for stakeholders to understand the circumstances that caused the load interruptions. The NEM institutions can then identify potential improvements to the processes that monitor and maintain reliability, as appropriate.

The Panel considers that this approach is reasonable given that there have only been a few reliability events since the start of the NEM in 1998, and in each case of USE the NEM institutions have reviewed the circumstances and refinements were identified and implemented.

The Panel notes the load shedding events on 29 and 30 January 2009, resulted in levels of USE that exceeded 0.002% in both Victoria and South Australia. Following these events AEMO undertook reviews of the circumstances that led to the load shedding on these days. In addition, the MCE requested the AEMC to “review energy market frameworks in light of the impact on electricity supplies of the extreme heat wave of 29-31 January 2009”.⁵⁷ This led to the AEMC’s “Review of the Effectiveness of NEM Security and Reliability Arrangements in light of Extreme Weather Events”⁵⁸ and shaped the terms of reference for the Panel’s “Review of the Operational Arrangements for the Reliability Standards”.⁵⁹

3.4 Draft amendments to the Reliability Standard

Appendix C of this report contains a draft of the Reliability Standard that has been amended to reflect the Panel’s draft recommendations above. The Panel intends this draft amended Reliability Standard to assist stakeholders when commenting on these recommendations.

⁵⁷ MCE, 18th *Communiqué*, Canberra, 6 February 2009.

⁵⁸ Further information on the AEMC’s review is available on its website at <http://www.aemc.gov.au/Market-Reviews/Open/Review-of-the-Effectiveness-of-NEM-Security-and-Reliability-Arrangements-in-light-of-Extreme-Weather-Events.html>.

⁵⁹ Further information on the Panel’s review is available on its website at <http://www.aemc.gov.au/Market-Reviews/Open/Review-of-Operationalisation-of-the-Reliability-Standards.html>.

4 Review of the Reliability Settings

4.1 Consultation on the Reliability Settings

4.1.1 Reliability Settings

The level of the MPC, the market floor price and the CPT form the key price envelope within which the wholesale spot market is expected to deliver the capacity required to achieve the NEM Reliability Standard. These settings provide important signals to participants concerning both supply-side and demand-side investment and usage. Briefly, if the MPC and CPT are set too high, market customers (predominantly retailers) can be financially exposed. If the MPC and CPT are set too low, there may be insufficient incentive to invest in new generation capacity.

The purpose of the Panel's review is to ascertain the levels of the existing NEM reliability settings. The Panel notes that changes to the market framework, in respect of what reliability settings are available in the NEM, are not included in the scope of this review.

4.1.2 Issues for stakeholder consultation

In its Issues Paper, the Panel sought comments from stakeholders on the Reliability Settings. In particular, the Panel asked:

- Given the Reliability Standard that stakeholders consider appropriate, what are the levels of the Reliability Settings (consisting of the market price cap, market floor price and cumulative price threshold) required to deliver that Reliability Standard?

Submissions on the Issues Paper closed on 14 August 2009 and the Panel received submissions from the NGF, Origin Energy and the MEU.

4.1.3 Issues raised by stakeholders

The NGF predominantly supports the recent decision by the AEMC to raise the MPC on 1 July 2010, but did not comment on the process to determine the levels that will apply from 1 July 2012.⁶⁰

The NGF and Origin Energy⁶¹ support regular reviews of the Reliability Settings due to the changes in climate change policies. The Panel notes that under the current Rules the Reliability Settings are reviewed every two years.

⁶⁰ NGF submission "Reliability Standards and Settings Review (REL0034)", 14 August 2009, p. 2.

⁶¹ Origin Energy submission "Reliability Standards and Settings Review (REL0034)", 21 August 2009, p. 2

The NGF considers that the CPT does not necessarily protect participants from extreme events. It considers that the Draft Report should note that the CPT however does provide protection from financial risk and that the AEMC has recently processed a Rule change proposal on this issue.⁶²

The MEU considers that the need for the CPT, and hence the administered price cap (APC), is a demonstration that the MPC is set too high. It considers that if the MPC was lower and another mechanism was used to meet reliability then the CPT may perhaps not be needed at all.⁶³ The Panel disagrees that the CPT is needed because the MPC is too high. In an energy only market the MPC needs to be high enough to encourage sufficient investment. The CPT provides a safety net to mitigate participants' financial risks should a period of high prices extend beyond what is necessary to provide a strong investment signal. Under market designs other than an energy only market a CPT may not be required but this is outside the scope of the Panel's review.

