

Reliability Panel AEMC

FINAL REPORT

Reliability Standard and Reliability Settings Review 2014

16 July 2014

Inquiries

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

E: panel@aemc.gov.au

T: (02) 8296 7800

F: (02) 8296 7899

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About the AEMC

The AEMC reports to the Council of Australian Governments (COAG) through the COAG Energy Council. We have two functions. We make and amend the national electricity, gas and energy retail rules and conduct independent reviews for the COAG Energy Council.

About the AEMC Reliability Panel

The AEMC Reliability Panel (Panel) is a specialist body within the AEMC and comprises industry and consumer representatives. It is responsible for monitoring, reviewing and reporting on reliability, security and safety 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.

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Summary

The Reliability Panel (Panel) is required, under clause 3.9.3A of the National Electricity Rules (NER or rules), to undertake a review and report on the reliability standard and reliability settings that should apply in the National Electricity Market (NEM) from 1 July 2016, until such time as they are amended. The Panel is responsible for making a determination on the reliability standard and recommendations to the Australian Energy Market Commission (AEMC) on the reliability settings.

Following the completion of this review, the Panel has decided to retain the current reliability standard, and to recommend no changes to the reliability settings, from 1 July 2016. Accordingly, their existing values will continue to apply until such time as either the Panel amends the reliability standard and/or the AEMC amends the reliability settings as an outcome of a rule change process.

In the NEM, the reliability standard is used to indicate to the market the required level of supply and demand adequacy on a regional basis. The reliability standard takes account of inter-regional transmission to capture the benefits of generation from across regional boundaries.

The reliability standard is set by the Panel in accordance with the NER. The current approach specifies the maximum expected unserved energy (USE) – or the maximum amount of electricity expected to be at risk of not being supplied to consumers, per financial year. Currently, the level of USE is set at 0.002 per cent of the annual energy consumption for the associated NEM region or regions per financial year.

To incentivise sufficient generation capacity and demand-side response to deliver the reliability standard, the NEM design includes three key reliability settings. The market price cap (MPC), market floor price (MFP) and the cumulative price threshold (CPT) arrangements form the key price envelope within which the wholesale spot market balances supply and demand and encourages sufficient capacity to deliver the reliability standard.

The challenge of maintaining reliability in the NEM is, therefore, ensuring that the reliability settings are set at levels to incentivise sufficient generation capacity and demand-side response to deliver the expected reliability outcome, but no higher than consumers are willing to pay for that outcome.

Reliability standard and reliability settings review 2014

In April 2013, the AEMC provided the Panel with a terms of reference for the reliability standard and reliability settings review.

The objectives of this review are to:

- determine whether the existing reliability standard is appropriate for the current market arrangements;

- determine the form and level of the reliability standard that should apply from 1 July 2016;
- recommend the appropriate reliability settings to apply in the NEM from 1 July 2016 to achieve the reliability standard chosen; and
- propose processes for implementing any changes arising from the review.

In accordance with the terms of reference for this review, this final report presents the Panel's decision on the reliability standard and recommendations on the reliability settings that should apply in the NEM from 1 July 2016, until such time as they are amended.

In carrying out its review, the Panel has had regard to the National Electricity Objective (NEO) when undertaking its assessments and preparing its decisions and recommendations. The Panel has considered the outcomes of ROAM Consulting's (ROAM) assessment of the suitability of the current reliability standard and reliability settings to apply from 1 July 2016. The Panel has also had regard to stakeholder submissions on the Panel's issues paper and draft report.

The Panel's decision with respect to the reliability standard, and recommendations with respect to the reliability settings, has not changed from the draft report. The Panel's final conclusions are as follows:

- **Reliability standard:** The Panel has determined to retain the current form and level of the reliability standard to apply from 1 July 2016, until such time as it is amended. That is:
 - the reliability standard will remain in the form of an output-based measure expressed in terms of the maximum permissible USE, or the maximum allowable level of electricity at risk of not being supplied to consumers, per financial year; and
 - the level of the reliability standard will remain at 0.002 per cent of the annual energy consumption for the associated region or regions, per financial year.
- **Market price cap (MPC):** The Panel's recommendation is that no change be made to the real value of the MPC to apply from 1 July 2016, until such time as it is amended. The MPC should continue to be indexed by the Consumer Price Index (CPI), annually.
- **Cumulative price threshold (CPT):** The Panel's recommendation is that no change be made to the real value of the CPT to apply from 1 July 2016, until such time as it is amended. The CPT should continue to be indexed by CPI annually. However, the Panel has decided to recommend that the AEMC or the Panel (as appropriate) carry out a review of the form of the CPT mechanism prior to the next reliability standard and reliability settings review, due to commence around 2017.

- **Market floor price (MFP):** The Panel's recommendation is that no change be made to the current value of the MFP. The MFP should continue to be set at - \$1,000/MWh from 1 July 2016, until such time as it is amended.
- **Indexation:** The Panel's recommendation is that no change be made to the current measure of indexation of the MPC and CPT (that is, continue to index MPC and CPT by the CPI, annually). However, the Panel has decided to recommend that a review of the current indexation measure occurs within two years. In terms of the MFP, the Panel has also decided to recommend that no change be made to the current approach of non-indexation (that is, the MFP should continue to be set in nominal terms).
- **Value of customer reliability (VCR):** The Panel's recommendation is that the AEMC or the Panel (as appropriate), in consultation with stakeholders and having regard to any VCR values delivered by the Australian Energy Market Operator (AEMO) as part of its national VCR review, develop a methodology to derive an appropriate estimate of VCR for use in determining the efficient reliability standard. This work should take place prior to the next reliability standard and reliability settings review, which is due to commence around 2017.
- **Methodology for future reliability standard and reliability settings reviews:** The Panel's recommendation is that the AEMC or the Panel (as appropriate) develop a methodology for undertaking future reliability standard and reliability settings reviews. This should include consideration of how the outcomes of any market modelling could be treated. This work should take place prior to the next reliability standard and reliability settings review, due to commence around 2017.

In developing its decision and recommendations, the Panel has sought to balance stability and predictability of the NEM's reliability framework against the potential for various changes to the reliability standard and the reliability settings to further promote efficiency in the NEM.

In doing so, the Panel has had particular regard to the strength of evidence provided by stakeholders and ROAM's modelling to support a case for change to the existing reliability standard and reliability settings. This includes evidence that the potential benefits of a change to the MPC, CPT and MFP would be outweighed by the additional risks and costs that may be introduced by the change.

The Panel considers that its decision and recommendations are likely to maintain certainty and help to continue to deliver efficient operational and investment decisions in the long term. This is in the long term interests of consumers as it promotes an appropriate balance between prices and reliability of supply of electricity.

The detailed reasons for the Panel's decision on the reliability standard, and recommendations on the reliability settings, are set out in chapters 5 and 6 of this final report, respectively.

Reliability Panel members

Neville Henderson, Chairman and AEMC Commissioner

Trevor Armstrong, Chief Operating Officer, Ausgrid

Murray Chapman, Group Manager Market Policy Development, Australian Energy Market Operator

Stephen Davy, Chief Executive Officer, Hydro Tasmania

Gavin Dufty, Manager Policy and Research, St Vincent de Paul Society, Victoria

Mark Grenning, Chief Advisor Energy, Rio Tinto

Chris Murphy, Manager Regulatory and Commercial, Meridian Energy

Nick Sankey, Head of Utilities Energy and Renewables, Commonwealth Bank

Richard Wrightson, General Manager Energy Portfolio Management, AGL Energy

Merryn York, Chief Executive Officer, Powerlink

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1 Introduction

This final report has been prepared for the Reliability Panel's (Panel) 2014 reliability standard and reliability settings review. The purpose of this report is to present the Panel's decision on the reliability standard and recommendations on the reliability settings to apply in the National Electricity Market (NEM) from 1 July 2016, until such time as they are amended.

1.1 The reliability standard and reliability settings review

Under the National Electricity Rules (NER or rules), the Panel is required to carry out a review of the reliability standard and reliability settings once every four years.¹ In this review, the Panel is reviewing the standard and settings to apply from 1 July 2016.² Accordingly, their existing values will continue to apply until such time as either the Panel amends the reliability standard and/or the AEMC amends the reliability settings as an outcome of a rule change process.

The regular review of the standard and settings allows the Panel to consider whether they remain suitable, or whether changes should be made to ensure they continue to meet the requirements of the market, market participants and consumers. This is because the market environment and market arrangements are constantly evolving. Regular review of the standard and settings is therefore important to allow potential impacts of any changes to be assessed.

If the standard and settings are not reviewed regularly, they may not continue to provide appropriate signals for necessary levels of electricity supply. This would ultimately have a detrimental effect on the reliability of the electricity supply to consumers.

A four-yearly review represents an appropriate balance between the certainty provided between reviews and the need to periodically check that the reliability standard and the values of the reliability settings continue to be appropriate. The four-yearly timetable also allows for any changes to the reliability standard or reliability settings to take effect before the next review is commenced.

1 Clause 3.9.3A(a) of the NER.

2 In this review, the Panel is considering reliability of the electricity generation and bulk transmission sectors. Reliability refers to the system capacity to generate and transport sufficient electricity to meet consumer demand in the NEM. The reliability standard is the primary mechanism to signal to the market for enough capacity to meet consumer demand for electricity. The reliability settings are price mechanisms which form the key price envelope within which the wholesale spot market seeks to balance supply and demand, and incentivise capacity to deliver the reliability standard while avoiding unmanageable risks for market participants.

1.2 Purpose of the review

The purpose of the review is to:

- determine whether the existing reliability standard is appropriate for the current market arrangements;
- determine the form and level of the reliability standard that should apply from 1 July 2016;
- recommend the appropriate reliability settings to apply in the NEM from 1 July 2016 to achieve the reliability standard chosen; and
- propose processes for implementing any changes arising from the review.

1.3 Requirements of the review

The Panel undertook this review in accordance with the requirements under the NER and the terms of reference issued by the Australian Energy Market Commission (AEMC or Commission).³

As set out under the NER, the Panel must consider the following as part of this review:⁴

- the reliability standard; and
- the reliability settings:
 - the market price cap (MPC), including the manner of indexing the MPC;
 - the cumulative price threshold (CPT), including the manner of indexing the CPT; and
 - the market floor price (MFP).

Following the completion of this review, the Panel may set a new reliability standard. Any recommended changes to the reliability settings would be submitted to the AEMC as a rule change request under the National Electricity Law (NEL).

1.4 Consultation process

The NER requires that the Panel follow the rules consultation procedures in carrying out this review.⁵

³ The terms of reference can be found on the AEMC website: www.aemc.gov.au.

⁴ Clause 3.9.3A(b) of the NER.

⁵ Clauses 3.9.3A(a) and 8.9 of the NER.

The following table outlines the key milestones and dates leading to the delivery of the Panel's final report to the AEMC.

Milestone	Date
Publication of issues paper	9 May 2013
Close of submissions on issues paper	21 June 2013
Public forum	4 December 2013
Publication of ROAM's draft report	16 December 2013
Close of submissions on ROAM's draft report	16 January 2014
Publication of Panel's draft report	13 March 2014
Close of submissions on Panel's draft report	10 April 2014
Publication of ROAM's final report	16 July 2014
Publication of the Panel's final report	16 July 2014

1.5 Consultation on the issues paper

On 9 May 2013, the Panel published an issues paper for this review of the reliability standard and reliability settings. Submissions on the issues paper closed on 21 June 2013. The Panel received 12 submissions and these are available on the AEMC website. A summary of the issues raised in submissions, and the Panel's response to each issue, are set out in Appendix A.

1.6 Consultation on ROAM's draft report and publication of ROAM's final report

On 4 December 2013, the Panel held a public forum in Melbourne for its consultant, ROAM Consulting (ROAM), to present ROAM's draft modelling results for this review.

On 16 December 2013, the Panel published ROAM's draft report for this review. Submissions on ROAM's draft report closed on 16 January 2014. The Panel received five submissions and these are available on the AEMC website. A summary of the issues raised in submissions, and the Panel's response to each issue, are set out in Appendix A.

On 16 July 2014, ROAM's final report was published, having regard to stakeholder comments received on its draft report.

1.7 Consultation on the Panel's draft report

On 13 March 2014, the Panel published a draft report for this review.⁶ Submissions on the draft report closed on 10 April 2014. The Panel received eight submissions and three supplementary submissions.⁷ These are available on the AEMC website. A summary of the issues raised in submissions, and the Panel's response to each issue, are set out in Appendix A.

1.8 Structure of the final report

The remainder of this final report is set out as follows:

- **Chapter 2 - Background:** provides an overview of the reliability framework in the NEM.
- **Chapter 3 - Assessment framework:** outlines the factors the Panel had regard to in analysing issues raised in this review.
- **Chapter 4 - Overview of modelling methodology:** summarises the modelling approach by ROAM for this review.
- **Chapter 5 - Reliability standard:** discusses specific issues, conclusions and recommendations related to the reliability standard.
- **Chapter 6 - Reliability settings:** discusses specific issues, conclusions and recommendations related to the reliability settings.
- **Appendix A - Submissions summary:** provides a summary of the issues raised by stakeholders in submissions on the Panel's issues paper and draft report, and ROAM's draft report for this review, including the Panel's response to those issues.
- **Appendix B - Introduction of the reliability standard and reliability settings to the NEM:** provides a background summary on the introduction of the reliability standard and reliability settings to the NEM.
- **Appendix C - Current and past related work:** provides a summary of current and previous reviews that have been conducted on the reliability standard and reliability settings.
- **Appendix D - Reliability standard and reliability settings - past key determinations, recommendations and amendments:** provides a summary of the key reviews and rule changes relating to the reliability standard and

⁶ Unless otherwise specified, reference to "draft report" in this final report means the Panel's draft report (as opposed to ROAM's draft report).

⁷ As the stakeholders' supplementary submissions on the draft report did not present any new issues from the respective stakeholders' original submissions on the draft report, these have not been directly referred to in this final report.

reliability settings previously undertaken by the National Electricity Code Administrator (NECA) Reliability Panel, the Australian Competition and Consumer Commission (ACCC), the AEMC Reliability Panel and the AEMC.

2 Background

This chapter provides background information on, and explanations of:⁸

- reliability;
- the reliability standard; and
- the reliability settings.

2.1 Reliability and the reliability standard

"Reliability" is a common term used across different industries, but the meaning and measure of reliability can be quite different.

For the purpose of measuring reliability in the context of this review, the reliability of the electricity generation and bulk transmission sectors is being considered. Reliability refers to the system capacity to generate and transport sufficient electricity to meet consumer demand in the NEM. For the purpose of measuring reliability, "bulk transmission" capacity equates to inter-regional capability.

The reliability standard for the generation and bulk transmission sectors (that is, the reliability standard) is a planning standard used to indicate to the market the required level of supply and demand adequacy on a regional basis. It is set by the Panel in accordance with the NER.

The current reliability standard is expressed in terms of the maximum unserved energy (USE) - or the maximum amount of electricity expected to be at risk of not being supplied to consumers, per financial year. The USE is measured in gigawatt hours (GWh) and is expressed as a percentage of the annual energy consumption for the associated region or regions. Under the current reliability standard, the level of the USE should not exceed 0.002 per cent of the annual energy consumption for the associated region or regions, per financial year.⁹

The reliability standard needs to adequately account for events that could impact power system performance, but which may not affect the overall reliability of the NEM. Therefore, the reliability standard defines the reliability incidents for the generation and bulk transmission supply of electricity that are to be included and excluded from assessing power system reliability.

⁸ See appendices B, C, and D for further background information on the reliability standard and reliability settings.

⁹ The reliability standard is published on the AEMC website: www.aemc.gov.au.

The reliability standard *includes* USE associated with power system reliability incidents that result from:

- a single credible contingency event on a generating unit or an inter-regional transmission element, that may occur concurrently with generating unit or inter-regional transmission element outages;¹⁰ 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".

The reliability standard *excludes* USE associated with power system reliability incidents that result from:

- multiple or non-credible contingencies;¹¹
- 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.

2.1.1 Performance against the reliability standard

Performance against the reliability standard is considered using the actual observed levels of annual USE for the most recent financial year. Plant performance and demand characteristics that occurred in that financial year are assessed to determine whether there are any underlying changes occurring.

Reviewing reliability standard performance in the past 13 financial years, the standard has been breached twice on a regional basis - in Victoria and South Australia in 2008-09. These two breaches occurred around the same time (29 and 30 January 2009) due to relatively extreme high temperatures over a prolonged period.¹² At the time the incidents were reviewed, the Panel had noted that the "long term" reliability standard over the previous ten year period had not been breached, and that the incidents had been managed appropriately by the AEMO and market participants.

¹⁰ A "contingency event" is defined under the NER as an event affecting the power system which the Australian Energy Market Operator (AEMO) expects would be likely to involve the failure or removal from operational services of one or more generating units and/or transmission elements. The NER further defines a "credible contingency event" as a contingency event where the occurrence of which AEMO considers to be reasonably possible in the surrounding circumstances, including the technical envelope. See clause 4.2.3 of the NER.

¹¹ The NER further defines "non-credible contingency events" as a contingency event other than a credible contingency event. See clause 4.2.3 of the NER.

¹² These events were considered in: AEMC, *Annual Market Performance Review 2009*, Final Report, 18 December 2009.

Regional performance against the reliability standard is set out in Table 2.1 below.

Table 2.1 Regional USE (2000-01 to 2012-13)

Year	Queensland	New South Wales	Victoria	South Australia	Tasmania ¹³
2012-13	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
2011-12	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
2010-11	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
2009-10	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
2008-09	0.0000%	0.0000%	0.0040%	0.0032%	0.0000%
2007-08	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
2006-07	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
2005-06	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
2004-05	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
2003-04	0.0000%	0.0000%	0.0000%	0.0000%	
2002-03	0.0000%	0.0000%	0.0000%	0.0000%	
2001-02	0.0000%	0.0000%	0.0000%	0.0000%	
2000-01	0.0000%	0.0000%	0.0000%	0.0000%	

2.2 Reliability settings

The reliability settings are the price mechanisms under the NER. These mechanisms are as follows:¹⁴

- MPC - the MPC is a cap placed on electricity spot prices in each half-hourly trading interval, and is set at \$13,500 per megawatt hour (MWh) for the current 2014-15 financial year. Under the NER, the AEMC indexes the MPC by the Consumer Price Index (CPI) each financial year.
- CPT - the CPT is the threshold governing the imposition of an administered price cap (APC). Where the sum of the spot prices in a region in 336 consecutive (half hourly) trading intervals exceeds the CPT, the APC will be applied in that region. The CPT is set at \$201,900 for the current 2014-15 financial year. Under the NER, the AEMC indexes the CPT by the CPI each financial year.

¹³ Tasmania joined the NEM in May 2005.

¹⁴ The value of the MPC and CPT for each financial year is published in the schedule of reliability settings by the AEMC on its website: www.aemc.gov.au.

- MFP – the MFP is the lowest allowable limit for the spot price. It is currently set at -\$1,000/MWh.