4.2 Process for determining the Reliability Settings

4.2.1 Engagement of ROAM consulting

The AEMC, on behalf of the Panel, engaged ROAM Consulting (ROAM) to undertake the modelling work to assist the Panel to assess the Reliability Settings. The aim of the modelling is to assist in forming a recommendation as to the levels of the MPC and the CPT to apply in the NEM. These values would take effect from 1 July 2012 and apply for the 2012/13 and 2013/14 financial years. ROAM was also requested to provide the Panel with advice on the impact of any change on the financial risks faced by market participants.

4.2.2 Methodology to determine the reliability settings

The approach used by ROAM to determine the Reliability Settings, in particular the MPC, has been to:

- adjust the level of generator capacity using advanced and/or announced projects so that there is sufficient capacity to achieve the Reliability Standard in each region in each year of the modelling period from 2012 to 2020; then
- adjust the level of the MPC so that a new entrant open cycle gas turbine (OCGT) is marginally profitable, that is, would recover sufficient expected income to cover its annualised capital and fixed operating costs, plus a return on its investment.

⁶² The NGF submitted the Rule change proposal "Contingency Administered Price Cap Following a Physical Trigger Event". On 4 June 2009 the AEMC determined not to make this Rule. Further information on the assessment of this Rule change proposal is available at www.aemc.gov.au/Electricity/Rule-changes/Completed/Contingency-Administered-Price-Cap-Following-a-Physical-Trigger-Event.html.

⁶³ MEU submission "Review of the Operational Arrangements for the Reliability Standard (REL0035) and Review of the Reliability Standard and Settings (REL0034)", August 2009, p. 38.

ROAM used its in-house electricity market forecasting package 2-4-C to perform the market simulations to determine the Reliability Settings. 2-4-C uses time sequential Monte Carlo simulations to match as closely as possible the operation of AEMO's Market Dispatch Engine (NEMDE).

ROAM developed a model of the NEM that includes:

- the existing and committed generation;
- forced and planned generator unit outages;
- regional load traces based on historical load traces that are scaled to match demand and energy projections; and
- represents network constraints.

ROAM has modelled the temperature dependence of the maximum demand projections in the AEMO ESOO by considering load traces that are based on the 10% and 50% probability of exceedence (POE) demand levels.⁶⁴ ROAM performs market simulations using both the 10% and 50% POE demand traces then weights the results to form an overall expected result.

The Panel published the accompanying report "Reliability Standard and Setting Review" which was prepared by ROAM.

4.2.3 Benchmarking with previous studies

Previous modelling for determining the level of the MPC and CPT was undertaken by Charles Rivers Associates International (CRA) as part of the 2007 Comprehensive Reliability Review (CRR).⁶⁵ At that time, the decision was made to increase the MPC to \$12 500/MWh and the CPT to \$187 500 effective from 1 July 2010.

Given the current review of the Reliability Settings is being undertaken by a different consultancy, ROAM undertook benchmarking studies to ensure continuity of the results. ROAM used the same input data as CRA when performing the modelling work for the benchmarking study. That is, the following sources of data were utilised:

- NEMMCO 2007 Statement of Opportunities;
- 2007 NEMMCO Energy and Demand Projections;
- 2007 ACIL Tasman Report to NEMMCO *Fuel Resource, new entry and generation costs in the NEM*, March 2007; and

⁶⁴ The 10% POE case represents an unusual weather year resulting in demand levels that are expected to be exceeded only one year in ten. By contrast, the 50% POE case represents a typical weather year where the demand would be expected to be exceeded this level one year in two.

⁶⁵ For further information see, *CRR Final Report Modelling Appendix E*, at: www.aemc.gov.au/Market-Reviews/Completed/Comprehensive-Reliability-Review.html

- initial installed capacity as per the CRA Input Assumptions and Results report.