The reliability settings function to:

- establish the parameters governing the price envelope within which supply and demand is balanced in the wholesale electricity market;
- provide important price signals to market participants for sufficient generation capacity and/or demand-side response (DSR) to deliver the reliability standard;¹⁵ and
- at the same time, provide a mechanism to limit financial risk for market participants.

The MPC and the MFP define the price envelope within which the wholesale electricity pool is dispatched and settled. The level of the MPC incentivises sufficient generation capacity and demand-side response to deliver the reliability standard.

The CPT is an explicit risk management mechanism designed to limit participants' exposure to protracted levels of high prices in the wholesale electricity spot market. If the CPT is breached, AEMO must impose the APC in accordance with the NER.¹⁶ The APC is currently set at \$300/MWh for all regions of the NEM, for all time periods.¹⁷

A summary of the current reliability framework is provided in Table 2.2 below.

¹⁵ Demand-side participation (DSP) refers to the ability of energy consumers to make decisions regarding the quantity and timing of their energy consumption that reflect their value of the supply and delivery of electricity. A form of DSP is DSR, which refers to actions by energy users to reduce their demand for network supplied energy in response to pricing signals during periods of peak demand or network stress. This final report refers to DSP in the context of DSR.

¹⁶ Clause 3.14.2(c) of the NER.

¹⁷ The APC is specified in a schedule that is developed, authorised, published and varied by the AEMC. It is available on the AEMC website, www.aemc.gov.au.

Table 2.2 Summary of the current reliability framework

Parameter	Objective	Level
Reliability standard	Indicates to the market the required level of supply and demand adequacy.	USE < 0.002% annual energy consumption of region
Market price cap	The key reliability setting. Incentivises sufficient generation capacity and demand-side response to deliver the reliability standard.	\$13,500/MWh (2014-15) Indexed by CPI each financial year
Market floor price	The lowest allowable limit for the spot price. Is generally considered unrelated to investment signals.	-\$1,000/MWh
Cumulative price threshold	An explicit risk management mechanism designed to limit participants' exposure to protracted levels of high prices in the spot market.	\$201,900 (2014-15) Indexed by CPI each financial year
Administered price cap	Designed to reduce the financial exposure of market participants during an extreme market event, while maintaining incentives for market participants to supply electricity.	\$300/MWh

Appendix B provides a summary of the early proposals made by the NECA, and final decisions made by the ACCC, in relation to the introduction of the reliability standard and the reliability settings in the NEM.

2.3 Relationship between the reliability standard and reliability settings

The reliability standard and reliability settings are interrelated. For example, an increase in the level of the reliability standard (such as tightening the standard to a higher level of reliability of, say, 0.001 per cent of USE) may require a corresponding increase in the level of MPC, or some other form of generation remuneration, to signal the appropriate level of generation capacity and demand-side response to deliver the higher standard. Depending on the effectiveness of that pricing signal to investors, there could potentially be reliability shortfalls, which may adversely impact on electricity customers.

Under the current framework, short-term reliability shortfalls may be managed by AEMO through two intervention mechanisms:

- The reliability and emergency reserve trader (RERT) mechanism - AEMO has the authority to contract for electricity reserves if shortfalls are forecast. This would require AEMO to negotiate and enter into contracts with reserve providers. The RERT provisions in the NER expire on 30 June 2016.¹⁸
- Reliability directions - AEMO may also direct registered participants to take certain action to maintain or re-establish the power system to the required operating state. Such reliability directions are governed by the provisions under the NER.¹⁹

These two intervention mechanisms provide a "safety net" in the event that there is insufficient generation capacity to meet demand. They provide the ability for AEMO to attempt to reduce the level of any electricity load shedding of customers.

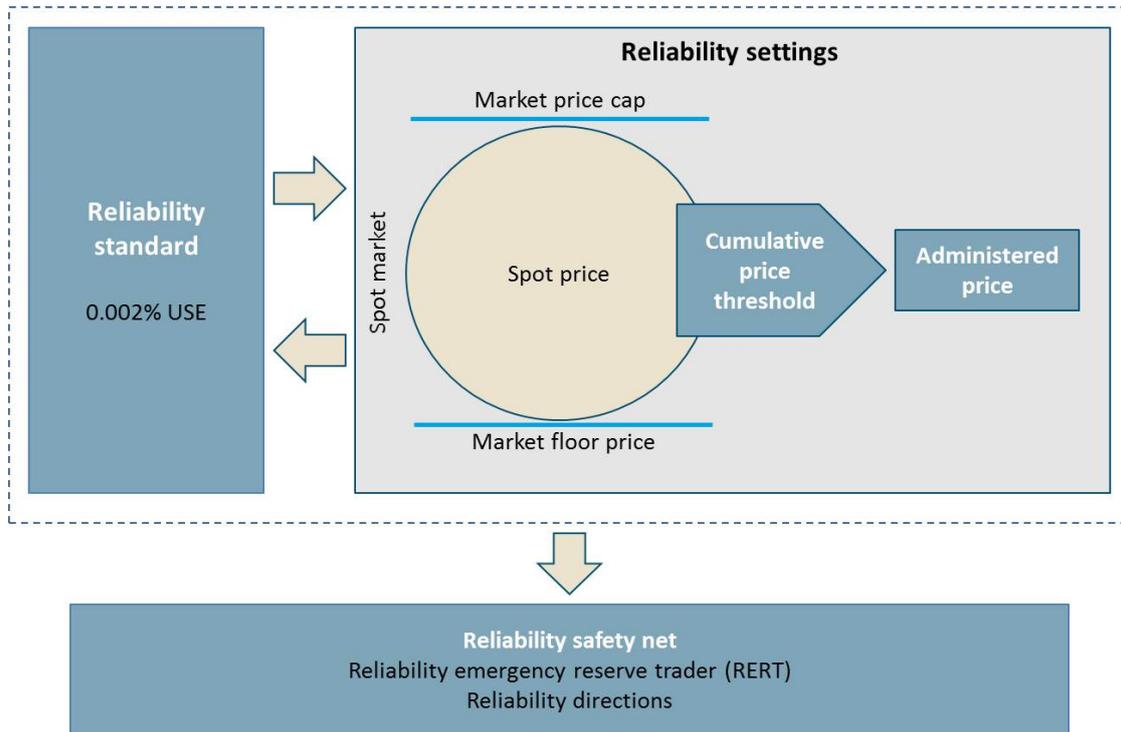
The RERT and AEMO's powers of direction are separate to the reliability standard and reliability settings. Therefore, AEMO's intervention mechanisms are not being considered under this review.

This interrelationship between the NEM reliability standard and reliability settings, and the two intervention mechanisms, is depicted diagrammatically in Figure 2.1 below.

¹⁸ The RERT provisions are set out under rule 3.2 of the NER and have been reviewed by the Panel on a number of occasions, and also considered by the AEMC through rule change processes. Although, in principle, the RERT provisions could provide benefits to the market, the performance of the market mechanisms have provided incentive to ensure sufficient capacity to date. Following the consideration of a rule change request from the Panel, the AEMC made a rule in March 2012 to extend the sunset of the RERT to 2016.

¹⁹ Clause 4.8.9 of the NER.

Figure 2.1 NEM reliability standard and reliability settings



The Panel has undertaken a number of reviews examining the reliability standard and reliability settings in the past. A summary of the key reviews is provided in Appendix C to provide additional context to this review.

3 Assessment framework

This chapter describes the assessment framework that the Panel has applied to assess the reliability standard and reliability settings in this review, in accordance with the requirements set out in the NEL and NER.

3.1 Requirements under the law and rules

3.1.1 National electricity objective

The Panel is required to have regard to the national electricity objective (NEO) when it undertakes its assessments, and makes decisions and recommendations for this review.

The NEO is set out in section 7 of the NEL as follows:

“The objective of this Law is to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to:

- (a) price, quality, safety, reliability and security of supply of electricity;
and
- (b) the reliability, safety and security of the national electricity system.”

For this review, the relevant aspect of the NEO is efficient investment in electricity services for the long term interests of consumers of electricity with respect to the price and reliability of supply of electricity.

Any changes to the reliability settings must be consistent with delivering the reliability standard, and must provide an appropriate level of protection to customers in respect of price. The long term interests of consumers will be promoted where an appropriate balance is achieved between price and reliability of supply of electricity.

3.1.2 Potential impact of proposed changes to the reliability settings

In accordance with the terms of reference for this review, and the NEL in which the following requirements are derived from, the Panel is also to consider the potential impact of any proposed changes to the MPC, CPT or MFP on:

- spot prices;
- forward contract prices and contract liquidity;
- investment in the NEM;
- the reliability of the power system; and
- market participants and consumers.

The Panel may also take into account any other matters the Panel considers relevant.²⁰

3.2 Other factors considered by the Panel

To assist its review of the reliability standard and reliability settings, the Panel has also had regard to the following factors:

- **Modelling** - quantitative and qualitative modelling can be used to investigate a range of issues relating to the reliability standard and reliability settings, particularly where the issues (such as in the external environment) and system (such as the NEM) are complex. Modelling is limited by a number of factors, including input assumptions made. It is only one consideration amongst other factors, described below.
- **Broader NEM philosophy** - competition between buyers and sellers in the market should be allowed to set the efficient price to achieve the appropriate level of reliability that is valued by customers in the market. The reliability settings should be designed to provide a sufficient range to promote this behaviour in the market.
- **Value to customers** - the reliability standard and reliability settings should be set at a level which reflects the price at which customers are willing to pay for reliability. That is, at a price that is not higher than the value customers place on reliability.
- **Trade-off between price and reliability** - in assessing the level of the reliability settings required to achieve the reliability standard, there is a tension between price and reliability outcomes. Regard should be given to the trade-off between the price to consumers and reliability of the electricity supply.
- **Investment certainty** - any changes to the reliability settings need to take into account the impact on investor certainty and incentives to invest in generation in order to achieve the reliability standard.
- **Financial risk** - the reliability settings need to be set at appropriate levels such that market participants and consumers are not exposed to risks of extreme or sustained high prices.
- **Stability and predictability** - consistency in the approach to setting the reliability standard and reliability settings provides stability and predictability for market participants. This includes taking into account relevant reviews, determination and recommendations. Such an approach will promote confidence in the market, investment certainty and efficiency in investment. In addition, some flexibility is

²⁰ These other matters could include any implications the gas market settings have on the electricity market settings or interactions between the gas and electricity markets, and the impact of renewable energy targets and other relevant policy settings. The Panel has to also consult with AEMO on the relevant gas market settings - AEMO's participation as a member of the Panel should facilitate this process.

required to accommodate changes in market conditions, while not undermining investor confidence. Therefore, any departure from previous approaches to setting the reliability standard and reliability settings should be transparent and based on clearly articulated objectives.

- **Proportionality and materiality** - any change to the reliability standard and reliability settings should be proportionate to the scale of any issue identified with the current reliability standard and reliability settings. In addition, the likely benefits from making a change should be balanced against the likely risks and costs to the market of doing so.

4 Overview of modelling methodology

On behalf of the Panel, the AEMC engaged ROAM to provide advice and modelling to assist the Panel with this review.

For further details of the modelling undertaken by ROAM, a separate modelling report by ROAM has been published by the Panel as an accompanying document to this final report.²¹

4.1 Modelling objectives

The objective of the modelling was to explore the reliability settings that are required to deliver the reliability standard for the 2016-17 to 2019-20 period.

ROAM also assessed the likelihood of a breach in the reliability standard over the next decade, and evaluated the suitability of the reliability standard from an economic perspective.

Finally, ROAM considered a number of non-reliability related impacts of changing the reliability settings.

4.2 Approach to modelling between Panel reviews

ROAM also carried out the modelling for the 2010 reliability standard and reliability settings review.²² During that review, ROAM received feedback from stakeholders regarding its modelling methodology, including possible improvements. In response to stakeholders' suggestions, ROAM developed a new approach for this review which it applied concurrently with the methodology used in 2010. The two approaches are discussed further in section 4.5.

4.3 Modelling stages

ROAM performed quantitative modelling to investigate a range of issues relating to the reliability standard and reliability settings. ROAM's modelling involved a number of stages to consider particular aspects of the reliability standard and reliability settings and their potential impact on the operation of the market.

These stages included the following:

- Benchmarking with previous studies:
 - Benchmarking studies for this review to ensure consistency of assumptions with previous studies.

²¹ Available at: www.aemc.gov.au.

²² Ibid.

- Stage 1 - Conceptual assessment of the reliability settings:
 - Quantitative modelling to determine the MPC (and associated CPT) required to allow new entrant open cycle gas turbine (OCGT) generation to operate profitably in a market which achieves the reliability standard. This stage focused on the "cap defender" approach, which was compared to the previously applied "extreme peaker" approach.²³
- Stage 2 - Assessment of current market conditions:
 - Additional quantitative modelling to forecast the level of reliability in a market where the existing reliability settings are maintained. A forecast is presented for two markets over a ten year period: one with a purely market-driven development of capacity; and another with no change in thermal capacity.
- Stage 3 - Assessment of the reliability standard:
 - Modelling to investigate the suitability of the current reliability standard of a maximum permissible USE of 0.002 per cent. This modelling determines the optimum level of the reliability standard, given an assumed value of customer reliability (VCR).²⁴
- Stage 4 - MFP assessment:
 - Modelling to review the suitability of the existing MFP. This modelling involves simulating cycling decisions of all generators in the NEM, subject to an objective of minimising costs over the forthcoming week.²⁵
- Stage 5 - Market impacts analysis:
 - Incorporates both forecast modelling and historical analysis to explore the impact that reliability settings have in the operation of the NEM. The analysis focuses on wholesale and contract markets in the NEM, how the reliability settings influence the behaviour of market participants, and the potential impacts of a reduction in the MPC from \$13,100/MWh to \$9,000/MWh.²⁶

4.4 Modelling assumptions and sensitivities

The Panel held a number of discussions with ROAM to develop the key input assumptions to be used in ROAM's modelling. In addition, given the significant degree

²³ See section 4.5 for further discussion on the cap defender and extreme peaker approaches to modelling.

²⁴ VCR relates to how customers value reliability of their electricity supply.

²⁵ In this instance, "costs" means avoidable costs (fuel, and variable operating and maintenance cost) and start-up costs.

²⁶ ROAM's modelling utilised an MPC of \$13,100/MWh, as applicable for the 2013-14 financial year.

of uncertainty in relation to a number of the input assumptions, ROAM also developed a range of alternative scenarios to inform the analysis.

The base case in ROAM's modelling incorporated the following assumptions:

- medium peak demand and energy projections;
- the mandated Large-scale Renewable Energy Target (LRET) scheme, targeting approximately 41 terawatt hours (TWh) of renewable energy generation by 2020;
- the central gas price trajectory provided in the AEMO Planning Assumptions 2013;²⁷
- a repealed carbon price;
- an annualised capital cost of \$100,000/MW per annum for OCGT capacity; and
- demand-side participation (DSP) quantities and price thresholds from the 2013 AEMO National Electricity Forecast Report (NEFR).²⁸

The sensitivities that were developed for ROAM's analysis included:

- high and low capital cost assumptions for the new entrant OCGT;
- alternative MPC multipliers associated with the CPT: 12 times, 15 times and 18 times the MPC;
- high and low demand and energy growth forecasts;
- a reduced LRET;
- a low gas price projection;
- carbon pricing at the Treasury Core projection;²⁹ and
- a 50 per cent reduction in the quantity of DSP.

4.5 Modelling approaches: cap defender and extreme peaker

An important change in ROAM's modelling approach since its work for the Panel on the 2010 review of the reliability standard and reliability settings is the application of the "cap defending generator" (or "cap defender") approach, in addition to the "extreme peaking generator" (or "extreme peaker") approach, for this review.

²⁷ AEMO, *2013 Planning Assumptions: Existing Generation Data*, 22 August 2013.

²⁸ AEMO, *2013 National Electricity Forecasting Report*, 28 June 2013.

²⁹ Australian Government, *The Treasury, Strong Growth, Low Pollution: Modelling a Carbon Price*, 21 September 2011, p. 90.

4.5.1 Extreme peaker approach

In 2010, ROAM applied the extreme peaker approach only. The extreme peaker approach assumes that a new entrant OCGT is bidding the MPC. This approach determines a relationship between the USE observed in each iteration of the modelling, and the MPC required for the new entrant generator to profitably operate in a system which is expected to experience a level of USE approaching the reliability standard.

A criticism from a number of stakeholders, at the time of the previous review, was that this concept of an extreme peaker was somewhat theoretical as it did not reflect market impacts. In particular, the approach was not consistent with the operation of recently commissioned OCGT plant in the NEM whereby the owners of such plant earn income by selling caps and offering plant for dispatch at its marginal operating costs rather than only operating when the spot price was at the MPC.

A number of stakeholders did not consider that it was appropriate to retire generation to force the market to deliver USE at the reliability standard. They also considered that the assessment of a new entrant generator was inappropriate in a market that had sufficient installed capacity to just deliver the reliability standard.

For this review, ROAM developed a new approach which it considered better reflected the operation of recently commissioned OCGT plant in the NEM. This approach is summarised below.

In its final report, ROAM noted that the purpose of including the results of its extreme peaker method was to provide a point of comparison with the 2010 review, and to provide a more theoretical upper bound on the MPC required to deliver the reliability standard.

4.5.2 Cap defender approach

For this review, ROAM also applied the cap defender approach for the first time. The approach continues to be based on assessing the MPC required for a peaking generator to be profitable with USE at 0.002 per cent (or some other standard being investigated). However, the peaking generator operates as a "cap defender". That is, the generator is assumed to be a notional 1 MW OCGT which is fully contracted using a \$300/MWh cap contract and bids its entire capacity at \$300/MWh.³⁰

ROAM considered that by incorporating the commercial considerations that drive new entrant investment in the real market, the cap defender approach would deliver results that were more robust and informative than those provided by the theoretical (extreme peaker) approach applied in 2010.

The cap defender approach allows the new entrant OCGT to recover its capital investment in periods in which the price is below the MPC, but above \$300/MWh. In

³⁰ By modelling a notional 1 MW generator, the potential for the generator to significantly impact on the market price outcome is removed.

contrast, the extreme peaking generator is prevented from benefiting from these opportunities as it only operates when USE occurs, or would occur, and when the spot price is at the MPC.

This allows the cap defending generator to profitably operate with a significantly lower MPC than is required by the extreme peaking generator. In other words, the outcome under the extreme peaker approach essentially represents an upper bound on the MPC that is required for a peaking generator to be profitable, given a particular demand forecast.

The cap defender approach aims to replicate market behaviour, by giving consideration to commercial market factors that drive new entrant OCGT generation investment in the NEM. The extreme peaker approach, in contrast, is independent of these factors.

Further discussion of the outcomes and limitations of each approach is provided in section 6.1.5.

5 Review of the reliability standard

This chapter discusses specific issues, conclusions and recommendations related to the reliability standard to apply in the NEM from 1 July 2016, until such time as it is amended. This chapter also considers VCR as it relates to the reliability standard.

Determination

- No changes will be made to the current form and level of the reliability standard. The standard will therefore continue to be:
 - in the form of an output-based measure expressed in terms of the maximum permissible USE, or the maximum allowable level of electricity at risk of not being supplied to consumers, per financial year; and
 - at the level of the maximum permissible USE, or the maximum allowable level of electricity at risk of not being supplied to consumers, of 0.002 per cent of the annual energy consumption for the associated region or regions, per financial year.