ROAM's methodology was to review the model outputs in order to closely align the USE levels achieved with the Reliability Standard. This was necessary to obtain a level of USE in line with the Reliability Standard that accurately determined the MPC required to achieve profitability for the marginal generator. Through this process ROAM determined that the MPC necessary to achieve the Reliability Standard was as low as \$12 500/MWh in 2010-11 and \$15 000/MWh in 2011-12, which is in close alignment with the value of \$12 500/MWh determined by CRA.⁶⁶

4.2.4 Assumptions for the Reliability Standard and settings review

The modelling assumptions utilised for the Reliability Standard and settings review are consistent with those used in AEMO's recalculation of the minimum reserve levels (MRLs) and the national transmission statement (NTS).⁶⁷ The assumptions for each modelling input is provided below.

New entry based on spot market outcomes

The ROAM modelling assumes that the new entry OCGTs derive all their income from the spot market. Therefore, a new entry OCGT is regarded as profitable when its expected spot market income exceeds its annualised capital and fixed operating costs, plus a return on its investment.

The Panel notes that new entry in the NEM occurs for a variety of reasons, depending on the circumstances of the proponent. In most instances the entry would be financed through cap contracts. However, the Panel considers the approach of considering spot market revenues is a valid proxy for the entry of the new entry peaking plant. The Panel is of this view because the value of these contracts is derived from the outcomes expected in the spot market. The Panel also considers that the approach is also both quantifiable and traceable. The Panel considers that the market settings must be able to deliver independent new entry, and not rely on the occasional commercial drivers of participants that may on occasion encourage entry earlier.

The Panel is seeking stakeholders views on this approach or alternative approaches that are also quantifiable and traceable.

Load traces

The time sequential Monte Carlo simulations performed by ROAM require load traces to represent the demands in each region. ROAM uses load traces that are based on:

⁶⁶ In coming to this determination, ROAM made an assumption that new entry Open Cycle Gas Turbine (OCGT) generation was 100% reliable, that is, the assumed forced outage rate was 0%.

⁶⁷ The National Transmission Statement was prepared by AEMO in accordance with clause 11.27 of the National Electricity Rules.

- the actual regional demands that occurred in each region in the 2008/09 financial year, and
- scaled to match the load forecasts in the AEMO 2009 ESOO.

Transmission network

- The transmission network model is based on five interconnected regions;
- The transmission network model has been applied as per the 2009 NTS constraints “workbook” provided by AEMO, which incorporates all intra- and inter-regional constraints and thus meets n-1 contingency standards such that load shedding will not occur for any credible transmission contingency.

Generators

- Existing and committed generating capacity has been taken from the 2009 ESOO;
- The values of the forced outage rates (FORs) utilised in the modelling are consistent with those used by AEMO in its MRL recalculations and the NTS;
- The 2009 ACIL Tasman report to AEMO “Fuel Resources, new entrant and generation costs in the NEM”, April 2009 has been used for capital cost forecasts for new entry generation, and variable operating, maintenance and fuel costs for generation. This is of significance for assessing the MPC needed for new entry peaking generation to be marginally profitable.

Intermittent generation

- Sufficient renewable generation was installed to meet the expanded 20% renewable energy target by 2020;
- Wind traces have been generated for each existing and committed wind farm (scheduled, semi-scheduled and non-scheduled), with all trace data modelled at the half-hourly level;
- All other relevant information is provided in the 2009 NTS consultation Final Report.

Generator bidding assumptions

- ROAM considers that applying a carbon price uplift to historical (current) bids is not necessarily an accurate representation of the bidding strategy of plant under an emissions trading regime, particularly for high carbon prices.
- Cournot modelling of generator bidding has not been used because it involves a large number of assumptions that are of little importance to the study of

reliability. Therefore, ROAM considers it more appropriate to instead construct generator bids by using a bid analyser process.

New entrant generation

The ROAM modelling assumes that the last new entry generation necessary to just meet the Reliability Standard will be OCGTs. That is, the MPC is set at the level where a new entrant OCGT would recover its expected annualised capital costs with a utilisation commensurate with 0.002% USE per annum.

In summary:

- New entrant peaking generators consistent with a balanced portfolio of new entrant plant types are assumed to be open cycle gas turbines;
- Capacity is offered to the market at the MPC; and
- The FOR of new entrant peaking generation is assumed to be 3%.

OCGT forced outage rates

The generator FORs used in the modelling for the AEMO NTS were determined using the methodology developed by the Forced Outage Data Working Group (FODWG).⁶⁸ ROAM used the same FORs for its advice to the Panel for this review.⁶⁹

A value of 27.88% for the FOR has been used for OCGTs, including existing and future units. This is consistent with the AEMO NTS. However, when assessing the profitability of the new entrant peaking generators ROAM has assumed a FOR of 3%, based on the availability for OCGTs presented in Table 32 of the ACIL Tasman report. This approach was adopted because:

- new entrant OCGTs will generally have a high level of availability;
- older OCGTs may have lower levels of availability so it is appropriate to assume a lower level of availability; and
- forced outages for peaking generators that are derived from historical performance can overstate the unreliability that can be expected in practice,⁷⁰ and thus indicate the need for an excessive increase to the MPC.

Further reasoning on the assumed OCGT FORs is available in the ROAM report. The Panel seeks stakeholders' view on this assumption.

⁶⁸ Further information on the FODWG is available on the AEMO website at www.aemo.com.au/electricityops/fodwg.html.

⁶⁹ Table A.3 of the ROAM report shows the FORs used for the ROAM modelling for each generator type.

⁷⁰ "CASOM 16: Are Reliability Measures Unreliable? Part 1" by Robert Richwine, available at www.worldenergy.org/documents/casom16_may03.pdf.

4.3 Results from the ROAM Studies

The Panel has published the “Reliability Standard and Setting Review” report by ROAM as an accompanying document.⁷¹ The modelling in the ROAM report indicates that from 1 July 2012 it may be necessary to consider raising:

- the MPC from \$12 500/MWh effective from 1 July 2010 to approximately \$20 000/MWh; and
- the CPT from \$187 500/MWh effective from 1 July 2010 to approximately \$300 000/MWh.

4.3.1 Explanation of the possible need to raise the MPC

The main reasons why the ROAM modelling shows that a further increase to approximately \$20 000/MWh, effective from 1 July 2012, may be required are:

- increased capital costs for new entrant open cycle gas turbines;
- peakier demand; and
- more detailed representation of interconnector capacity assumptions, resulting in reduced inter-regional capabilities at times of high demand.

In addition, the Panel notes that the CRA analysis performed as part of the CRR indicated that:

- the MPC should be raised from \$10 000/MWh to \$12 500/MWh from 1 July 2010; and
- it would be likely that further increases to the MPC after 1 July 2012 may be necessary.

Figures 10 and 11 of the CRR show the expected levels of USE for MPC levels of \$12 500/MWh and \$15 000/MWh respectively.⁷² The figures show that the analysis performed at this time indicated a likely need to raise the MPC in approximately 2012.

Increased capital costs for new entrant open cycle gas turbines

In April 2009 AEMO published an updated ACIL Tasman report “Fuel Resources, new entrant and generation costs in the NEM”. This report showed that the capital

⁷¹ The ROAM report is available on the AEMC website at www.aemc.gov.au/Market-Reviews/Open/Review-of-the-Reliability-Standard-and-Settings.html.

⁷² Figures 10 and 11 are on page 67 of the final report for the CRR, published in December 2007. These figures are extracted from page 22 of the accompanying CRA report on its modelling.

costs of new entrant open cycle gas turbines rose by approximately 22%.⁷³ An increase in the capital costs means that a higher level of MPC is required such that a new entrant OCGT would recover its annualised capital costs. The ACIL report also shows the OCGT real capital costs are expected to reduce during the forecast period.

The Panel notes the importance of the assumed capital costs when determining the level of the MPC. The Panel also notes that the future capital costs of new OCGTs will depend on a number of factors including the extent:

- of the recovery from the recent global financial crisis; and
- to which global demand for gas turbines increases as existing coal generators are replaced by gas powered generators under a carbon constrained future.⁷⁴

Peakier demand

A peakier demand trace means that the number of hours that a new entrant OCGT can run and recover its capital cost is reduced for a given level of the USE Reliability Standard, thus the level of the MPC would need to be higher.

The Panel notes that the AEMO 2009 ESOO predicts that NEM-wide energy demand growth is forecast to grow at 1.9% per annum over the next 10 years while the peak demand is forecast to grow at 2.5%. The ESOO also shows that the differential growth between energy and maximum demand varies between the respective NEM regions.

In addition, the increased penetration of wind generators will make the demand seen by the scheduled generators appear more peaky. This is because at times of high demand there will be increased uncertainty as to the contribution made by intermittent wind generators.