Recommendation

- The AEMC or the Panel (as appropriate), in consultation with stakeholders and having regard to any VCR values delivered by AEMO as part of its national VCR review, develop a methodology to derive an appropriate estimate of VCR for use in determining the efficient reliability standard. This work should be carried out prior to the next reliability standard and reliability settings review, which is due to commence around 2017.

5.1 Form of the reliability standard

As discussed in chapter 2, the reliability standard is an output-based measure expressed in terms of the maximum permissible USE, or the maximum allowable level of electricity at risk of not being supplied to consumers per financial year. The USE is expressed as a percentage of the annual energy consumption for the associated region or regions.

5.1.1 Stakeholder submissions on the issues paper

In submissions on the issues paper for this review,³¹ stakeholders were generally supportive of maintaining the current form of the reliability standard using USE.³² Consequently, no submissions offered an alternative form of the reliability standard.

³¹ The issues paper and submissions on the issues paper are available on the AEMC's website, www.aemc.gov.au.

St Kitts Associates considered there would be value in the Panel elaborating on how the concept of USE remains appropriate in the context of increased DSR capability.³³

5.1.2 Stakeholder submissions on the Panel's draft report

In submissions on the draft report for this review,³⁴ stakeholders generally reiterated their support for maintaining the current form of the reliability standard.³⁵

However, AEMO raised an issue around communication of the reliability standard.³⁶ Specifically, it considered that the lack of reference in the draft report to the level of the reliability standard being an "expected" outcome meant that there was a risk it could be misinterpreted by stakeholders. It requested that this be clarified in the final report. AEMO also proposed that the description of the reliability standard be amended to clarify that it is a probabilistic standard, considered to be met where it is "expected to be met on average in the longer term", taking into account any trends in demand and plant performance.

AEMO also proposed that a discussion of compliance be added to the current description of the reliability standard.

5.1.3 Panel's analysis

The Panel has carried out a number of reviews in the past which have considered, in detail, the form of the reliability standard, including whether measures other than USE should be adopted.³⁷ In those reviews, the Panel did not identify any overall benefits to the market, or market participants and consumers, from amending the form of the reliability standard. There was also limited support from stakeholders for change.

In the issues paper for this review, the Panel noted that it did not consider there had been any significant changes in market arrangements to suggest that its previous considerations on this matter were no longer relevant. This view was supported by stakeholders in their submissions to the issues paper.

32 AGL, Submission on issues paper, p. 1; Energy Supply Association of Australia (ESAA), Submission on issues paper, pp.1-2; GDF Suez Australian Energy, Submission on issues paper, p. 1; National Generators Forum (NGF), Submission on issues paper, p. 3; Alinta Energy, Submission on issues paper, p. 1; Macquarie Generation, Submission on issues paper, pp. 1-6; Major Energy Users (MEU), Submission on issues paper, pp.3-4.

33 St Kitts Associates, Submission on issues paper, p. 3.

34 The draft report and submissions on the draft report are available on the AEMC's website, www.aemc.gov.au.

35 AEMO, Submission on Panel's draft report, pp. 1-2; AGL Energy, Submission on Panel's draft report, p. 1; Alinta Energy, Submission on Panel's draft report, pp. 1-2; GDF Suez Australian Energy, Submission on Panel's draft report, p. 1; Grid Australia, Submission on Panel's draft report, p. 1; MEU, Submission on Panel's draft report, p. 3; Origin Energy, Submission on Panel's draft report, p. 1.

36 AEMO, Submission on Panel's draft report, pp. 2, 10.

37 See Appendix C for further details of these past Panel reviews.

In the draft report for this review, the Panel's subsequent draft determination was that no changes would be made to the current form of the reliability standard. As noted above, submissions on the draft report were generally supportive of this draft determination.

Demand-side response

The Panel has considered the issue raised by St Kitts Associates regarding the relevance of the current form of the reliability standard in the context of increasing DSR.³⁸ The Panel notes that if the demand-side were able to respond to prices in real time, and if the MPC was set at a level sufficient to incentivise the demand-side to voluntarily reduce load at times of high prices, then (at least in theory) a reliability standard based on USE may not be needed. If the demand-side (that is, customers of electricity) were able to send accurate and effective price signals to the market regarding the optimal level of electricity supply, there may not be a need for a regulatory solution or standard for ensuring reliability.

However, given that the availability and uptake of DSP opportunities have been relatively low in the NEM to date, the reliability standard is necessary to provide a signal to the market in relation to the required level of supply and demand adequacy.³⁹ Further, the MPC (and the CPT) limit risks to market participants in the event that there is insufficient DSP at a time of supply scarcity.

In addition, as the Panel stated in its 2007 Comprehensive Reliability Review, the current USE standard in the NEM is an energy standard for an energy-only market.⁴⁰ This design is well suited to placing value on cumulative, long-term energy shortfalls and thus rewarding additional generation, or DSR, to reduce that shortfall.

Current description of reliability standard

The Panel has considered the issue raised by AEMO in relation to clarity of the reliability standard. The Panel notes that the reliability standard is a planning standard which is expressed in terms of the maximum amount of electricity expected to be at risk of not being supplied to consumers, per financial year. This means that, operationally, generation and bulk transmission supply of electricity should be planned to achieve an expected USE that is not more than 0.002 per cent of the annual energy consumption for the associated region or regions per financial year. Determination of the "expected" value is based on a probabilistic assessment covering a range of different demand levels and power plant availability/outages.

³⁸ St Kitts Associates, Submission on issues paper, p. 3.

³⁹ The AEMC's Power of choice review considered how the NEM could better support efficient demand-side participation. The review recommended, among other things, development of a Demand Response Mechanism (DRM). This work, to be led by AEMO, has recently been deferred. Given the uncertainty around its implementation (and, thus, the timing of its benefits), the Panel will monitor the work and consider any the impacts on the form of the reliability standard in its next review, which is due to commence around 2017.

⁴⁰ Reliability Panel, *Comprehensive Reliability Review*, Final Report, 21 December 2007, p. 24.

In response to AEMO's concerns regarding the description of the reliability standard, the Panel supports AEMO's view that the reliability standard is a planning standard which is expressed in terms of the maximum amount of electricity expected to be at risk of not being supplied to consumers, per financial year. To ensure that this is clear, the Panel has amended references to the reliability standard in this final report, as appropriate.

With respect to AEMO's proposal to amend the description of the published reliability standard to include a discussion on compliance, the Panel notes that no other stakeholders raised this as an issue in submissions on the issues paper and draft report. In light of this, the Panel considers that the current description is sufficiently clear and unlikely to cause significant confusion among stakeholders. It has therefore not made the change proposed by AEMO.

5.1.4 Panel's final determination

Having had regard to the views of stakeholders and the Panel's own analysis and review, the Panel has decided to adopt its draft determination in relation to the form of the reliability standard, as its final determination. That is, the form of the reliability standard will continue to be an output-based measure expressed in terms of the maximum permissible USE, or the maximum allowable level of electricity at risk of not being supplied to consumers, per financial year.

5.2 Level of the reliability standard

As discussed in chapter 2, the current level of the reliability standard is 0.002 per cent of USE for each region or regions per financial year. It has remained unchanged since it was established in 1998 at the commencement of the NEM.

Operationally, available electricity generation and bulk transmission capacity in (and between) each region should be planned up to the point that USE does not exceed the reliability standard in each financial year. Where this is achieved, the reliability standard would also be achieved for the NEM as a whole.

5.2.1 Stakeholder submissions on the issues paper

In submissions on the issues paper for this review, a number of stakeholders considered that the current level of the reliability standard was appropriate.⁴¹

For example, AGL did not see any benefit in tightening the standard from 1 July 2016, given that the current level appears to be sufficient for delivering reliable capacity and

⁴¹ AGL, Submission on issues paper, p. 1; ESAA, Submission on issues paper, pp.1-2; GDF Suez Australian Energy, Submission on issues paper, p. 1; NGF, Submission on issues paper, p. 3; Alinta Energy, Submission on issues paper, p. 1; Macquarie Generation, Submission on issues paper, pp. 1-6; MEU, Submission on issues paper, pp.3-4.

adequate generation investment in the NEM.⁴² GDF Suez noted that the current reliability standard was broadly consistent with international experience and had been serving the industry well.⁴³

5.2.2 Stakeholder submissions on the Panel's draft report

In their submissions on the draft report for this review, stakeholders generally reiterated their support for maintaining the current level of the reliability standard.⁴⁴

5.2.3 ROAM's modelling

To help inform the Panel on the ability of the market to achieve the reliability standard over the next 10 years, ROAM carried out quantitative analysis to forecast the level of reliability achieved in a market with the existing reliability standard. The results of ROAM's modelling indicated that, assuming the existing reliability settings are maintained, the current oversupply of capacity in the NEM will be maintained between 2013-14 and 2022-23.⁴⁵ That is, the existing reliability settings are sufficient to deliver a level of reliability consistent with the reliability standard.

In addition, ROAM carried out modelling to investigate the suitability of the current reliability standard from an economic perspective. Specifically, ROAM examined the optimum level of the reliability standard given an assumed VCR.⁴⁶ ROAM's modelling indicated that the current reliability standard of a maximum permissible USE of 0.002 per cent would be economically efficient if VCR was assumed to be \$30,000/MWh.

While ROAM's modelling determined a relationship between VCR and the optimal level of reliability (that is, the level of reliability that minimises total economic costs), ROAM did not form a view on whether the existing reliability standard is the economically efficient or optimal standard.⁴⁷ The relationship between the reliability standard and VCR is considered further in section 5.3.

5.2.4 Panel's analysis

To date, the NEM has performed well against the reliability standard. In the past 13 financial years, the reliability standard has only been breached, on a regional basis,

⁴² AGL, Submission on issues paper, p. 1.

⁴³ GDF Suez Australian Energy, Submission on issues paper, p. 1.

⁴⁴ AEMO, Submission on Panel's draft report, pp. 1-2; AGL Energy, Submission on Panel's draft report, p. 1; Alinta Energy, Submission on Panel's draft report, pp. 1-2; GDF Suez Australian Energy, Submission on Panel's draft report, p. 1; Grid Australia, Submission on Panel's draft report, p. 1; MEU, Submission on Panel's draft report, p. 3; Origin Energy, Submission on Panel's draft report, p. 1.

⁴⁵ ROAM Consulting, *Reliability Standard and Settings Review*, Final Report to AEMC, 21 May 2014, pp. 57-62.

⁴⁶ *Ibid*, pp. 63-65.

⁴⁷ *Ibid*, p. 63.

twice: in Victoria and South Australia in 2008-09. These two breaches occurred around the same time and coincided with relatively extreme weather events.⁴⁸

In addition, having had regard to both ROAM's assessment of current market conditions and stakeholders' submissions on the issues paper and draft report, no compelling evidence has been presented to the Panel to support a proposition that reliability in the NEM will deteriorate in the future.

The Panel has an obligation under the NER to have regard to any VCR determined by AEMO, which the Panel considers relevant, when carrying out its review of the reliability standard and reliability settings.⁴⁹ In this context, the Panel welcomes the work of ROAM to determine a relationship between the optimal reliability standard and VCR.

While the ability to determine an optimal reliability standard for the NEM is currently constrained by the lack of appropriate VCR, nevertheless, this is an area that warrants further investigation. The relationship between VCR and the reliability standard is considered further in the section 5.3.

5.2.5 Panel's final determination

Having had regard to the views of stakeholders and the Panel's own analysis and review, the Panel considers that there is no case for changing the level of the reliability standard at this time. It has therefore decided to adopt its draft determination to retain the current level of the reliability standard, as its final determination. That is, the level of the reliability standard will continue to be set at 0.002 per cent of the annual energy consumption for the associated region or regions, per financial year.

5.3 Value of customer reliability

As noted in section 5.2.4, the Panel has an obligation under the NER to have regard to any VCR is determined by AEMO when carrying out its review of the reliability standard and reliability settings.

In previous reviews of the reliability standard and reliability settings, VCR has been considered in the context of its relationship to the MPC. In this review, the Panel has considered VCR in the context of its relationship with the reliability standard, as opposed to the MPC. This is because VCR and the MPC address different purposes and are not directly related.

In the issues paper for this review, the Panel sought views from stakeholders on whether the current approach to determining the reliability standard and reliability settings effectively takes into account the trade-offs between the costs of investing in

⁴⁸ At the time, the Panel noted that the "long term" reliability standard over the previous 10 year period had not been breached, and that AEMO and market participants had managed the incidents appropriately.

⁴⁹ Rule 3.9.3A(c)(2) of the NER.

and maintaining the networks, and VCR. In response, several submissions were received on this matter, as summarised below.

5.3.1 Stakeholder submissions on the issues paper

In submissions on the issues paper for this review, stakeholders were generally supportive of VCR being given some consideration in this current review of the reliability standard and reliability settings.

However, stakeholders also recognised the difficulties associated with determining an accurate measure of VCR.⁵⁰ For example, the Energy Supply Association of Australia (ESAA) noted that VCR typically cannot account for customers' exposure to high impact, low probability events on the transmission network and are subject to uncertainty and measurement error.⁵¹ Therefore, stakeholders also generally considered that caution should be exercised by the Panel when using VCR in the review.⁵²

Opinions differed on the appropriate VCR to use in the context of setting the reliability standard for the electricity generation and bulk transmission sectors. The ESAA considered that the residential sector was the most appropriate customer group to reference as this sector is most likely to experience load shedding at times of short supply.⁵³ However, Alinta Energy considered that use of a VCR estimate based on the residential sector ignores the overall VCR by not reflecting the value of reliability by the industrial and commercial sectors.⁵⁴ Alinta Energy considered this to be indicative of the issue of investment in transmission being valued above investment in generation and demand-side alternatives.⁵⁵

EnergyAustralia considered that, given it is not practical to have different reliability standards for generation and bulk transmission capacity within the NEM regions, any VCR estimate needs to reflect an average across the NEM.⁵⁶

GDF Suez noted that the MPC and VCR are different mechanisms and do not necessarily need to be set at similar levels.⁵⁷ On a related note, St Kitts Associates noted that the residential VCR should be considered as a ceiling on the MPC, but that this should not be interpreted as saying that the MPC should be increased to the current VCR.⁵⁸

50 AGL, Submission on issues paper, p. 2; ESAA, Submission on issues paper, p. 2.

51 ESAA, Submission on issues paper, p. 2.

52 AGL, Submission on issues paper, p. 2; ESAA, Submission on issues paper, p. 2.

53 ESAA, Submission on issues paper, p. 2.

54 Alinta Energy, Submission on issues paper, p. 15.

55 Ibid.

56 EnergyAustralia, Submission on issues paper, p. 2.

57 GDF Suez Australian Energy, Submission on issues paper, p. 2.

58 St Kitts Associates, Submission on issues paper, p. 6.

The Major Energy Users (MEU) considered there was no direct correlation between VCR and the MPC.⁵⁹ It considered that VCR is used for assessing whether network investment was efficient, while the MPC is set at the point where no increase will result in increased reliability of supply.

St Kitts Associates noted that another dimension to the VCR discussion was the emergence of DSR at existing prices.⁶⁰ It considered this was evidence of a willingness to accept demand-side reductions at prices already revealed in the market.⁶¹

St Kitts Associates also noted that the policy response from the Standing Council on Energy and Resources (SCER) to the AEMC's Extreme Weather Review,⁶² which included a request to the AEMC to provide additional advice on the relationship between VCR and the MPC.⁶³ It considered that this advice would be of value for consideration as a part of this review.⁶⁴

5.3.2 Stakeholder submissions on the Panel's draft report

In their submissions on the draft report for this review, GDF Suez, Grid Australia and AEMO were generally supportive of exploring the link between the reliability standard and VCR further, subject to the outcomes of AEMO's current VCR review (this review is discussed in the next section).⁶⁵ However, AGL, Origin and Grid Australia expressed caution in relation to this approach, given that the methodology for deriving an appropriate VCR estimate remains unsettled.⁶⁶

Alinta Energy was not convinced by arguments that suggested VCR and the MPC did not greatly relate to each other.⁶⁷ It considered that the draft report did not resolve the issue of potential bias towards transmission build for the purpose of guaranteeing reliability against the standard, over generation build and demand-side alternatives. It considered that this bias is caused by the current MPC being set below the proxy VCR of \$30,000 (which, according to ROAM, corresponds to the 0.002 per cent reliability standard).

⁵⁹ MEU, Submission on issues paper, p. 10

⁶⁰ St Kitts Associates, Submission on issues paper, p. 6.

⁶¹ Ibid.

⁶² AEMC, *Review of the Effectiveness of NEM Security and Reliability Arrangements in light of Extreme Weather Events*, Final report, 31 May 2010.

⁶³ St Kitts Associates, Submission on issues paper, p. 6.

⁶⁴ Ibid.

⁶⁵ AEMO, Submission on Panel's draft report, p. 3; GDF Suez Australian Energy, Submission on Panel's draft report, p. 1; Grid Australia, Submission on Panel's draft report, pp. 1-2.

⁶⁶ AGL Energy, Submission on Panel's draft report, p. 1; Grid Australia, Submission on Panel's draft report, pp. 1-2; Origin Energy, Submission on Panel's draft report, p. 1.

⁶⁷ Alinta Energy, Submission on Panel's draft report, pp. 2-3.

5.3.3 Panel's analysis

From an efficiency perspective, the level of reliability pursued through regulation must have regard to both the rising incremental costs, and the diminishing value, of greater reliability.

This interaction was highlighted by ROAM in its work to determine the relationship between VCR and the optimal level of reliability (that is, the level of reliability that minimises total economic costs). The relationship is illustrated below.

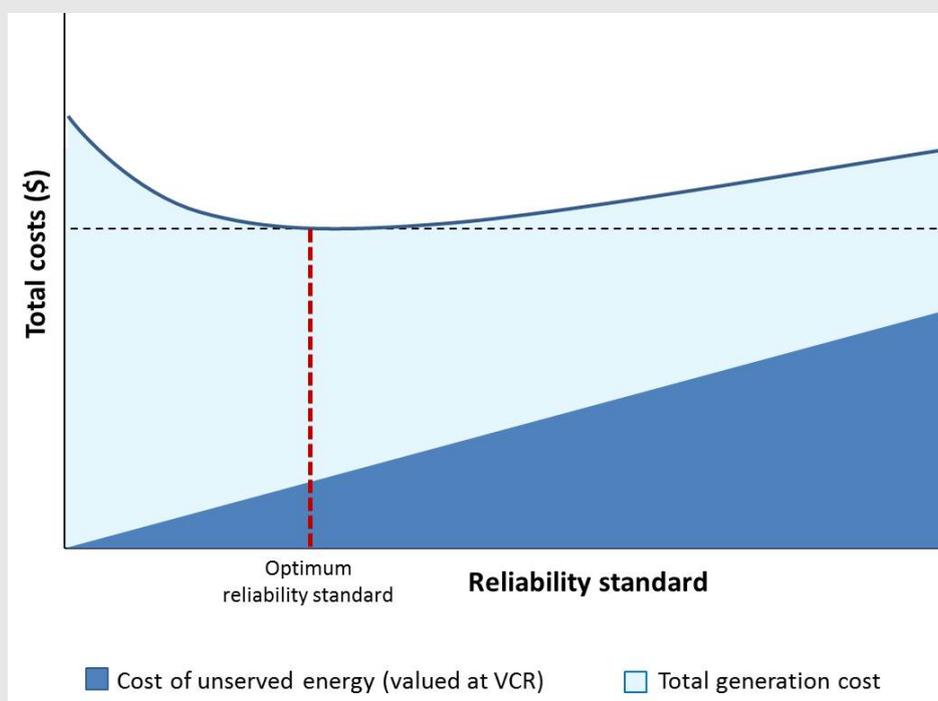
Delivering reliability at minimum cost to consumers

The total cost to the market of achieving a given reliability standard is the sum of:

- the cost of generation required to deliver the reliability standard; and
- the cost of unreliability, as measured by VCR multiplied by the level of USE.

The market is optimised, from a theoretical perspective, when the reliability standard corresponds to the minimum combined cost of generation and USE. A conceptual representation of this relationship is provided in Figure 5.1.

Figure 5.1 Assessment of the reliability standard



Source: ROAM Consulting, *Reliability Standard and Settings Review*, Final Report to AEMC, 21 May 2014, p. 12.

The Panel notes that costs and benefits vary, depending on the type of customer, time of interruption, geographical location, and climate. Hence, to set an appropriate reliability standard, detailed and accurate information about the cost functions of

businesses, and the value of reliability for customers, would be needed.⁶⁸ As noted above, the outcome of ROAM's modelling indicated that the current reliability standard of a maximum permissible USE of 0.002 per cent would be economically efficient if VCR was assumed to be \$30,000/MWh. To date, however, the value of reliability for all NEM customers has never been evaluated. Such an evaluation necessarily involves complex issues, such as variations in valuations across customers in different sectors and locations.⁶⁹

AEMO is currently conducting a National Value of Customer Reliability (VCR) Review, which is due to be completed in September 2014.⁷⁰ AEMO's review is intended to deliver regional-specific VCRs which can effectively be applied for use in revenue regulation, planning and operational purposes in the NEM. The availability of up-to-date national VCR values will provide a valuable input into the Panel's future review of the reliability standard. However, in order to accommodate this, consideration must be given to how to use those values to derive an estimate of VCR for use in determining the economically efficient reliability standard.⁷¹

Therefore, following completion of AEMO's review, the Panel considers that the AEMC or the Panel (as appropriate), in consultation with stakeholders and having regard to any VCR values delivered by AEMO as part of its national VCR review, develop a methodology to derive an appropriate estimate of VCR for use in determining the efficient reliability standard. This work should be carried out prior to the next reliability standard and reliability settings review, which is due to commence around 2017.

To facilitate VCR that more accurately represents the true value placed on reliability by customers, the Panel encourages market participants to participate in AEMO's national VCR review. See AEMO's website for details.

5.3.4 Panel's final recommendation

Consistent with its draft recommendation for this review, the Panel has decided to recommend that a methodology to derive an appropriate estimate of VCR be developed by the AEMC or the Panel (as appropriate) to help inform the identification of an economically efficient reliability standard. This review should be carried out in consultation with stakeholders and have regard to any VCR values delivered by

⁶⁸ The above approach is consistent with the AEMC's reason in its advice to SCER in December 2013, which recommended linking the reliability standard and reliability settings in the wholesale energy market with VCR. Specifically, the AEMC recommended that VCR, estimated for the customers most affected by a supply shortfall, be used as a cross-check on the reliability standard to assess how well the prevailing standard reflects the value customers place on reliability.

⁶⁹ For this reason, the current approach used in the NEM has been to measure reliability by the reliability standard. The challenge of maintaining reliability in the NEM has, therefore, been a question as to what level of MPC is sufficient to incentivise investment and operational behaviours necessary to deliver the expected reliability outcome.

⁷⁰ See Appendix C for further details of this review.

⁷¹ Overall, the objective is to establish an administratively determined VCR which best reflects the diverse preferences of the customers impacted by certain investment decisions.

AEMO as part of its national VCR review. The review should occur following the completion of AEMO's national VCR review, and ideally prior to the next reliability standard and reliability settings review.

6 Review of the reliability settings

This chapter considers whether the current levels of the MPC, CPT and MFP are appropriate to achieve the reliability standard to apply in the NEM from 1 July 2016. It also considers the manner in which the MPC and CPT are indexed, and whether this should extend to the MFP.

Recommendations

Market price cap (MPC)

- No change be made to the real value of the MPC. The MPC should continue to be indexed by the CPI, annually.

Cumulative price threshold (CPT)

- No change be made to the real value of the CPT. The CPT should continue to be indexed by the CPI, annually.
- The AEMC or the Panel (as appropriate) to review the current form of the CPT, prior to the next reliability standard and reliability settings review (which is due to commence around 2017).

Market floor price (MFP)

- No change be made to the current value of the MFP. The MFP should, therefore, continue to be set at -\$1,000/MWh.

Indexation

- No changes be made to the current measure of indexation of the MPC and CPT (that is, the values of MPC and CPT should continue to be adjusted by the CPI, annually). However, the Panel does recommend that a review of the current indexation measure occurs within two years.
- No change be made to the current approach of non-indexation of the MFP. The MFP should, therefore, continue to be set in nominal terms.

General

- The AEMC or the Panel (as appropriate) develop a methodology for undertaking future reliability standard and reliability settings reviews. This should include consideration of how the outcomes of any market modelling could be treated. This work should take place prior to the next reliability standard and reliability settings review, which is due to commence around 2017.

6.1 Market price cap

As discussed in chapter 2, the MPC was set at \$13,100/MWh for the 2013-14 financial year and increased to \$13,500/MWh for the current 2014-15 financial year.⁷² For this review, the real value of the MPC has been assessed to consider whether it remains appropriate to deliver the reliability standard to apply from 1 July 2016, until such time as it is amended.

In the draft report for this review, the Panel decided to recommend the following:

- The current real value of the MPC be maintained.
- A methodology for undertaking future reliability standard and settings reviews be developed. This should include consideration of how the outcomes of any market modelling should be treated. This review should take place prior to the next reliability standard and reliability settings review due to commence around 2017.

6.1.1 Stakeholder submissions on the issues paper

In submissions on the issues paper for this review, a number of stakeholders considered the current value of the MPC was suitable to deliver the reliability standard going forward.⁷³ Some of these stakeholders referred to the fact that the reliability standard had only been breached twice in the past ten years as a reason that no change was required to the existing reliability settings.

In contrast, a number of other stakeholders considered that there was a case for changing the current level of the MPC. Alinta Energy noted that, during the Panel's 2010 review of the reliability standard and reliability settings, Alinta Energy had supported an increase in the MPC to \$16,000/MWh, as recommended by ROAM at the time.⁷⁴ Alinta Energy also noted that its own analysis at the time had suggested the MPC be set in the range of \$14,000/MWh to \$20,000/MWh.⁷⁵ For this review, Alinta Energy reiterated its view that the MPC was too low to ensure the reliability standard would be met.⁷⁶

⁷² As indexed by the AEMC in accordance with clauses 3.9.4(c)-(e) and 3.14.1(d)-(f) of the NER.

⁷³ AGL, Submission on issues paper, pp. 1-2; GDF Suez Australian Energy, Submission on issues paper, p. 2; NGF, Submission on issues paper, pp. 3-4.

⁷⁴ Alinta Energy, Submission on issues paper, p. 2.

⁷⁵ Ibid.

⁷⁶ Ibid, pp. 2-3.

The MEU considered that, based on market evidence,⁷⁷ the current value of MPC was "probably too high" and that the previous setting of \$10,000/MWh was sufficient to ensure the reliability standard would be achieved.⁷⁸

6.1.2 Stakeholder submissions on ROAM's draft report

In submissions on ROAM's draft report, several stakeholders commented on the outcomes of ROAM's MPC analysis in relation to the adoption of different MPCs in each region.⁷⁹

The MEU considered that an outcome of ROAM's modelling was that the South Australian region (which has the lowest peak demand and the lowest energy consumption of all mainland NEM regions) requires a higher MPC to deliver the USE compared to the other NEM regions.⁸⁰ As a consequence, the MEU considered that the South Australian region should set the level of the MPC across the other NEM regions.⁸¹ It argued that maintaining the current reliability standard and MPC across the NEM would impose unnecessary costs on consumers in regions where the MPC could be lower and still achieve the reliability standard.⁸² It considered that weighting the MPC in proportion to demand or consumption in each region would produce the most equitable outcome in the instance that a single MPC is applied across the NEM.⁸³

On the other hand, Origin Energy supported maintaining the application of a single reliability standard and set of reliability settings across the NEM. It considered that the difficulties associated with applying multiple MPCs across the NEM would outweigh the economic benefit of doing so.⁸⁴ It considered that this is consistent with the Panel's view in 2007.

⁷⁷ The market evidence referred to by the MEU includes rising electricity prices and almost no USE experienced in the market for the past 13 years. See page 8 of MEU's submission on the draft report for further explanation.

⁷⁸ The MEU noted that under the current reliability settings: there has been no lack of investment in generation except for base load dispatchable generation; there has been considerable investment in peaking generation and renewable energy generation; and the reliability standard had been outperformed. On this basis, the MEU considered that the MPC was "probably too high" and that the previous setting of \$10,000/MWh was sufficient to meet the reliability standard. For further details, see: MEU, Submission on issues paper, pp. 3, 6.

⁷⁹ Regional MPCs relate to setting a different MPC in each NEM region to deliver a different price-reliability trade-off from the generation sector. This issue has been previously considered by the Panel, the AEMC and the Ministerial Council on Energy (MCE).

⁸⁰ MEU, Submission on ROAM's draft report, pp. 15-22.

⁸¹ Ibid.

⁸² Ibid.

⁸³ Ibid.

⁸⁴ Origin Energy, Submission on ROAM's draft report, p. 2.

6.1.3 Stakeholder submissions on the Panel's draft report

In submissions on the Panel's draft report, the majority of stakeholders supported the Panel's draft recommendation to maintain the current level of MPC (and its continued indexation).⁸⁵ While Snowy Hydro supported maintaining the current level of MPC, it did not support its continued indexation.⁸⁶

Both Alinta Energy and the MEU expressed concern in relation to the Panel's analysis of the MPC and its subsequent draft recommendation to maintain the current level.⁸⁷ However, their views differed with respect to the factors that should be considered in setting the MPC, and whether the level of the MPC should be raised or lowered.

For example, Alinta Energy considered there would be little value in capping the MPC where its sole objective was to signal scarcity in the market. It noted that while the MPC's role in managing risk was often cited as an additional objective, in its view, this role was overstated. On this basis, it considered that the rationale for using anything other than the extreme peaker approach to inform the level of the MPC was relatively weak. Consequently, Alinta Energy expressed support for an MPC set at a level greater than the existing MPC, and "much greater" than the level suggested by ROAM's cap defender model.

On the other hand, the MEU did not consider that the Panel had given sufficient weight to available market evidence when making its draft recommendation to leave the current level of the MPC unchanged.⁸⁸ In addition, the MEU considered that the decision to increase the MPC to \$12,500/MWh in 2010 was based on modelling which "has since been demonstrated to be flawed", as evidenced by the development of the new cap defender approach. It considered that if a more robust model had been used in 2010, then the Panel would likely not have recommended the increased value for the MPC. It, therefore, proposed that the future level of the MPC should be lowered to \$9,000/MWh, in line with the outcomes of the cap defender based modelling.

Some stakeholders suggested areas that could be considered in the Panel's recommended review of the methodology for undertaking future reliability standard and reliability settings reviews.⁸⁹ Both AEMO and GDF Suez considered the review would provide a good opportunity to explore further the relative merits of the cap defender and extreme peaker approaches to modelling. GDF Suez also suggested a

⁸⁵ AEMO, Submission on Panel's draft report, pp. 3-5; AGL Energy, Submission on Panel's draft report, p. 1; GDF Suez Australian Energy, Submission on Panel's draft report, p. 1; Grid Australia, Submission on Panel's draft report, p. 1; Origin Energy, Submission on Panel's draft report, p. 1.

⁸⁶ Snowy Hydro, Submission on Panel's draft report, pp. 1-4. See section 6.4.1 below for further discussion on indexation issues.

⁸⁷ Alinta Energy, Submission on Panel's draft report, pp. 2-4; MEU, Submission on Panel's draft report, pp. 3-21.

⁸⁸ Specifically, the MEU cited evidence which showed that an MPC of \$10,000/MWh had delivered the reliability implied by the reliability standard. MEU, Submission on Panel's draft report, pp. 3-21.

⁸⁹ AEMO, Submission on Panel's draft report, pp. 3-5; GDF Suez Australian Energy, Submission on Panel's draft report, pp.1-5.

number of risk factors which should be taken into account when assessing the level of the MPC required to provide the appropriate incentive for investors in the market to build generation when required

Alinta Energy and the MEU had expressed some concerns that a consequence of undertaking a future review of the methodology for the reliability standard and reliability setting reviews is that it provided scope for the Panel to defer further consideration of the MPC level.⁹⁰ They saw this as an indication that the Panel's current review was incomplete.

AEMO, Origin Energy and the MEU also expressed support for the application of a single MPC between regions in the NEM.⁹¹

6.1.4 ROAM's modelling

ROAM was asked to model the reliability settings to determine, among other things, the MPC required for the market to continue to deliver the reliability standard. ROAM applied two approaches in its modelling:⁹²

- The cap defender approach: as noted in section 4.5.2, this approach determines the MPC required for a new entrant OCGT bidding at \$300/MWh to operate profitably in a market that is expected to deliver the reliability standard.
- The extreme peaker approach: as noted in section 4.5.1, this approach assumes that a new entrant OCGT is bidding at the MPC. This approach was used in the Panel's 2010 review of the reliability standard and reliability settings.

ROAM's modelling under the extreme peaker approach suggested that a higher MPC - in the vicinity of \$23,000/MWh - would be required to deliver the current reliability standard.⁹³ In contrast, ROAM's modelling of MPC values under the cap defender approach indicated that a lower MPC - around \$9,000/MWh - may be sufficient to incentivise the market to deliver the current reliability standard.⁹⁴

The above values provide a range to guide consideration of the potential non-reliability impacts of changing the MPC on the market.⁹⁵

As part of the assessment of the MPC, ROAM's modelling explored the relationship between MPC and USE in each region.⁹⁶ ROAM observed that there are significant

⁹⁰ Alinta Energy, Submission on Panel's draft report, pp. 2-4; MEU, Submission on Panel's draft report, pp. 3-21.

⁹¹ AEMO, Submission on Panel's draft report, p. 6; MEU, Submission on Panel's draft report, p. 3; Origin Energy, Submission on Panel's draft report, p. 1.

⁹² See section 4.5 for further discussion on these two approaches.

⁹³ ROAM Consulting, *Reliability Standard and Settings Review*, Final Report to AEMC, 21 May 2014, Executive Summary, p. 3.

⁹⁴ Ibid.

⁹⁵ Ibid.

differences in MPC requirements between regions when the cap defender approach is applied.⁹⁷ In particular, South Australia would require a MPC which is significantly higher than other regions to allow a new entrant OCGT generator to operate profitably in a market which is expected to achieve the reliability standard.⁹⁸

6.1.5 Panel's analysis

Purpose of the market price cap

Having considered submissions on the issues paper and draft report, it is apparent that there are differing views among stakeholders as to the key objective of the MPC.⁹⁹ Understanding the role of the MPC is an essential first step in reviewing the MPC as it ultimately supports how, and at what level, the MPC should be set.

For the purposes of clarification, the Panel notes that the key objective of the MPC is to incentivise sufficient generation capacity and demand-side response to deliver the reliability standard. In accordance with the NER, one of the Panel's key objectives for this review is to recommend an MPC which it considers will allow the reliability standard to be satisfied without use of AEMO's powers to intervene.

However, the MPC has a number of other important objectives, which include:

- in conjunction with the CPT, limiting the financial burden that can fall on market participants during periods of high wholesale spots prices;
- limiting the financial risk to retailers resulting from the inability to adjust prices to customers in real time, in line with movements in the wholesale spot price; and
- in conjunction with the MFP, limiting price volatility in the wholesale spot market and, by implication, the financial contract market.¹⁰⁰

The challenge for the Panel is therefore to recommend a value which balances the incentives for sufficient generation capacity (particularly in peaking plant) and demand-side response, with a manageable level of risk to market participants (in particular, retailers or customers participating in the market themselves) resulting from extreme price events.

The Panel notes that Alinta Energy's views in relation to the level of the MPC are based on the premise that the sole objective of the price cap is to signal scarcity in the market.

⁹⁶ Ibid, pp. 30-32.

⁹⁷ Ibid, p. 33.

⁹⁸ Ibid.

⁹⁹ For example: Alinta Energy, Submission on Panel's draft report, pp. 2-4; MEU, Submission on Panel's draft report, pp. 3-21.

¹⁰⁰ While the MPC effectively caps half-hourly risk in the wholesale spot market; the cumulative effect of high spot prices is capped by the CPT.

It is neither the role of this review to consider changes to the objectives of the MPC or any of the other reliability settings.¹⁰¹

For further clarification, Appendix B provides an overview of the history of the reliability standard and reliability settings, including the reasons why each was included in the NEM design.

Appropriate level of the market price cap

In the draft report for this review, the Panel decided to recommend that no change be made to the current real value of the MPC. To arrive at its recommendation, the Panel considered a number of factors of which the outcomes of ROAM's modelling was one. Below is a detailed discussion of the factors that were considered in this review.

Modelling

The outcomes of ROAM's modelling, under both the cap defender and extreme peaker approaches, have been considered. This has included consideration of the inherent limitations associated with each of the models.

In summary, while the results of the cap defender based modelling suggested that a lower MPC may be sufficient to continue to deliver the reliability standard, the results of the extreme peaker based modelling suggested that the current MPC may not be high enough to continue to deliver the reliability standard.

In relation to the extreme peaker based modelling which has now been used as an input into several of the Panel's reliability standard and settings reviews, there appears to be an emerging consensus that this approach produces an MPC value that is arguably higher than that which is needed for the NEM to deliver the reliability standard.

The primary reason for this is generally acknowledged to be that the extreme peaker approach relies on income when the spot price is at the MPC, and does not take into account the income that could be received at market prices between its marginal operating cost and the MPC. The recommendation made by the Panel in the last review to set the MPC lower than the value determined by the extreme peaker approach (\$23,000/MWh) is consistent with this observation.

As outlined in section 4.5.2, the cap defender approach was developed by ROAM to address these concerns. That is, by including commercial considerations which drive new entrant investment, the cap defender approach was expected to provide a more realistic view of the market compared to the extreme peaker approach.

¹⁰¹ Clause 3.9.3A(d)(1) of the NER.