Interconnector capacity assumptions

The level of interconnector capacity determines the level at which capacity can be shared between regions when attempting to meet the demand during periods of scarcity. Therefore, if a lower set of interconnector capacities is modelled then there will be a greater reliance on generation capacity from within each region and a higher level of MPC may be required to meet the Reliability Standard.

In its analysis for the 2007 CRR, CRA assumed that interconnector capability would be augmented where indicative analysis showed “further capacity would be commercially viable”.⁷⁵

⁷³ Table 7.1 of the ROAM report shows a comparison of the capital costs of open cycle gas turbines in the 2007 and 2009 ACIL Tasman reports “Fuel Resources, new entrant and generation costs in the NEM”.

⁷⁴ A greater reliance on gas powered generation is expected to lead to increased demand for OCGTs, both directly and because combined cycle gas turbines contain one or more OCGTs. This increased demand is likely to translate to increased OCGT capital costs.

In contrast ROAM assumed for its modelling that the transmission network model has been applied as per the 2009 NTS constraints “workbook” provided by AEMO, which incorporates all intra- and inter-regional constraints.

4.3.2 Calculating a single weighted MPC

The ROAM modelling considered the level of MPC required for new entrant OCGTs to be marginally profitable in each region. The ROAM modelling shows different values of MPC would be required for each region because of the unique characteristics of the regions, including the load shape, the mix of generation and the degree of inter-regional interconnection. However, under the current design a single MPC value applies in all regions of the NEM.

For ROAM’s initial analysis it calculated an MPC value that is the average of the individual regional values, weighted with the regional annual energy consumption. This approach will be expected to deliver sufficient investment across the NEM as a whole but may be expected to deliver insufficient investment in the regions that appear to require a higher MPC value. However, the reliability of these regions will tend to be supported by the investment in the other regions.

An alternative approach could be to apply the maximum value of the regional MPC values on the basis that the Reliability Standard is to be met in each region of the NEM. This approach is likely to encourage more investment, and hence higher prices, than would otherwise be necessary to deliver an expected USE of no more than 0.002% in each region. Even the region with the highest individual MPC value would be likely to achieve better than 0.002% USE because of the high levels of investment in the other NEM regions.

The Panel is seeking stakeholders’ views on which approach should be used to combine the individual regional MPC values into a single NEM wide value.

4.3.3 Implications of material rises in the MPC and the CPT

The Panel considers that a substantial increase to the level of the MPC would be likely to affect the behaviour of participants. Therefore, it is not possible to fully assess the impact of such an increase and hence the resultant impact on reliability.

In addition the Panel has identified a number of consequential issues that may also be affected by a substantial increase to the MPC.

⁷⁵ Page 15 of the CRA report for the Panel’s CRR, available at www.aemc.gov.au/Market-Reviews/Completed/Comprehensive-Reliability-Review.html.

The Panel is seeking comments and information from stakeholders on the impact of a substantial increase to the MPC, including but not limited to those issues identified below. In each case the Panel is seeking stakeholders' views on the significance of these issues in relation to setting the MPC. In particular, the Panel is seeking stakeholders' views on the requirement under clause 3.9.4(c) of the Rules to have regard to the potential impact of any proposed increase in the market price cap on:

- (1) spot prices;
- (2) investment in the National Electricity Market; and
- (3) the reliability of the power system.

Additional demand side response

ROAM's modelling for the Panel assumed that the most efficient investment to meet the Reliability Standard is in OCGT capacity. That is, the cheapest available supply side option currently available.

The Panel considers that a substantial increase to the level of the MPC may make more demand side options economically viable. If this is the case, the price would be capped below the higher MPC when the demand side options are dispatched, thus the MPC may not need to be increased by as much as the increase indicated by the ROAM analysis.

To analyse this further the Panel would need to form a view of the level of the MPC which is likely to attract significant levels of DSP capacity, thus making DSP the most efficient investment to meet the Reliability Standard.

Increased prudential requirements

The Panel notes that the prudential requirements required by market customers will be likely to increase in proportion to any increase in the level of the MPC. This is an additional burden for market customers and may, in the extreme, become a barrier to entry into the market.

Additional risk premiums for retailers

A significant increase in the MPC increases the threat of higher spot prices. This will be likely to lead to higher risk premiums on energy contracts and hence higher prices to market customers. In the case of retailers, these higher contracting prices will generally be passed onto the individual customers through higher retail tariffs.