Assumptions about market structure, as well as the extent of, and conditions for, DSP can have a significant effect on whether ROAM's modelling derives a conservative or optimistic estimation of MPC. For example:

- Market structure: The cap defender approach assumes the level of concentration of market power that occurs in the NEM. The greater the level of market concentration, the more prices are likely to exceed \$300/MWh, leading to an increase in the pool price revenue and an increased supply of generation. This means that a lower MPC would be required, compared to a situation of greater competition.
- Bid prices for DSP: If DSP is modelled as being bid at a high price, when the DSP is dispatched, the spot prices will be high and the cap defending generator would earn a high revenue. However, if DSP is modelled as being bid at a low price nearer to \$300/MWh, then the cap defending generator would not earn a high revenue when the DSP is setting the spot price.

In addition, the cap defender approach relies on an assumed bidding engine which determines the order of generation offers for dispatch. Assumptions about generation portfolio and individual generator behaviour will influence modelling outcomes. It is uncertain, at this stage, whether the assumed bidding engine produces results which are higher or lower than what is needed.

It needs to be recognised that neither modelling approaches are ideal, and modelling can only be used to inform subsequent judgements. For the reasons stated above, the Panel considers that the extreme peaker approach provides an MPC outcome which is arguably higher than what is needed for the NEM to deliver the reliability standard. Whilst the cap defender approach is designed to be more realistic than the extreme peaker and therefore less theoretical in construct, it is difficult at this stage to consider just how optimistic the former is. Until the Panel, as well as and stakeholders, have a better understanding of the cap defender approach, including the implications on the results from the assumptions and sensitivities applied, the Panel considers that it would be premature to consider reducing the value of the MPC to that determined by that modelling approach. Equally, it would be inappropriate to consider increasing the current level of the MPC to that suggested by the extreme peaker modelling. This is in light of the Panel's previous concerns regarding the extreme peaker approach.

Therefore, at this stage, the Panel considers there is value in drawing on the results of ROAM's two modelling approaches (the extreme peaker and cap defender approaches) to help guide the discussion with respect to an appropriate value of MPC. On this basis, the appropriate level of the MPC to apply from 1 July 2016 is unlikely to be as low as the outcome of the cap defender approach (that is, \$9,000/MWh), and not as high as the outcome of the extreme peaker approach (that is, \$23,000/MWh). The Panel notes that the current value of the MPC (\$13,500/MWh for the 2014-15 financial year) sits within this range.

The Panel notes that the majority of submissions to the draft report acknowledged that both approaches to the modelling had limitations. They considered that there would be

benefit in carrying out further work in this area ahead of the Panel's next reliability standard and reliability settings review.¹⁰²

However, as noted in section 6.1.3, Alinta Energy and the MEU strongly supported the extreme peaker approach and cap defender approach, respectively.¹⁰³

As noted in chapter 3, ROAM's modelling outcomes are one of a number of factors that the Panel has considered in recommending the appropriate level of the MPC required to deliver the reliability standard. In summary, at this stage, the Panel does not consider that outcomes of the modelling provide a clear case for either increasing, or decreasing, the current real value of the MPC.

However, in recognition of the concerns raised by stakeholders in relation to the two modelling approaches, the Panel considers there is merit in it, or the AEMC (as appropriate), exploring further the modelling and its use in future reliability standard and reliability settings reviews. This is discussed further below.

Other factors considered

In order to gain a better understanding of the potential costs and risks associated with making a change to the current level of the MPC, some of the broader impacts associated with making such a change have been considered. Additional factors, some of which are set out below, have helped to inform the Panel's recommendation on the level of the MPC to apply from 1 July 2016.

The Panel notes that consideration of other relevant factors (that is, in addition to modelling) is not a new approach for the Panel when assessing the level of the MPC. Extensive work has been carried out in past Panel and AEMC reviews examining the broader impacts on market pricing outcomes and participant behaviour from alternative levels of the MPC.¹⁰⁴ For example, in the Panel's previous reliability standard and reliability settings review in 2010, modelling by ROAM indicated that an MPC of at least \$16,000/MWh would be required to deliver the reliability standard going forward. However, the Panel decided not to recommend that the MPC be increased to this level. In making its recommendation, the Panel not only considered that there were limitations in the modelling, but also that risk-related factors (such as price volatility, contract liquidity and prudential risks) would likely be impacted by an increase in the level of the MPC to \$16,000/MWh. Consequently, the Panel considered that a smaller increase in the level of the MPC from \$10,000/MWh to \$12,500/MWh

102 For instance: AEMO, Submission on Panel's draft report, pp. 3-5.

103 For instance: Alinta Energy, Submission on Panel's draft report, pp. 2-4; MEU, Submission on Panel's draft report, pp. 3-21.

104 For example, the AEMC's 2010 Extreme Weather Events Review and the Panel's 2010 Review of the Reliability Standard and Reliability Settings considered in detail the non-reliability impacts of increasing the level of the MPC. Other important reviews are set out in Appendix C.

would likely provide an efficient balance between the cost and the value of reliability of electricity supply at the wholesale level.¹⁰⁵

In its report to the Panel for this review, ROAM provided some high level qualitative analysis considering the non-reliability impacts of changing the MPC.¹⁰⁶ A number of observations related to market pricing outcomes and market participant behaviour are summarised below:

- *Market impact for consumers:* In theory, reducing the level of MPC may reduce the ability of generators to earn revenue in the spot market, leading to lower prices for consumers in the short term. However, over the longer term, a lower MPC could dampen investment signals, leading to a shortage of generation capacity. In this event, a lower MPC could result in increased prices to consumers over the longer term.
- *Impact on contract markets:* The level of MPC affects investors' future expectations of pool price outcomes. An increase in MPC, which is likely to increase expectations of future pool price outcomes, will likely lead to an increase in electricity contract prices. A change in MPC will also influence the level of volatility in the NEM. This may affect decisions made by market participants given their level of risk aversion, and therefore contract market liquidity. A lower MPC would reduce the incentive for market customers to purchase cap contracts which, in turn, would reduce contract premiums. Contract discounts could have impacts on reliability and, consequently, on risks of a lower MPC.¹⁰⁷
- *Prudential requirements:* Qualitatively, a change in the reliability settings will, at some stage in the future, change the prudential requirement and credit limit for both generators and customers operating in the NEM. All else being equal, an increase in the MPC will increase prudential requirements, and vice versa.
- *Impact on DSP:* A reduction in MPC may reduce the incentive for participants to engage in demand-side management activities. However, a reduction in DSP can result in a need to increase the MPC to deliver the reliability standard. Therefore, the level of MPC and the quantity of DSP which is provided to the market are closely related.

At this point, the Panel acknowledges the MEU's concern that applying a higher MPC than is necessary to deliver the reliability standard may result in customers paying

¹⁰⁵ See Appendix B for an overview of the ACCC's decision not to increase the MPC (called value of lost load (VoLL) at the time) to \$20,000/MWh as recommended by NECA, in December 2000. Instead, the ACCC decided VoLL should be set at \$10,000/MWh. The ACCC argued (among other things) that an increase in VoLL to \$20,000/MWh would be in excess of that needed to lead to a sufficient increase in investment to address system reliability issues, and that the likely public benefits were not likely to be greater than the anti-competitive detriments of increasing the level of VoLL.

¹⁰⁶ ROAM Consulting, Reliability Standard and Settings Review, Final Report to AEMC, 21 May 2014, pp. 69-83.

¹⁰⁷ That said, ROAM recognised that significant contract discounts would presumably attract investment speculators, and, therefore, there should be a natural lower limit on contract values.

more for their electricity than is necessary.¹⁰⁸ However, as stated above, reducing the level of the MPC may not necessarily lead to lower prices for consumers in the longer term. Although somewhat counterintuitive, and depending on available generation and/or supply capability, reducing the level of the MPC may lead to higher average prices for consumers. This could occur where prices in the wholesale spot market tend towards the MPC more often.

In considering the level of the MPC to apply from 1 July 2016, the Panel has also had regard to the impact of any change on investor certainty. Investor decisions in the NEM are based on expectations of future prices, as opposed to the current level of prices. Therefore, in order for the NEM's reliability framework to operate as intended (that is, to incentivise sufficient generation capacity and demand-side response to deliver the reliability standard), it must be stable and predictable.¹⁰⁹

In the current environment of declining demand and excess generation capacity, maintaining stability and predictability of the reliability framework remains important. Greater certainty and stability in the reliability settings will allow investors to make more informed, and hence more efficient, investment decisions in relation to the delivery of generation and demand-side capacity. In turn, this will promote the continued delivery of the reliability standard.

Given the importance of maintaining the stability and predictability of the NEM's reliability framework, any changes proposed to the reliability settings - in this case, the MPC - would need to be supported by evidence that change is warranted. This includes evidence that the potential benefits of an increase, or decrease, in the level of the MPC are likely to be outweighed by the additional risks and costs that may be introduced by the change.

In this case, the Panel does not consider that a sufficient case has been presented by stakeholders to suggest that a change to the level of the MPC is required.

Future review of methodology for reviewing the market price cap

In the draft report, the Panel recommended that a separate piece of work be undertaken to develop a methodology for future reliability standard and settings reviews. While most stakeholders expressed support for this recommendation,¹¹⁰ Alinta Energy and the MEU had concerns about what this implied for the Panel's current review of the MPC.¹¹¹

¹⁰⁸ MEU, Submission on Panel's draft report, pp. 3-21.

¹⁰⁹ Given that there are many factors outside of the NEM's reliability framework which affect prices (government environmental policies, for example), providing certainty in relation to the framework will allow investors to better form their own view of how external factors would likely influence future prices in the NEM.

¹¹⁰ For instance: AEMO, Submission on Panel's draft report, pp. 3-5; GDF Suez Australian Energy, Submission on Panel's draft report, pp.1-5.

¹¹¹ Alinta Energy, Submission on Panel's draft report, pp. 2-4; MEU, Submission on Panel's draft report, pp. 3-21.

In both past and present reviews of the reliability settings, two common areas of debate among stakeholders have related to the appropriateness of the modelling approach used, and the other factors taken into consideration, when recommending an appropriate level of the MPC. In this review, an area of debate has been whether the extreme peaker approach or the cap defender approach should have been used.

Having considered the views of stakeholders, the Panel considers that, at this stage, it is too early to form a view on whether it is appropriate to rely on one model over another, or even both. This is because, given use of the cap defender approach is relatively new (compared to the extreme peaker approach), it has not had the benefit of detailed consideration by stakeholders and the Panel. This means that the extent of the impacts and interrelationship between the variables from using this approach are not yet well understood. Until such time as the Panel is confident that the approach taken to the modelling will produce clear and unambiguous results, it is reluctant to rely on one model over the other.

As noted earlier, modelling is one of a number of factors that the Panel uses in recommending the level of the MPC. From the perspective of effective stakeholder engagement with the Panel, this supports a need to develop a transparent methodology for recommending the MPC.

The Panel considers that it would be beneficial for stakeholders to be provided with an opportunity to engage on the development of the appropriate methodology for recommending the MPC, prior to the next reliability standard and reliability settings review (due to commence in 2017).

The Panel considers the benefits of such a review include:

- increasing transparency and providing clarity to market participants around the Panel's decision-making framework;
- separating most of the procedural discussions on the methodology for calculating the MPC from the substantive economic considerations for recommending the level of the MPC;
- clarifying and settling on the methodology for recommending the MPC, which, in turn, may be reflected in the Terms of Reference for future reliability standard and reliability settings reviews; and
- narrowing and focusing the scope of future reliability standard and reliability settings reviews, and thereby, potentially reducing the time required to undertake such reviews.

Regional market price caps

Modelling

The rules require that the Panel has an obligation to review, among other things, a single MPC which is applicable across the NEM. The consideration of different MPCs

in each region is beyond the scope of this review. However, having had regard to the issues raised by stakeholders in their submissions, the Panel has a number of comments on this matter.

While the outcomes of ROAM's modelling provide a useful starting point for discussion around the appropriate value of the MPC, the results should not be construed as evidence that change to the MPC is required. As noted above, the outcomes of ROAM's modelling (in particular, the outcomes of its cap defender approach) are extremely sensitive to the input assumptions made, and the sensitivities applied.

In respect of this matter, ROAM notes in its report that consideration of different MPCs in each region was beyond the scope of its review. Its modelling, therefore, did not include consideration of issues, such as, the physical and pricing constraints between regions. These issues, had they been incorporated into the modelling, would have resulted in different values being produced, and potentially different conclusions being drawn.¹¹² For this reason, ROAM's modelling does not provide evidence that different MPCs for different regions lead to "equitable" prices.

Other factors considered

In addition to the Panel's analysis of ROAM's modelling in relation to regional MPCs, the Panel notes that, in 2010, the AEMC considered the high level implications of allowing the level of the MPC to vary across regions in its Extreme Weather Events Review.¹¹³ In that review, the AEMC recommended that an arrangement allowing the MPC to vary between regions should not be pursued further. It considered that introducing new regional specific arrangements into the NEM's inter-connected market would most likely be detrimental to overall NEM efficiency and would be unlikely to contribute to the achievement of the NEO. It also noted that such an arrangement would present a number of challenging implementation issues, including the need to re-apportion load-shedding between regions.

Given that this previous work identified some problematic implementation issues and negative impacts on NEM efficiency, and given the lack of response to the concept of

¹¹² For example, under ROAM's modelling, in Figure 5.2 of its final report, a simple interpretation is that Victoria requires a much lower MPC compared to South Australia, and South Australia appears to be setting a higher level of MPC across the different regions. Based on this argument, it would suggest that Victorian customers are paying inequitably higher prices as a result of a higher than required MPC. However, this is based on ROAM's modelling of only physical constraints. If both the physical and pricing constraints were considered between the different regions, Victoria would likely require a higher MPC, although how much higher is unknown. Otherwise, if Victoria was subjected to a lower MPC, without consideration of these constraints, it could experience a lower level of reliability that may not be consistent with the reliability standard.

¹¹³ AEMC, *Review of the Effectiveness of NEM Security and Reliability Arrangements in light of Extreme Weather Events*, Final report, 31 May 2010.

regional MPCs in submissions¹¹⁴, the Panel does not recommend that an arrangement enabling different MPCs in each region be pursued at this stage.

That said, the Panel does not preclude future work being carried out to assess the efficiency implications of allowing a different MPC in some or all regions. Such analysis would require a detailed specification of implementation assumptions and modelling to identify the more complex interactions and outcomes that would be involved and to understand the implications on achieving the NEO.

6.1.6 Panel's final recommendation

The Panel's final recommendation has not changed from its draft recommendation.

The Panel's decision is to recommend that no change be made to the real value of the MPC to apply from 1 July 2016.

The Panel has also decided to recommend that, ahead of the next reliability standard and reliability settings review, which is due to commence around 2017, the AEMC or the Panel (as appropriate) develop a methodology for undertaking future reliability standard and reliability settings reviews. This should include consideration of factors that should be taken into account for recommending the MPC, including how the outcomes of any market modelling could be treated. For example, an assessment of the cap defender and extreme peaker approaches to modelling, as well as possible alternative approaches, could be carried out in an effort to establish a modelling approach (including sensitivities and assumptions) that is understood by all stakeholders. That said, it is important to note that the outcomes of this review would inform, but not constrain, the Panel in making its decision on which modelling approach to take in the future.

6.2 Cumulative price threshold

As discussed in chapter 2, the CPT is set at a value that is equivalent to 15 times the MPC – that is, at \$197,100 for the 2013-14 financial year, and increased to \$201,900 for the 2014-15 financial year.¹¹⁵

For this review, the real value of the CPT has been assessed to consider whether it remains appropriate to apply from 1 July 2016, until such time as it is amended, to alleviate the risk of market participants being exposed to prolonged periods at extreme prices before the APC is applied.

In the draft report for this review, the Panel decided to recommend that:

- the current level of the CPT be maintained; and

¹¹⁴ In its submission to ROAM's draft report, the MEU did suggest that, where a single MPC is applied across NEM regions, the MPC should be weighted in proportion to demand or consumption in each region. See MEU, Submission on ROAM's draft report, pp. 15-22.

¹¹⁵ As indexed by the AEMC in accordance with clauses 3.14.1(d)-(f) of the NER.

- the form of the CPT mechanism be reviewed before the next reliability standard and reliability settings review.

6.2.1 Stakeholder submissions on the issues paper

In submissions on the issues paper for this review, AGL and GDF Suez considered the current value of the CPT is suitable to limit financial risk for market participants.¹¹⁶

In contrast, the MEU considered that the current level of the CPT is "probably too high and imposes costs on consumers that are not warranted".¹¹⁷ The Australian Energy Regulator (AER) noted that the CPT had been breached a number of times since it was considered in detail, and that these events should be reviewed to consider whether the CPT remains effective as a risk management mechanism.¹¹⁸ St Kitts Associates also noted that the issues paper did not provide any analysis of the number of times the current CPT had been breached and the nature of those circumstances.¹¹⁹

Several stakeholders commented on the level of the CPT as a multiple of the MPC. GDF Suez considered that the current level of CPT at 15 times the MPC provided the correct balance between protecting market participants from extended high price periods, and providing a sufficient signal to sustain the energy only market.¹²⁰

On the other hand, Alinta Energy questioned whether the link between the CPT and MPC should continue. It argued that these two reliability settings should first be reviewed separately, and then their overall impact considered, given they influence the market differently.¹²¹ The MEU considered that the Panel should identify a more theoretically sensible basis for setting the value of the CPT, which should be based on the risks faced by market participants rather than based on an arbitrary multiple of the MPC.¹²²

Alinta Energy also noted that the CPT should remain the primary mechanism for dealing with low probability, high impact events that jeopardise a participant's cash flow.¹²³ It considered that, if the current level of the CPT did not provide sufficient time for the market to respond to successive price periods at or near the MPC, then market intervention is required to maintain the viability of market participants.¹²⁴

¹¹⁶ AGL, Submission on issues paper, p. 2; GDF Suez Australian Energy, Submission on issues paper, p. 2.

¹¹⁷ MEU, Submission on issues paper, p. 6

¹¹⁸ Other reasons that the AER argued for reviewing the CPT were: the period since the CPT has been considered in detail; the CPT should be reviewed to consider whether it is still appropriate; and whether there are other alternative designs to the CPT. For further details, see: AER, Submission on issues paper, pp. 1-3

¹¹⁹ St Kitts Associates, Submission on issues paper, p. 5.

¹²⁰ GDF Suez Australian Energy, Submission on issues paper, p. 2.

¹²¹ Alinta Energy, Submission on issues paper, pp. 2-3, 5.

¹²² MEU, Submission on issues paper, pp. 6-7.

¹²³ Alinta Energy, Submission on issues paper, p. 3.

¹²⁴ Ibid.

Nevertheless, it suggested that the issue, as to the appropriate level of the CPT, should take into consideration its effect on merchant investor behaviour, impact on price signals, and the level of risk that the market can accept.¹²⁵

St Kitts Associates considered it was important for the Panel to communicate analysis of the trade-off between incentivising investment and introducing additional price risk.¹²⁶

6.2.2 Stakeholder submissions on the Panel's draft report

In submissions on the Panel's draft report, stakeholders were generally supportive of maintaining the current level of CPT (and its continued indexation).¹²⁷ However, the MEU considered that, if a recommendation was made to reduce the level of the MPC (as suggested by the results of the cap defender modelling), then the CPT level should also be reduced and indexation removed.¹²⁸

Submissions were also generally supportive of a separate future review of the form of the CPT.¹²⁹ Alinta Energy suggested that such a review could cover broader areas of risk, and include separating its association with the MPC.¹³⁰

AEMO also proposed that the APC be included within the scope of any future CPT review and, more broadly, as part of the next reliability settings review.¹³¹ It considered that the APC closely interacts with the reliability settings.

6.2.3 ROAM's modelling

The value of the CPT has a material impact on the MPC required to achieve the reliability standard. As noted above, the CPT is currently set to a value equivalent to 15 times the value of MPC. ROAM analysed the impact of changes to this multiplier, using its cap defender approach. Two alternative CPT multipliers (12 and 18 times the MPC) were applied to explore the MPC required for the new entrant OCGT generator to profitably operate.

ROAM found that as the CPT increases, the number of administered price periods decreases, leading to fewer APC-adjusted periods. As a result, the pool revenue of the new entrant OCGT generator increases and the MPC required for a new entrant OCGT

¹²⁵ Ibid, pp. 3-5.

¹²⁶ St Kitts Associates, Submission on issues paper, p. 4.

¹²⁷ AEMO, Submission on Panel's draft report, p. 7; AGL Energy, Submission on Panel's draft report, p. 1; GDF Suez Australian Energy, Submission on Panel's draft report, p. 1; Grid Australia, Submission on Panel's draft report, p. 1; Origin Energy, Submission on Panel's draft report, p. 1.

¹²⁸ MEU, Submission on Panel's draft report, p. 4. See section 6.4.1 below for further discussion on indexation issues.

¹²⁹ AEMO, Submission on Panel's draft report, pp. 7-8; Alinta Energy, Submission on Panel's draft report, pp. 4-5; MEU, Submission on Panel's draft report, p. 21.

¹³⁰ Alinta Energy, Submission on Panel's draft report, pp. 4-5.

¹³¹ AEMO, Submission on Panel's draft report, pp. 7-8.

generator to operate profitably decreases. Averaged over regions and study years, ROAM found:¹³²

- a 20 per cent decrease in CPT multiplier, from 15 to 12, leads to a 19 per cent increase in the required MPC; and
- a 20 per cent increase in CPT multiplier, from 15 to 18, leads to a 13 per cent decrease in the required MPC.

6.2.4 Panel's analysis

Modelling

ROAM's modelling highlights a clear relationship between the CPT and MPC. However, as discussed in the previous section in relation to the MPC, the specific outcomes are highly sensitive to the input assumptions used. At this stage, the results of ROAM's modelling do not provide sufficient evidence to support a case for either an increase, or decrease, to the value of the CPT.

In addition, the appropriate level of the CPT needs to be considered in the context of the acceptable level of risk for market participants. As noted by ROAM, one element of this is prudential requirements. This is discussed in the next section.

Other factors considered

As explained in chapter 2, the CPT is an explicit risk management mechanism designed to limit participants' financial exposure to the wholesale spot market during prolonged periods of high prices. It is also designed not to hinder incentives for sufficient generation capacity and demand-side response to deliver the reliability standard, in that the CPT is set at a level that is unlikely to be triggered except in very extreme circumstances.

In considering the appropriate level of the CPT to apply from 1 July 2016, the above objectives have been considered. In particular, if the level of the CPT is set too high, market participants and consumers may not be adequately protected from prolonged periods of extreme prices. Similarly, if the level of the CPT is too low, there is a risk that the signals provided by the MPC may be dampened, potentially leading to an increase in the number incidences where the USE would be exceeded.

To date, the CPT threshold has only been exceeded, and therefore an administered price period triggered, in a limited number of circumstances. As envisaged by its design, these circumstances have been rare, suggesting they occur at extreme cases.

Given that the CPT appears to be working as intended, and given the lack of sufficient evidence provided by ROAM's modelling and in stakeholders' submissions to suggest

¹³² ROAM Consulting, *Reliability Standard and Settings Review*, Final Report to AEMC, 21 May 2014, pp. 45-46.

that an increase, or decrease, in the current level of the CPT is required from 1 July 2016, at this stage, the Panel considers that the level of the CPT (relative to the MPC) should remain unchanged.

The Panel acknowledges the views of stakeholders who questioned whether the current form of the CPT, including the multiplier, remains appropriate. The Panel also recognises that the design of the CPT mechanism has not been the subject of a comprehensive review for some time.¹³³ However, in the context of this current review, the Panel's consideration of the CPT is limited to the level of the threshold.

With that said, the Panel considers there may be benefit in the AEMC or the Panel (as appropriate) undertaking a review of the current form of the CPT, prior to the next reliability standard and reliability settings review (which is due to commence in 2017). This work could coincide with the Panel's other recommended review of VCR having regard to the MPC and reliability standard. For example, this work could include a review of the units of measurement of the CPT, and take into consideration AEMO's recent review of a CPT for the Declared Wholesale Gas Market.¹³⁴

In this respect, the Panel acknowledges support from stakeholders for a separate review of the CPT. However, the Panel would like to clarify that it considers both the MPC and CPT have a role in capping risk in the wholesale spot market. While the MPC effectively caps half-hourly risk, the cumulative risk of high spot prices is capped by the CPT.¹³⁵ Therefore, any review of the respective roles of the CPT and MPC would be beyond the scope of the future review of the CPT. The review should be limited to considering the form of the CPT.

With respect of AEMO's suggestion to include consideration of the APC in a separate CPT review and, more generally in the reliability settings review,¹³⁶ the Panel notes that, under the NER, the AEMC is responsible for developing, authorising, publishing and varying (from time to time) an APC for each region. Consideration of the level of

¹³³ In 2002, the NECA conducted a review of capacity mechanisms in parallel to the NECA Reliability Panel's review of the VoLL, including an increase of VoLL to \$20,000/MWh and accompanied by the introduction of the CPT to be set at \$300,000. Subsequent to this, the ACCC did not allow for this and substituted a value of \$10,000/MWh for VoLL and \$150,000 for the CPT. The ACCC considered that the CPT would have some effect in capping risk if the CPT was set to \$150,000 where up to 2000MW of baseload capacity was constrained off for an extended period of time, which it considered would reduce the risk of market participants being exposed to prolonged periods at extreme prices before the administered price cap is applied. In the AEMC Reliability Panel's 2007 Comprehensive Reliability Review, the Panel reviewed VoLL and the CPT and recommended they be increased to \$12,500/MWh and \$187,500, respectively. These values were considered and approved by the AEMC in a NER rule determination in 2009, and has remained as the base values for MPC and CPT since 1 July 2010.

¹³⁴ AEMO, Declared Wholesale Gas Market Cumulative Price Threshold Review, Final report, 16 September 2013.

¹³⁵ This is consistent with the ACCC's view when the CPT was introduced. Although the ACCC considered that this level of the CPT would alleviate some of the concerns as to risk associated with sustained moderate increases in prices increasing average pool prices, the MPC (or Value of Lost Load) of \$10,000/MWh (at that time) would still serve as the defacto price cap in instances of short periods of extreme prices.

¹³⁶ AEMO, Submission on Panel's draft report, pp. 7-8.

the APC, including possible indexation, as well as arrangements around its governance, is therefore beyond the scope of this review. However, the Panel welcomes AEMO's suggestions, and notes that these may be better addressed as part of a rule change request or separate review.

6.2.5 Panel's final recommendation

The Panel's final recommendation has not changed from its draft recommendation.

The Panel has decided to recommend no change be made to the real value of the CPT to apply from 1 July 2016. The CPT should continue to be indexed by CPI annually.

There may be benefit in the AEMC or the Panel (as appropriate) to carry out a review of the current form of the CPT, prior to the next reliability standard and reliability settings review (which is due to commence in 2017).

6.3 Market floor price

As discussed in chapter 2, the MFP is currently set at -\$1000/MWh under the NER. For this review, the current MFP value has been assessed to consider whether it remains appropriate to apply from 1 July 2016, until such time as it is amended.

In the draft report for this review, the Panel decided to recommend that the current level of the MFP be maintained.

6.3.1 Stakeholder submissions on the issues paper

Level of the market floor price

In submissions on the issues paper, AGL and Stanwell considered the current level of the MFP is appropriate.¹³⁷ For instance, AGL considered that the current MFP sufficiently incentivises generation offload of electricity supply.¹³⁸

Alinta Energy suggested that the MFP be set at a level that exceeds the price of a renewable energy certificate (REC). It considered that a value, such as -\$100, may be correct.¹³⁹

¹³⁷ AGL, Submission on issues paper, p. 2; Stanwell Corporation, Submission on issues paper, p. 1.

¹³⁸ AGL, Submission on issues paper, p. 2.

¹³⁹ In its submission, Alinta noted that wind generators that are subsidised via RECs were able to generate and earn revenue regardless of the spot price, given their short run marginal costs (SRMC) were close to zero. In contrast, non-renewable generators who needed to continue to generate at high levels of minimum generation, were unable to recover their costs as a result of excess wind generators suppressing the price outcomes. See: Alinta Energy, Submission on issues paper, pp. 14-15.

GDF Suez noted that the price signal provided by the MFP should be sufficiently strong to drive down surplus generation, but not so strong as to result in driving off conventional generation that may be required to support intermittent generation.¹⁴⁰

St Kitts Associates considered that the issues paper did not explain the role of the MFP in satisfying the NEO, and queried whether a negative MFP is appropriate, or whether a MFP is required at all.¹⁴¹ Alinta Energy also noted that the purpose of the MFP needs to be clarified, including how it assists the market in meeting the supply and demand balance in the interest of consumers.¹⁴²

Other considerations

In relation to the impact of increasing intermittent generation on negative pricing outcomes, the MEU suggested that the Panel look at the broader risks to the market. This is because higher volumes of intermittent generation have resulted in a reduction in the availability of dispatchable generation capacity, increasing the risk of low reserve levels.¹⁴³ The MEU did not consider that increasing the MFP would address this problem.¹⁴⁴

EnergyAustralia considered that the Renewable Energy Target (RET) had driven the increased penetration of renewable generators that are subsidised to generate at negative prices rather than for any technical constraint.¹⁴⁵ It submitted that the Panel should consider the MFP in this context, and also consider whether generation and market interconnectors should only be able to bid negatively where there are demonstrable technical constraints.¹⁴⁶

Macquarie Generation noted that where conventional thermal generators have been taken out of service due to the RET, AEMO's direction powers (as noted in chapter 2) may no longer provide a reliable safety net mechanism.¹⁴⁷

While not directly related to reliability, Alinta Energy noted that system security is an issue in terms of availability of generation.¹⁴⁸ That is, there is an impact on the ability of those generators to provide system restart ancillary services.¹⁴⁹

140 GDF Suez Australian Energy, Submission on issues paper, p. 2.

141 St Kitts Associates, Submission on issues paper, p. 5.

142 Alinta Energy, Submission on issues paper, p. 12.

143 MEU, Submission on issues paper, p. 9.

144 Ibid.

145 EnergyAustralia, Submission on issues paper, p. 3.

146 Ibid.

147 Macquarie Generation, Submission on issues paper, pp. 5-6.

148 Alinta Energy, Submission on issues paper, p. 16.

149 Ibid.

6.3.2 Stakeholder submissions on the Panel's draft report

In submissions on the Panel's draft report, stakeholders were generally supportive of maintaining the current level of the MFP (and its non-indexation).¹⁵⁰

Snowy Hydro considered that the MFP provided an important investment signal to new technologies, such as battery storage, which presented alternatives to excess generation from thermal generators.¹⁵¹

AEMO and GDF Suez considered that the AEMC's Optional Firm Access (OFA) review would better deal with issues associated with strategic MFP bidding,¹⁵² and that renewable energy policies should stabilise ahead of the next reliability standard and settings review.¹⁵³ However, Alinta Energy considered that the strategic bidding issue, and the issue of renewable generation benefiting at times of thermal generation offload, remained unresolved.¹⁵⁴

6.3.3 ROAM's modelling

ROAM was asked to explore issues related to the MFP, including to determine the MFP required to incentivise economically efficient behaviour at times of very low demand and excess generation.

ROAM's modelling of the MFP indicated that short-term cycling of coal-fired generation units is not necessary in the near future.¹⁵⁵ Therefore, ROAM considered that there is no economic imperative for a significantly negative MFP, and suggested that a MFP of -\$50/MWh may be sufficient to allow an efficient operation of the market.¹⁵⁶

¹⁵⁰ AEMO, Submission on Panel's draft report, p. 9; AGL Energy, Submission on Panel's draft report, p. 1; Grid Australia, Submission on Panel's draft report, p. 1; MEU, Submission on Panel's draft report, pp. 3-4.

¹⁵¹ Snowy Hydro, Submission on Panel's draft report, p. 1.

¹⁵² This is where generators may have an incentive to adjust their offers into the market in order to maximise the amount of output they are dispatched for. Generally, this means that generators will make offers at levels lower than their costs. This can ultimately see all generators behind a constraint making offers at the MFP. The problem of this is that it can result in volatile spot market outcomes and inefficient dispatch. For further information, see: AEMC, *Transmission Frameworks Review*, Final report, 11 April 2013.

¹⁵³ AEMO, Submission on Panel's draft report, p. 9; GDF Suez Australian Energy, Submission on Panel's draft report, pp. 1, 5.

¹⁵⁴ Alinta Energy, Submission on Panel's draft report, pp. 5-6.

¹⁵⁵ ROAM Consulting, *Reliability Standard and Settings Review*, Final Report to AEMC, 21 May 2014, pp. 66-67.

¹⁵⁶ Ibid.

However, ROAM noted that its analysis was based on an assumed set of cycling costs, which are difficult to estimate given the potential impacts of cycling on unit wear-and-tear and outages.¹⁵⁷

6.3.4 Panel's analysis

Modelling

In reviewing the MFP, the outcomes of ROAM's modelling have been considered to assess the maximum MFP required for market efficiency.

ROAM's modelling was based on an analysis of the cycling decisions of generators using a number of key cycling cost assumptions. While ROAM concluded that there is no strong evidence to suggest that the current MFP is required to achieve efficient outcomes in the NEM, it also cautioned against drawing inferences from the outcomes of this modelling without taking the large uncertainty in cycling costs into account.¹⁵⁸

Given the inherent uncertainties associated with generator cycling costs in the NEM, and, therefore, the limitations inherent in ROAM's analysis, the Panel considers that the outcomes of this modelling should not be relied upon too heavily to justify changes to the current level of MFP.

With that said, the Panel has had regard to the historical analysis carried out by ROAM in relation to the effect of the MFP on the operation of the market in the recent past.¹⁵⁹ Of the few MFP events that have occurred since July 2011 (mostly in Queensland and South Australia), ROAM found that the majority were driven either by the behaviour of market participants in the dispatch intervals following a pool price spike (MFP bidding), or in periods of low demand. ROAM found that while the low demand events were generally short term only and that minimum generation levels were still required to be dispatched, the MFP bidding events could have had a detrimental impact on efficiency in the market. On the latter point, ROAM considered that increasing the MFP (that is, making it less negative) may reduce the effectiveness of this behaviour and lead to more efficient outcomes.

Having considered ROAM's qualitative analysis of the historical occurrences of MFP events, the Panel considers that the conclusions do not provide sufficient evidence to

¹⁵⁷ Ibid, Executive Summary, p. 6.

¹⁵⁸ In its final report, ROAM noted that there is no public source of information relating to the cost of cycling in the NEM. Furthermore, cycling costs are notoriously difficult to estimate. While ROAM used publically available estimates of cycling costs for different technologies and consulted with stakeholders to ensure that these costs were broadly appropriate for plant in the NEM, it nonetheless noted that inferences drawn from the outcomes of this modelling should take the large uncertainty in cycling costs into account.

¹⁵⁹ The MFP has occurred infrequently in recent history. It is most frequently observed in Queensland (25 dispatch intervals since 1 July 2011) and in South Australia (15 dispatch intervals since July 2011).

support a case for an increase to the value of the MFP (that is, making it less negative in value).

In relation to ROAM's observations on MFP bidding, this issue, and its effect on efficient market outcomes, the Panel notes that this is currently being considered by the AEMC in a number of areas. These include the AEMC's OFA review, the South Australian Minister for Mineral Resources and Energy's rule change request in relation to bidding in good faith, and the AER's rule change request on generator ramp rates and dispatch inflexibility in bidding.¹⁶⁰

Other factors considered

The MFP aims to provide an appropriate price signal for the spot market to clear at times of very low demand and excess generation in a region. It does so by incentivising generators to offload generation when it is efficient to do so.

As such, the MFP has not historically been viewed as a tool to incentivise generator investment. The Panel notes Snowy Hydro's view that the level of the MFP may be used by investors in new technologies (such as battery storage) as a signal to operate in the market.¹⁶¹ This issue highlights that cycling impacts may not be the only consideration when reviewing the level of the MFP.

It is observed that there has been an increase in the number of negative pricing periods in the NEM in recent history. This may be due to a number of factors, including that the costs of shutting down and restarting generating units may be high. It may also be a result of generators who receive other revenue outside the spot market (such as renewable generators through RECs) being able to profitably bid below zero at times.

It is also recognised that, in the current environment of low demand growth and increasing investment in renewable energy (mostly wind), there may be further downward pressure on wholesale electricity prices, potentially causing the number of negative pricing periods to increase. At the same time, the nature of wind generation is more intermittent, which could affect the costs for managing power system security.

Regard has been given to the changing mix of generation in the NEM, and the possibility of increased instances of MFP events, in considering the suitability of the current MFP to deliver efficient outcomes for market participants and consumers in the NEM.

In particular, it is recognised that the increasing levels of investment in renewable generation is being driven by external factors outside of the reliability settings. For

¹⁶⁰ The AEMC is currently assessing a rule change request which seeks to make changes to the manner in which generators may offer electricity to the wholesale market. It is also assessing a rule change request proposing a requirement for generator ramp rates and dispatch inflexibility profiles to reflect the technical capabilities of generating plant. See the "Bidding in Good Faith" and "Generator ramp rates and dispatch inflexibility in bidding" rule change requests (respectively), both available at www.aemc.gov.au.

¹⁶¹ Snowy Hydro, Submission on Panel's draft report, p. 1.

instance, some submissions have suggested aligning the value of the MFP to counter the effects of RECs; that is, by making the MFP less negative. However, there is uncertainty surrounding government carbon policy and the RET, which affects incentives and investment decision-making more generally.¹⁶² Given the uncertainty associated with these external policy settings, which are currently at an unsettled stage of development, it would not be appropriate to adjust the reliability settings, especially the MFP.

At this point, the Panel notes the concerns raised by Alinta Energy that the current level of the MFP is causing a number of issues that were not anticipated at the time the -\$1000/MWh value was established.¹⁶³ These issues include strategic bidding by some generators in the face of constraints, and the bidding behaviour of wind generators who, through the RET, are generating pool revenue and given preference in the pool on the basis of negligible short-run costs.

In the draft report, the Panel noted that the issues raised by Alinta Energy were, to an extent, dependent on the progress of the AEMC's current OFA review and the outcomes of external policy settings like the RET, respectively, which are currently unsettled. The Panel also noted that stakeholders had not provided sufficient evidence to suggest either that the current value of the MFP is resulting in inefficient market outcomes, or that their proposed values would lead to more efficient market outcomes relative to the current situation.