Additional risks for generators

A significant increase in the MPC will also increase risks to generators trading in the NEM. In particular, generators may be less willing to contract their capacity as they

would be exposed to increased risks should their physical generation not be available at times of high prices.

This may eventually lead to generators being less willing to invest in further capacity due the perceived increase in the risks. Conversely, it may lead other generators to consider additional capacity to act as a physical hedge for their existing portfolio of generating units.

Transient market power

A significant increase in the MPC increases the potential for higher spot prices and hence financial impact, at times when market participants exercise transient market power.

However, a significant increase in the MPC may reduce the opportunities to exercise transient market power. In the short-term, the possibility of higher prices may increase the level of contracting in the energy market, thus reducing the incentive to exercise transient market power. In the long-term the potential of higher prices is likely to encourage increased generator and demand side investments, thus increasing competition at times of high spot prices.

The likelihood of high prices during periods of scarcity is a natural outworking of the energy only market and, therefore, necessary to encourage sufficient investment.

Whilst a material increase in the MPC and CPT may raise concerns about the potential financial impact that could occur if market participants were to exercise transient market power, the regulatory framework provides for the AER to monitor, investigate and enforce compliance with the bidding and rebidding requirements of the NER and for the ACCC to ensure compliance with competition law.

Investment is currently occurring at an MPC of \$10 000/MWh

In recent years there has been investment mainly in peaking generating capacity in all regions of the NEM. Therefore, superficially this may suggest the market is working. However, the ROAM modelling suggests that even including current and planned investments, the NEM is unlikely to attract sufficient capacity to meet the reliability standard into the future.

While some new generation capacity is coming to the market this may not necessarily be sufficient to continue to meet the Reliability Standard in the future, as demonstrated by ROAM's modelling. The AEMO 2009 ESOO shows that there is sufficient generation capacity to meet the Reliability Standard up to 2011/12 in South Australia, 2012/13 in Victoria, 2013/14 in Queensland and 2013/14 in New South Wales.

The Panel notes that, while the current level of the MPC has encouraged sufficient generator investment to date, this may not be the case in the future.

A more gradual increase in the MPC

A possible approach to mitigate the impacts of a significant increase in the MPC could be to introduce the increase in stages.

Introducing the increase in stages means that market participants are able to adapt to the changes gradually and allow the impact of the changes to be better assessed before the full increase is implemented. The disadvantage is that the lower MPC may not deliver sufficient generating capacity to meet the standard during the transition.

4.3.4 The level of the cumulative price threshold

Another initial finding from ROAM is the level of the CPT is likely to need to be increased to \$300 000/MWh. This level of CPT appears to retain the current ratio between the CPT and the MPC that currently applies in the NEM.

ROAM's initial modelling shows that a lower level of CPT would dampen the investment signals from the spot market and would, therefore, require a greater increase to the level of MPC necessary to meet the Reliability Standard.

4.3.5 The level of the market floor price

ROAM is not recommending a change to the market floor price from the current level of -\$1 000/MWh.

A Terms of Reference

[Reproduced below]

Reliability Panel Review of the operational arrangements of the reliability settings and Reliability standard and settings review AEMC Terms of Reference (3 March 2009)

Introduction

The Reliability Panel (Panel) made a number of recommendations in relation to the operationalisation of the bulk supply reliability standard in the final report of its Comprehensive Reliability Review (CRR), which was published in December 2007. The Panel also forecast in the CRR a number of other initiatives and reviews it would undertake as a response to issues raised during consultations. The Panel is also required to undertake periodic reviews of reliability matters.

The Panel's indicative work program in 2009 and 2010 foreshadowed a number of the issues subject to these terms of reference. Therefore, the terms of reference align a range of related matters.

Scope of the reviews

The Panel is requested to review the operationalisation of the reliability standard including:

- the methodology and process used by NEMMCO for calculating the minimum reserve levels (MRLs), especially where the MRLs apply across more than one jurisdiction;
- the MRLs and associated arrangements and standards to be used in the short-term reserve assessment of reliability;
- the current "Guidelines for management of electricity supply shortfall events" (sometimes referred to as 'share the pain' guidelines) that were issued by the Panel in September 1998;
- the need and possible design of a short-term version of the RERT that could be used in a critical emergency;
- whether the wording of the standard as published by the Panel in the CRR could be clarified to give better guidance to NEMMCO as to how to operationalise the standard; and
- whether the Rules should be amended to clarify the requirement for market participants to inform NEMMCO, via dispatch bids or offers, of their actual capability under the prevailing or forecast temperature conditions.