In addition to the AEMC's OFA review, issues associated with strategic bidding are also being considered by the AEMC as part of the South Australian Minister for Mineral Resources and Energy's rule change request in relation to bidding in good faith, and the AER's rule change request on generator ramp rates and dispatch inflexibility in bidding.

Consistent with its previous view, the Panel considers it would be inappropriate, at least at this time, to attempt to address issues associated with generator strategic bidding behaviour through amendments to the level of the MFP.

6.3.5 Panel's final recommendations

The Panel's final recommendation has not changed from its draft recommendation.

¹⁶² In the last year, government policy on mechanisms to reduce carbon dioxide emissions from the electricity sector has changed twice. The previous Labor Government announced it would bring forward by one year the transition of a price on carbon emissions, from a fixed price to a floating price linked to the European Union Emissions Trading Scheme. The current Liberal-National Coalition Government gained office on 7 September 2013. Its stated policy is to abolish the carbon price and fund emissions cuts through "direct action" policies. Further, any changes to the carbon price legislation would need to pass through Parliament. The future of the RET has also continued to be a source of speculation. The Government's current policy is to conduct a full review of the RET in 2014. This is consistent with the currently legislated timing for a review.

¹⁶³ Alinta Energy, Submission on Panel's draft report, pp. 5-6.

The Panel has decided to recommend that no change be made to the current level of the MFP. The MFP should, therefore, continue to be set at -\$1,000/MWh.

6.4 Indexation of the reliability settings

CPI indexation of the MPC and CPT was introduced in 2012 following a rule change request from the Panel to the AEMC.¹⁶⁴ The purpose of indexing the MPC and CPT is to maintain the dollar values of these parameters in real terms, broadly reflective of changes in the capital costs of generation, thereby providing certainty in relation to revenue from generation investments over time.

A question for this review is whether the current manner of indexation is still considered to be appropriate for application from 1 July 2016 with respect to achieving the reliability standard.

The current mechanism for indexation ensures that, for each financial year, the values of the MPC and CPT are adjusted to reflect the change in the CPI between the calendar year 2010 (the base year) and the calendar year commencing 18 months before the start of the financial year in question (the indexed year). The calculation is a relatively simple one, with the revised MPC and CPT values to apply from the following 1 July calculated by the AEMC and published on its website by no later than the end of February each year.

In the issues paper for this review, the Panel asked stakeholders whether they considered the MPC and CPT should continue to be indexed from 1 July 2016 and, if so, whether the CPI is the appropriate index to be applied. In addition, the Panel asked stakeholders whether the MFP - which is not currently indexed - should also be indexed from 1 July 2016 and, if so, whether the CPI was also the appropriate index to be applied.

Further, in the draft report for this review, the Panel asked stakeholders for specific comments on the measure of indexation of the MPC and CPT. In particular:

- Is there sufficient change in any of the AEMC's previous reasoning that would justify a change to the manner of indexation of the MPC and CPT?
- What improvements could be made to the manner of indexation of the MPC and CPT to promote efficient investment in excess of the current levels? For example, should a CPI-X based approach be introduced, and what would be the ramifications and implementation considerations that need to be given to introducing a CPI-X based approach?

The Panel decided to recommend in its draft report that:

- the current indexation measure for the MPC and CPT be maintained;
- the current non-indexation for the MFP be maintained; and

¹⁶⁴ AEMC, *Reliability Settings from 1 July 2012*, Rule determination, 16 June 2011.

- the current indexation measure be reviewed within two years.

The next section considers these matters further.

6.4.1 Indexation of the market price cap and cumulative price threshold

Stakeholder submissions on the issues paper

In their submissions on the issues paper for this review, AGL and GDF Suez supported the current indexation of the MPC, which they considered contributes to delivering the reliability standard, which had not been breached.¹⁶⁵

The MEU considered that the MPC should be indexed by CPI only if the MPC is set for a long period, as costs increase.¹⁶⁶ Otherwise indexing for regular reviews would provide little benefit as there is no exactness of setting the value.

Despite not supporting an increase or decrease in the level of the MPC, the NGF supported the current annual indexation of the MPC.¹⁶⁷

Further, St Kitts Associates considered that reasons for ongoing indexation appears to be weaker, related to the impact of increased use of DSR.¹⁶⁸

Stakeholder submissions on the draft report

In submissions on the draft report for this review, a number of stakeholders supported continuing the current indexation of the MPC and CPT.¹⁶⁹

However, Snowy Hydro considered that indexation of the MPC should be put on hold until the next reliability standard and reliability settings review.¹⁷⁰ Its reasons included:

- the MPC is an artificial construct and there is surplus generation in the NEM, not requiring an increase in the level of the MPC to encourage new generation; and
- maintaining the current level of market access for generators to their own regional reference node (RRN) who sell forward hedge contracts in their own pricing region would be preserved if the level of MPC and MFP are locked at their nominal values.

¹⁶⁵ AGL, Submission on issues paper, pp. 1-2; GDF Suez Australian Energy, Submission on issues paper, p. 2.

¹⁶⁶ MEU, Submission on issues paper, pp. 4-6.

¹⁶⁷ NGF, Submission on issues paper, pp. 3-4.

¹⁶⁸ St Kitts Associates, Submission on issues paper, p. 4.

¹⁶⁹ AEMO, Submission on Panel's draft report, pp. 6-7; AGL Energy, Submission on Panel's draft report, p. 1; Origin Energy, Submission on Panel's draft report, p. 1.

¹⁷⁰ Snowy Hydro, Submission on Panel's draft report, pp. 1-4.

In summary, Snowy Hydro argued that progressively indexing MPC upwards without a corresponding increase in the MFP could lead to a situation where a generator (bidding at the MFP in a region operating at the MPC) could become increasingly constrained off in favour of inter-regional flows. It considered that without symmetry of indexation, the current level of access for some generators in certain circumstances could be eroded, leading to a gradual change in the competitive balance of the market.

The MEU considered that the current indexation of the MPC and CPT should be removed because the new cap defender approach (which the MEU supports for arguing a lower MPC) does not rely on capital cost assessments, which it considers indexation was designed to track.¹⁷¹

Alinta Energy supported annual indexation of the reliability settings, but did not consider indexation appropriate when it is based on a nominal MPC that does not reflect capital costs - that is, when the cap defender approach is used to inform the level of MPC, as opposed to Alinta Energy's preference for the extreme peaker approach.¹⁷² Alinta Energy did not support the Panel's draft recommendation of a future review of the method of indexation of the reliability settings on the basis that this would provide false comfort to the industry that a better method exists.

Panel's analysis

AEMC final rule determination (2011)

The AEMC made a rule in June 2011 to introduce a mechanism to index the MPC and CPT by applying the CPI on an annual basis, beginning 1 July 2012.¹⁷³ This rule was made in response to the Panel's rule change request based on its recommendation in the 2010 reliability standard and reliability settings review.

In the Panel's 2010 review, the Panel recommended that indexation of the MPC and CPT should occur, albeit based on the Intermediate Producer Price Index (Stage 2 PPI). Its selection of this manner of indexation was based on the following criteria, where indexation should:

- be based on the supply-side costs of delivering the reliability standard;
- follow similar economics trends to those parameters used in setting the MPC and CPT, particularly the capital cost of new OCGTs;¹⁷⁴
- be independently verifiable; and

¹⁷¹ MEU, Submission on Panel's draft report, pp. 4, 22.

¹⁷² Alinta Energy, Submission on Panel's draft report, p. 6.

¹⁷³ NER clauses 3.9.4(b)-(e) and 3.14.1(c)-(f).

¹⁷⁴ Capital costs of OCGT generating plant generally include labour, cement, imported materials and basic metals.

- be amenable to forecasting, which is important in providing certainty to investors on the likely changes to the MPC and CPT over time.

In its consideration of the Panel's rule change request, the AEMC agreed that the selection criteria identified by the Panel were broadly appropriate. However, the AEMC concluded that an additional, and critical, factor to be considered in selecting an appropriate index, was the relative stability or volatility of the measure.

Based on its assessment of the rule change request against the criteria, the AEMC made a more preferable rule, incorporating many of the features proposed in the Panel's rule change request. The AEMC determined to make a rule to provide for:

- the adjustment of the values of the MPC and CPT, in line with changes in the CPI on an annual basis, with effect from 1 July 2012; and
- a four-yearly comprehensive review of the reliability standard and reliability settings, including indexation, to be undertaken by the Panel.¹⁷⁵

In summary, the AEMC's reasons for its decision were that:

- indexation of the MPC and CPT, to maintain their values in real terms over time, will provide a strong and continuous signal to incentivise an efficient level of investment to deliver the reliability standard, while limiting the financial exposure of market participants and consumers;
- adoption of the CPI introduces an index which is more commonly used in business and investment decisions, which provides a higher degree of stability and predictability to the market than the Stage 2 PPI, and will provide a strong revenue signal for investors;
- retention of the requirement for a comprehensive and integrated review of the reliability standard and reliability settings, including the manner of the indexation of the MPC and CPT, on a four-yearly basis will allow these values to remain calibrated to the relevant underlying cost drivers. It will also allow for any changes that have been introduced to take effect before the next Panel review is commenced, unlike the now superseded biennial process;
- the extension of the time period between Panel reviews of the reliability settings, from two to four years, will provide a greater measure of certainty and predictability for market participants;
- a clear signal will be sent to the market that the intention in the rules is to preserve the value of the reliability settings over time, which should act to provide further certainty and reassurance to investors; and

¹⁷⁵ This replaced the existing obligation on the Panel to undertake a two-yearly review of the reliability standard and reliability settings.

- a degree of administrative efficiency is provided by implementing a relatively automated process to effect incremental increases to the MPC and CPT, and thereby avoiding the need to undertake a formal rule making process to implement any such changes.

While the AEMC accepted the benefits of indexation in making its determination, it also noted that it had been unable to identify an available index that was likely to accurately track the changes in the costs of generating plant that are a key consideration in recommending the appropriate levels of the MPC and CPT.

This led the AEMC to conclude that the reliability settings should continue to be reviewed on a regular basis to ensure that they remain calibrated to the relevant underlying cost drivers. This was one driver of the AEMC's decision to require the Panel to undertake a comprehensive and integrated review of the reliability standard and reliability settings, including the manner of the indexation of the MPC and CPT, every four years.

The AEMC considered that a four-yearly review represented an appropriate balance between the certainty provided by indexation between reviews, and the need to periodically check whether the reliability standard, the values of the reliability settings, and the indexation of these settings, continued to be appropriate. It also considered that the four-yearly timetable would allow for any changes to the reliability standard or reliability settings that had been introduced to take effect before the next review is commenced, unlike the now superseded biennial process.

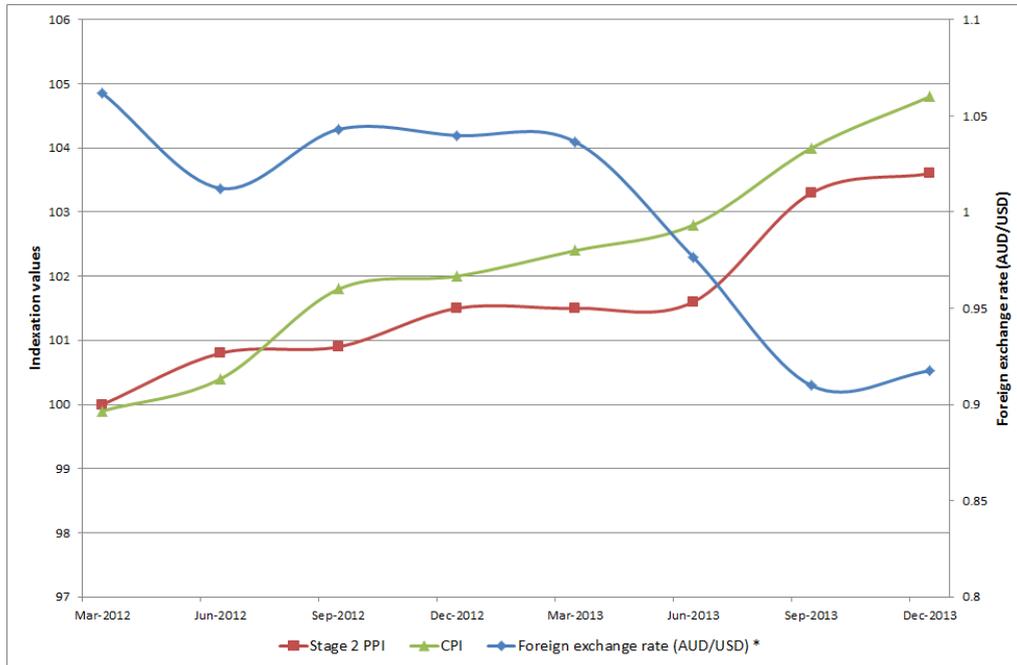
Current state of indexation

It has only been two years since the AEMC's final determination on indexation of the MPC and CPT came into effect. In this time, the CPI has increased steadily. This is illustrated (among other things) in Figure 6.1. As intended, the nominal values of the MPC and CPT have also increased from 1 July in each of the years since, in order to maintain the real values of these parameters

Also in this time, recent data from AEMO shows that OCGT costs have remained relatively stable. As shown in Figure 6.2, this follows a period of a slight declining trend in OCGT costs from 2009 to 2012, generally attributed to the global economic downturn lowering demand for OCGT worldwide.

In addition, and as could be expected, there have also been short term movements in a number of inputs that contribute to OCGT costs. Figure 6.1, for example, also shows that the Australian Dollar (based on the foreign exchange rate (AUD/USD)), which has an impact on any imported component of OCGT costs, fell over the period from March 2012 to September 2013. In the short to medium term, if the Australian Dollar depreciates from its current level, as some market economic forecasts suggest, then OCGT costs may increase as a result of the depreciation.

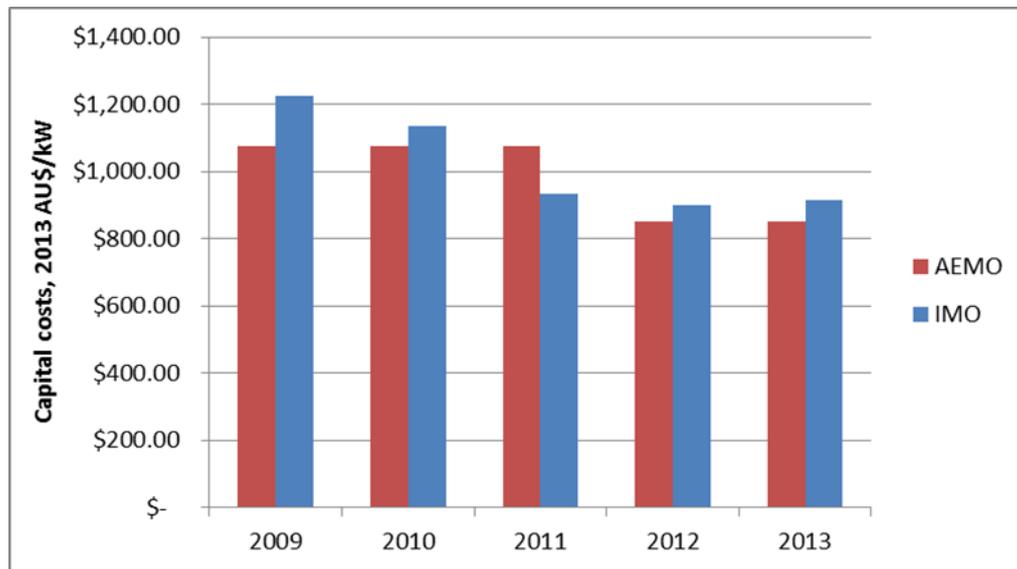
Figure 6.1 Foreign exchange rate and indexation values between 2012 and 2013



Note *: Foreign exchange rates, CPI and interest rates applied are by the Reserve Bank of Australia, monthly data averaged to quarterly unless noted otherwise.

Source: Australian Bureau of Statistics and Reserve Bank of Australia.

Figure 6.2 Recent OCGT cost data used by AEMO



'Overnight' OCGT capital costs including connection costs

Source: Diagram supplied by AEMO, with information sourced from: ACIL Tasman, *Fuel resource, new entry and generation costs in the NEM*, 2009; ACIL Tasman, *Review of EPRI cost data, prepared for AEMO/DRET*, 2010; Bureau of Resources and Energy Economics, *The Australian Energy Technology Assessment (AETA)*, 2012.

In principle, and where achievable, the Panel considers that there are likely to be benefits resulting from indexing the MPC and CPT by a measure which broadly tracks the changes in capital costs of new OCGT plant.

At the conclusion of this review, a divergence of views among Panel members remains around the suitability of CPI as the measure of indexing the MPC and CPT. One viewpoint is, to the extent that the CPI maintains the real dollar values of the MPC and CPT, the CPI measure is considered to be achieving its intended objective. The alternative viewpoint is a concern that CPI indexation of the MPC and CPT may be inappropriate in the context of recent decreases in OCGT plant costs.

Based on the data above, it is difficult to draw any robust conclusions on whether CPI continues to remain the most appropriate measure of indexation to apply from 1 July 2016. Although the data shows a declining trend in OCGT costs from 2009 to 2011, this is followed by a flattening (and, arguably, a slight increase) in OCGT costs across 2012 and 2013. In addition, as noted above, it is only two years since CPI indexation was first applied on 1 July 2012 to the dollar values of MPC and CPT, as a consequence of a rule made by the AEMC. The identification of any emerging trends in the data or relationships between variables over a relatively short time period is, therefore, challenging.

Further, it is worth noting that when the AEMC chose CPI as the measure by which to index the MPC and CPT, there was a general recognition by the AEMC that the CPI was not particularly reflective of changes in the capital costs of OCGT plant. Its strength, rather, was the stability and predictability (and, hence, certainty to investors) that it would provide.

The Panel acknowledges that a number of stakeholders supported indexation on the belief that the purpose of indexing the MPC and CPT by CPI was to ensure the values of these parameters reflected changes in OCGT costs.¹⁷⁶ However, as noted above, the AEMC's final determination to adopt the CPI as the measure of indexation was based on a number of considerations, in addition to movements in OCGT costs.

The Panel would also like to clarify that indexation allows the nominal value of the MPC and CPT to reflect the monetary value in real terms for a given financial year. Were no measure of indexation applied, the real value of the MPC and CPT would effectively decline.¹⁷⁷

While it is important to periodically review the appropriateness of the selected measure of indexation for application to the MPC and CPT, given the above considerations, one viewpoint may be that to do so now would be premature. The alternative viewpoint may be that, by continuing to apply CPI indexation to the MPC and CPT until the next statutory reliability standard and reliability settings review in

¹⁷⁶ MEU, Submission on Panel's draft report, pp. 4, 22; Alinta Energy, Submission on Panel's draft report, p. 6.

¹⁷⁷ That is, maintaining indexation of the MPC means its value is maintained in real terms – it has not been increased.

2018, this may result in successive increases in the MPC and CPT values which may, or may not, reflect general trends in OCGT capital costs over the same period.