In addition, the Panel is also requested to commence a 'Reliability standard and settings review' as proposed by the Panel in its Rule change proposal "NEM Reliability Settings: VoLL, CPT and Future Reliability Review". Although a final determination is yet to be made on this Rule change proposal, it is considered

desirable that this review be commenced now to test the appropriateness of the future standard and settings. Furthermore, under the existing Rules, the Panel would have been required to review VoLL by 30 April 2010.

Process

The recent unserved energy events in Victoria and South Australia have highlighted the need for close scrutiny of the way the reliability standard is put into operation in the NEM, and also the appropriateness of the reliability standard and settings.

Therefore, these reviews are likely to have important implications for NEM stakeholders. Consistent with its philosophy of engaging with those parties, the AEMC requests the Panel to plan to involve stakeholders by seeking submissions and holding at least one forum for these reviews.

The Panel is requested to consider the national electricity objective (NEO) contained in section 7 of the National Electricity Law (NEL) when it considers issues raised in these reviews and when making associated recommendations.

Timing

Recognising the extensive work program within the Panel, the Panel should aim to complete its review into the operationalisation of the reliability standard by the end of December 2009 and the reliability standard and settings review by the end of April 2010.

Clearly, these Panel reviews will also assist the AEMC in responding to the MCE directed review into the energy market frameworks in light of the impact on electricity supplies of the extreme heat wave of 29-31 January 2009, which was identified in the MCE's 6 February 2009 Communiqué.

Notwithstanding the end dates for these reviews and given the desirability of implementing any appropriate changes in a timely manner for the summer of 2009/10, the Panel should consider the possibility of making necessary changes to guidelines or proposing Rule changes before the completion of these reviews.

B The Panel's obligations under the National Electricity Rules to review the Reliability Standard and settings

3.9.3A Reliability standard and reliability settings review

- (a) By 30 April of each second year (commencing 2010) the *Reliability Panel* must conduct a review in accordance with the *Rules consultation procedures* on the *reliability standard* and *reliability settings* set out in paragraph (b) of this clause and publish a report on the *reliability standard* and *reliability settings* that it recommends should apply from 1 July in the year commencing 2 years after the year in which the review is conducted.
- (b) In conducting a review in accordance with this clause 3.9.3A the *Reliability Panel* must review the following:
 - (1) the *reliability standard*;
 - (2) the *market price cap*;
 - (3) the *cumulative price threshold*; and
 - (4) the *market floor price*.

3.9.4 Market price cap

- (a) The *market price cap* is a price limit which is to be applied to *dispatch prices*.
- (b) The value of the *market price cap* is \$10,000/MWh prior to 1 July 2010. Effective from 1 July 2010, the value of the *market price cap* is \$12,500/MWh.
- (c) In conducting a review of the *market price cap* in accordance with clause 3.9.3A, the *Reliability Panel* must have regard to the potential impact of any proposed increase in the *market price cap* on:
 - (1) *spot prices*;
 - (2) investment in the *National Electricity Market*; and
 - (3) the *reliability* of the *power system*.
- (c1) The *market price cap* recommended by the *Reliability Panel* in a review under clause 3.9.3A must be a level which the *Reliability Panel* considers will:
 - (1) allow the *reliability standard* to be satisfied without use of NEMMCO's powers to intervene under clauses 3.20.7(a) and 4.8.9(a);
 - (2) in conjunction with other provisions of the *Rules*, not create risks which threaten the overall integrity of the *market*; and
 - (3) take into account any other matters the *Reliability Panel* considers relevant.
- (c2) A report of the *Reliability Panel* under clause 3.9.3A must set out the conclusions of its review and the recommendation in relation to the level of the *market price cap* along with supporting information including:
 - (1) details of all relevant market conditions and circumstances on which the recommendation is based; and

- (2) an assessment of whether the level of the *market price cap* together with the operation of the *cumulative price threshold* has achieved the objectives set out in clauses 3.9.4(c1)(1) and (2).
- (d) In its review of the *market price cap* under clause 3.9.3A, the *Reliability Panel* may only recommend a change to the *market price cap* from 1 July in the year commencing 2 years after the year in which the review is being conducted where:
 - (1) in the *Reliability Panel's* opinion, it is highly probable that the relevant *market* conditions and circumstances on which the recommendation for that year are based as stated in the report of the *Reliability Panel* under clause 3.9.3A will eventuate; and
 - (2) the *Reliability Panel* has given due consideration to the impact of the change to the *market price cap* on *Market Participants* and, in the event of a recommended decrease in the *market price cap*, any alternative arrangements considered necessary to ensure that the *reliability standard* is maintained.

...

3.9.6 Market floor price

- (a) The *market floor price* is a price floor which is to be applied to *dispatch prices*.
- (b) The value of the *market floor price* is \$-1,000/MWh.
- (c) **[Deleted]**
- (d) The *market floor price* recommended by the *Reliability Panel* in a review under clause 3.9.3A must be a level which the *Reliability Panel* considers will:
 - (1) allow the *market* to clear in most circumstances;
 - (2) not create substantial risks which threaten the overall stability and integrity of the *market*; and
 - (3) take into account any other matters the *Reliability Panel* considers relevant.
- (e) A report of the *Reliability Panel* under clause 3.9.3A must set out the conclusions of its review and the recommendation in relation to the level of the *market floor price* along with supporting information including details of all relevant *market* conditions and circumstances on which the recommendation is based.

...

3.14.1 Cumulative price threshold and administered price cap

- (a) In conjunction with each *participating jurisdiction*, and after consulting *Market Participants* in accordance with the *Rules consultation procedures*, the AEMC must develop, authorise and *publish* and may vary from time to time a schedule to specify an *administered price cap* for each *region* to apply to *spot prices* and *market ancillary service prices* and to be used as described in this rule 3.14.
- (b) The *administered floor price* for each *region* to apply to *spot prices* and to be used as described in clause 3.14.2 will be the negative of the value of the *administered price cap*.
- (c) The *cumulative price threshold* is \$150,000 prior to 1 July 2010. Effective from 1 July 2010, the *cumulative price threshold* is \$187,500.

C NEM Reliability Standard – Generation and Bulk Supply – Draft Amendments for Consultation

This Reliability Standard for Generation and Bulk Supply⁷⁶ was determined by the Reliability Panel (Panel) as part of its “Review of the Reliability Standard and Settings”, which it will complete in April 2010. This Reliability Standard forms part of the *power system security and reliability standards* and was determined in accordance with clauses 8.8.1(a)(2) and 8.8.3 of the National Electricity Rules (Rules).

Form of the Reliability Standard

The NEM Reliability Standard for Generation and Bulk Supply is expressed in terms of the maximum expected unserved energy (USE), or the maximum allowable level of electricity expected to be at risk of not being supplied to consumers, per financial year. The USE is measured in GWh and should be expressed as a percentage of the annual energy consumption for the associated region or regions.

Level of the Reliability Standard

The maximum permissible unserved energy (USE), or the maximum allowable level of electricity expected to be at risk of not being supplied to consumers, is 0.002% of the annual energy consumption for the associated region or regions per financial year.

Performance Against the Reliability Standard

Performance against this Reliability Standard for Generation and Bulk Transmission should be considered using the actual observed levels of annual USE for the most recent financial year.

Operational Implementation of the Reliability Standard

Operationally, it should be planned to achieve an expected USE that is within this Reliability Standard for Generation and Bulk Transmission in each financial year and for each region, which means that it should also be achieved for the NEM as a whole.

⁷⁶ “NEM Reliability Standard – Generation and Bulk Supply – December 2009” is contained in Appendix D of the Review of the Reliability Standard and Settings, December 2009, and is available on the AEMC website.

Scope of the Reliability Standard

This Reliability Standard for Generation and Bulk Supply includes unserved energy associated with power system reliability incidents that results from:

- a single credible contingency on a generating unit or an inter-regional transmission element, that may occur concurrently with generating unit or inter-regional transmission element outages; or
- delays to the construction or commissioning of new generating units or inter-regional transmission network elements, including delays due to industrial action or 'acts of God'.

This Reliability Standard for Generation and Bulk Supply excludes unserved energy associated with power system security incidents that results from:

- multiple or non-credible contingencies;
- outages of transmission or distribution network elements that do not significantly impact the ability to transfer power into the region where the USE occurred; or
- industrial action or 'acts of God' at existing generating or inter-regional transmission facilities.