The Panel, therefore, has decided to recommend that it undertakes a review of the current and possible alternative measures of indexation that may be applied to the MPC and CPT, with such a review to be completed by 1 July 2016. This approach allows for the current measure of CPI indexation to be observed to operate over an extended period of time, and for any emerging trends to be analysed and evaluated against other possible alternative measures of indexation. This recommendation is in line with the AEMC's intention that the appropriateness of the measure of indexation be reviewed every four years.

Implications of asymmetry between market price cap and market floor price levels

As noted above, in the Panel's 2010 review of the reliability standard and reliability settings, it recommended annual indexation of MPC and CPT values, with effect from 1 July 2012. On the basis that the MFP does not directly influence generator investment signals,¹⁷⁸ the Panel was not concerned with the impact of changes in the real value of the MFP. In its final rule determination regarding the reliability settings to apply from 1 July 2012, the AEMC acknowledged this point regarding MFP and subsequently made a rule which required that only the MPC and CPT be annually indexed. The AEMC's final determination means there is asymmetry in the levels of MPC and MFP over time.

The Panel acknowledges the concern raised by Snowy Hydro that the effect of this asymmetry may be an erosion in the current level of access for some generators (in certain circumstances), which in turn may lead to a gradual change in the competitive balance of the market.¹⁷⁹ While Snowy Hydro has provided one illustrative example of the potential effect of maintaining asymmetry between the MPC and MFP, the Panel would be interested in having a complete understanding of the potential effects under a wider range of scenarios. For instance, only one constraint equation was provided by Snowy Hydro as a hypothetical risk on the current level of access for some generators, which is insufficient evidence to support the materiality of the issue. The Panel is not aware if there are any other constraint equations that display a similar level of risk. If there are, which equations? And, what is the likelihood of these risks occurring in reality?

The Panel is conscious that the scope of this issue may be broader than reliability of the generation and bulk-transmission sector (for example, as it relates to matters concerning generator access and regional design of the market). The Panel, therefore, considers that industry participants may be best placed to progress this issue further, for example, in the context of an industry initiative. Alternatively, the matter could be

¹⁷⁸ Note that while the MPC which provides a price signal aimed at incentivising sufficient generation capacity and demand-side response to deliver the reliability standard, the MFP provides a price signal aimed at incentivising efficient cycling decisions by generators at times of low demand.

¹⁷⁹ Snowy Hydro, Submission on Panel's draft report, pp. 1-4.

raised in the context of the Panel's recommended future review of the current indexation measure.

Notwithstanding the above, the Panel welcomes Snowy Hydro's observations and notes their importance in highlighting that cycling impacts may not be the only consideration when reviewing the level of the MFP.

Panel's final recommendations

The Panel's final recommendation has not changed from its draft recommendation.

The Panel has decided to recommend that no change be made to the current measure of indexation of the MPC and CPT. That is, the CPI should continue to be used to index the MPC and CPT annually.

However, the Panel has decided to recommend that a review of the current indexation measure occurs within two years.

In terms of the MFP, the Panel has decided to recommend that no change be made to the current approach of non-indexation. That is, the MFP should continue to be set in nominal terms.

With respect to concerns regarding asymmetry between MPC and MFP levels that may impact upon the current level of access for some generators, the Panel considers that this should be progressed further as part of an industry-led initiative, or raised in the Panel's recommended future review of the current indexation measure.

6.4.2 Indexation of the market floor price

In the draft report for this review, the Panel decided to recommend that the current non-indexation of the level of the MFP be maintained. The Panel welcomed any comments on this draft recommendation and how improvements could be made to encourage efficient behaviour.

Stakeholder submissions on the issues paper

In its submission on the issues paper, the NGF considered there should be greater symmetry between the MPC and MFP such that if, for example, the MPC increased by two per cent, then the MFP should decrease by two per cent (and that the MFP should also be indexed).¹⁸⁰ As such, the NGF considered that the MFP should also be indexed.¹⁸¹

¹⁸⁰ NGF, Submission on issues paper, p. 4.

¹⁸¹ Ibid.

Although Stanwell endorsed the submission from the NGF, it did not share the NGF's view on the MFP, and instead supported leaving the MFP at the current level, without indexation.¹⁸²

Alinta Energy also considered that the arguments of symmetry are largely irrelevant.¹⁸³

Stakeholder submissions on the draft report

Snowy Hydro noted that it originally proposed that the MFP should be indexed to align with the indexation of the MPC.¹⁸⁴ However, given the Panel's position in the draft report, it proposed that the MPC and MFP should be left at nominal values until the next reliability standard and reliability settings review.

Panel's analysis

As noted in section 6.4.1, indexation of the MPC and CPT was introduced following the Panel's review of the reliability standard and reliability settings in 2010.

The MFP, on the other hand, differs from the MPC and CPT in that it does not provide an investment signal, and is therefore decoupled from the costs of capital. Instead, the MFP operates at times of very low demand and excess generation and provides a signal to offload generation. On this basis, indexation would have minimal impact on the signalling effects of the MFP.

As noted by Alinta Energy,¹⁸⁵ given the MFP differs in the signals it provides compared to the MPC and CPT, indexation of the MFP would not be appropriate.

Panel's final recommendations

The Panel's final recommendation has not changed from its draft recommendation.

The Panel has decided to recommend that no change be made to the current non-indexation of the MFP.

6.5 Other issues

This section lists the specific issues that were identified by stakeholders in submissions on the issues paper for this review, and which stakeholders considered the Panel should have regard to during this review process. These issues were general considerations that stakeholders considered should be taken into consideration as part of a review of the reliability settings, as considered in this chapter.

¹⁸² Stanwell Corporation, Submission on issues paper, p. 1.

¹⁸³ Alinta Energy, Submission on issues paper, p. 13.

¹⁸⁴ Snowy Hydro, Submission on Panel's draft report, pp. 1-4.

¹⁸⁵ Alinta Energy, Submission on issues paper, p. 13.

6.5.1 External factors for consideration

The purpose of the reliability settings is to: balance supply and demand in the wholesale spot market; incentivise sufficient capacity to deliver the reliability standard; and avoid unmanageable risks for market participants.

However, consumer preferences and investment requirements are changing. These have partly been in response to changes in relative prices, technology and government policies such as climate change.

In the issues paper for this review, the Panel asked stakeholders for views on whether there were any factors that the Panel should take into consideration in its assessment of the reliability standard and reliability settings.

A number of stakeholders responded and listed the following factors, among others, as warranting consideration by the Panel:

- the current oversupply of generation and the emerging trend of falling demand;
- government environmental policies, such as the LRET, the Small-scale Renewable Energy Scheme (SRES) and the carbon price;
- the increased penetration of intermittent generation;
- increased volumes of DSP and the future introduction of a DRM;
- commercial considerations, including increases in the cost of acquiring capital to invest in new generation;
- market structure, including prevalence of vertical integration of generators and retailers; and
- financial considerations, including increased regulation of electricity derivatives.

Other relevant external factors listed by stakeholders in submissions on the issues paper are set out in Appendix A.

The Panel has had regard to these factors, in addition to those listed in chapter 3, in carrying out this review of the reliability standard and reliability settings.

Abbreviations

ACCC	Australian Competition and Consumer Commission
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
AMPR	Annual Market Performance Review
APC	administered price cap
Code	National Electricity Code
Commission	See AEMC
CPI	Consumer Price Index
CPT	cumulative price threshold
DRM	Demand Response Mechanism
DSP	demand-side participation
DSR	demand-side response
ESAA	Energy Supply Association of Australia
GWh	gigawatt hour
LRET	Large-scale Renewable Energy Target
MCE	Ministerial Council on Energy
MEU	Major Energy Users
MFP	market floor price
MPC	market price cap
MRL	minimum reserve level
MWh	megawatt hour
NECA	National Electricity Code Administrator

NEFR	National Electricity Forecast Report
NEL	National Electricity Law
NEM	National Electricity Market
NEMMCO	National Electricity Market Management Company
NEO	national electricity objective
NER	National Electricity Rules
NGF	National Generators Forum
OCGT	open cycle gas turbine
OFA	Optional Firm Access
Panel	Reliability Panel
REC	renewable energy certificate
RERT	reliability and emergency reserve trader
RET	Renewable Energy Target
ROAM	ROAM Consulting
RRN	regional reference node
rules	See NER
SCER	Standing Council on Energy and Resources
SRES	Small-scale Renewable Energy Scheme
SRMC	short run marginal cost
Stage 2 PPI	Intermediate Producer Price Index
TWh	terawatt hour
USE	unserved energy
VCR	value of customer reliability
VoLL	value of lost load

A Submissions summary

The tables below provide a summary of the key issues raised by stakeholders in their submissions to the Panel's issues paper, ROAM's draft report and the Panel's draft report, respectively.

Where relevant, the issues have been arranged into the following areas:

- reliability standard, including its form and level, and VCR;
- MPC, including its level and measure of indexation;
- CPT, including its level and measure of indexation;
- MFP, including its level; and
- other issues.

The tables include the Panel's response to each issue. For ease of reference, the relevant page numbers have been included in the table.

The submissions received are available on the AEMC website at www.aemc.gov.au.

A.1 Submissions on the issues paper

The Panel published the issues paper on 9 May 2013. 12 submissions were received from stakeholders. The key issues are summarised below.

A.1.1 Summary of issues about the reliability standard

Table A.1 Form and level of the reliability standard

Organisation	Substantive point being made	Panel comments
AGL Energy (p. 1), Alinta Energy (p. 1), EnergyAustralia (p. 1), GDF Suez (p. 1), Macquarie Generation (pp. 1-6), MEU (pp. 3-4), NGF (p. 3)	Agree the current form and level of the reliability standard are appropriate and there is no need to change these.	Noted. See chapter 5.
St Kitts Associates (p. 3)	<p>Does not consider a need to tighten the reliability standard. Consumers would likely prefer that if the standard is tightened then reliability investments would target outages originating at the distribution network level rather than at the wholesale market level.</p> <p>Consumers would value if the Panel elaborated on how the USE concept remains appropriate in relation to an increase in DSR capability. This is because the ability of consumers to lower demand would meet available supply, as opposed to the historic assumption that investment should be centered on an increased supply of electricity to meet demand.</p>	Noted. See chapter 5.

Table A.2 Value of customer reliability

Organisation	Substantive point being made	Panel comments
AGL Energy (p. 2), ESAA (p. 2)	Broadly supports VCR, but it is difficult to measure accurately, and the consequential impacts in changing the	Noted. See chapter 5.

Organisation	Substantive point being made	Panel comments
	reliability settings and reliability standard to reflect VCR. Therefore, suggests caution before taking VCR into account.	
Alinta Energy (p. 15)	VCR is inconsistent with the MPC because it only considers the residential sector and excludes industrial, commercial and agricultural sectors across the NEM. Such inconsistency creates inefficient outcomes where transmission investment is valued more than generation. Therefore, the MPC and VCR should be aligned more closely to assure sufficient incentives exist for generation to meet the reliability standard and customer expectations of reliability at least cost.	Noted. See chapter 5.
EnergyAustralia (p. 2)	Having different reliability standards for generation and bulk transmission capacity in the NEM is not practical. VCR needs to reflect an average across the NEM.	Noted. See chapter 5.
MEU (pp. 10-12)	Does not support alignment between VCR and the MPC because it considers: the USE is determined by competitive generation; there is no direct relationship between VCR and the MPC; there is variation between VCR based on customer types and no reason has been provided for that variation; there would be an increase in the number of reliability settings; and there would be an unnecessary increase in the MPC as a result, where the risks are borne by market participants and costs are passed onto consumers.	Noted. See chapter 5.
St Kitts Associates (p. 6)	Suggests that residential VCR should be considered as a ceiling on the MPC, but does not propose to increase the MPC to the current estimates of VCR. Considers that it may be misleading to use these estimates associated with consumer willingness to pay for wholesale market reliability	Noted. See chapter 5.

Organisation	Substantive point being made	Panel comments
	and that of network reliability. With respect to DSP, there is evidence that willingness to accept production impacts on demand reduction at revealed market prices.	

A.1.2 Summary of issues about the MPC

Table A.3 Level of MPC

Organisation	Substantive point being made	Panel comments
AGL Energy (pp. 1-2), MEU (pp. 3-4), NGF (pp. 1-4)	<p>The current level of the MPC is appropriate, given the reliability standard has not been breached.</p> <p>AGL does not support an increase to the level of the MPC because it would financially expose market participants.</p> <p>The NGF does not support changing the MPC, given there are other incentives resulting in a current oversupply of generation and a decrease in demand growth. Increasing the MPC would send the wrong price signals.</p> <p>The MEU considered that the MPC may be too high to achieve the reliability standard and there is more than sufficient generation in the NEM, with the previous value of \$10,000/MWh being sufficient.</p>	Noted. See chapter 6.
Alinta Energy (pp. 2-3, 5-13)	Disagreed with previous stakeholders' submissions that the MPC should not be increased, based on the view that investment was occurring under the existing MPC and contract market outcomes were driving investment	Noted. See chapter 6.

Organisation	Substantive point being made	Panel comments
	<p>decisions. Considers the MPC continues to be inadequate because it favours transmission over generation for non-economic reasons.</p> <p>Suggests consideration should be given to the need for additional capacity, based on: the current market outlook; the purpose of the MPC to signal for OCGT to be built to supply the last increment at high demand periods; the impact of spot prices and contract prices; and the consumer benefit from existing generators being incentivised to supply, and the value of capacity and energy hedge offers.</p>	
GDF Suez (p. 2)	The MPC should be kept sufficiently high to provide a significant investment signal. Although the MPC is not the primary investment signal, if it is set too low, then it could deter new investment.	Noted. See chapter 6.
St Kitts Associates (p. 4)	Consumers need substantial convincing that the MPC should be increased.	Noted. See chapter 6.

Table A.4 Indexation of MPC

Organisation	Substantive point being made	Panel comments
AGL Energy (pp. 1-2), GDF Suez (p. 2), NGF (pp. 3-4)	The current indexation of the MPC is appropriate.	Noted. See chapter 6.
MEU (pp. 3-4)	The MPC should be indexed by the CPI only if it is set for a long period as costs increase; otherwise regular reviews of the MPC and inexactness of setting its value provide little benefit.	Noted. See chapter 6.

Organisation	Substantive point being made	Panel comments
St Kitts Associates (p. 4)	Considers the argument for ongoing indexation of the MPC appears to be weaker now, noting the impact of DSP.	Noted. See chapter 6.

A.1.3 Summary of issues about the CPT

Table A.5 Form of CPT

Organisation	Substantive point being made	Panel comments
AER (pp. 1-3)	The effectiveness of the CPT needs to be thoroughly reviewed as a risk management mechanism. It has not been reviewed in detail for a decade, and the CPT has been breached a number of times or close to breaching. Suggests the Panel consider different design possibilities of the CPT, such as a longer time horizon with a 90 day rolling cumulative price. This could ensure it limits participant financial exposure to the wholesale spot market during high price periods, while preserving the market's ability to use price signals to provide reliability.	Noted. See chapter 6.

Table A.6 Level of CPT

Organisation	Substantive point being made	Panel comments
AER (pp. 1-3)	The current level of the CPT needs to be reviewed to determine whether it creates unnecessary risk in the market, noting the number of breaches or near breaches of	Noted. See chapter 6.

Organisation	Substantive point being made	Panel comments
	the level of the CPT.	
AGL Energy (p. 2) and GDF Suez (p. 2)	The current level of the CPT is appropriate, providing the correct balance in limiting financial exposure to market participants.	Noted. See chapter 6.
Alinta Energy (pp. 4-5)	<p>Considers the market has been slow to respond to non-credible risks and congestion, and questions whether the level of the CPT has been set at the appropriate level. If not, then suggests market intervention could be used.</p> <p>Suggests consideration be given to: how merchant investors use the CPT; whether the CPT impedes price signals; and a market acceptable level for the CPT, without increasing overall market risks.</p>	Noted. See chapter 6.
MEU (pp. 6-7)	Considers the current level of the CPT may be too high and imposes unwarranted costs on consumers.	Noted. See chapter 6.
St Kitts Associates (p. 5)	Does not consider there to be evidence that the current CPT restricts the market's ability to deliver the reliability standard. The long term interests of consumers in changing the CPT will need to be explained.	Noted. See chapter 6.

Table A.7 Indexation of CPT

Organisation	Substantive point being made	Panel comments
AGL Energy (p. 2)	The current indexation of the CPT is appropriate	Noted. See chapter 6.

Table A.8 Relationship between CPT and MPC

Organisation	Substantive point being made	Panel comments
Alinta Energy (pp. 2-3, 16)	Considers that the CPT and MPC should be analysed independently, as their influence on the market will likely differ. Then, the net impact on the market can be drawn.	Noted. See chapter 6.
MEU (pp. 6-7)	Considers that the CPT and MPC are linked by a factor of 15, implying 15 consecutive hours at the MPC as a market failure, and disagrees with such a relationship. Considers that the CPT does not impact upon the reliability standard or reliability settings, and linking the CPT to the APC is more realistic to establish a risk mitigation process.	Noted. See chapter 6.

A.1.4 Summary of issues about the MFP

Table A.9 Level of MFP

Organisation	Substantive point being made	Panel comments
AGL Energy (p. 2), Stanwell Corporation Limited (p. 1)	<p>The current MFP sufficiently incentivises generators to offload at negative price periods. Therefore, the MFP does not need to be changed.</p> <p>If the level of the MFP were reduced, Stanwell noted that the Panel needs to fully investigate whether there are benefits of such a reduction that would outweigh the market risks. Increased risks could include financial risks for slow start plant, which is inherent when there is an increase in</p>	Noted. See chapter 6.

Organisation	Substantive point being made	Panel comments
	the magnitude of price fluctuation and settlement of negative spot prices.	
Alinta Energy (pp. 13-15), GDF Suez (p. 2)	<p>Alinta Energy considers that the MFP is unrelated to the MPC and, therefore, the MFP does not need to be symmetrical with the MPC.</p> <p>Given the subsidisation of wind generation, Alinta Energy and GDF Suez consider that the current MFP is not appropriate. Alinta Energy considers that the MFP value should be in the excess of the REC and setting it to -\$100 could be correct; or it could be -\$300 to link it with the APC, but this would be for convenience reasons rather than economic reasons.</p>	Noted. See chapter 6.
NGF (p. 4)	As alternative to indexing the MFP at the same rate as the MPC, it suggests a perfectly symmetrical MFP and MPC. However, this could introduce other significant issues.	Noted. See chapter 6.
St Kitts Associates (p. 5)	Questions the need for the MFP, given the lack of interest in it in the past.	Noted. See chapter 6.

Table A.10 Impact of renewable generation on MFP

Organisation	Substantive point being made	Panel comments
Alinta Energy (pp. 13-15)	Considers that, given that wind generation is subsidised via the RET, wind generators generate the pool revenue and are given preference in the market. With the current level of the MFP, there are therefore limited signalling effects on wind generation. This may also encourage strategic bidding	Noted. See chapter 6.

Organisation	Substantive point being made	Panel comments
	where subsidised wind generation bid negatively in the expectation that thermal generators with a higher short run marginal cost (SRMC) continue to generate.	
EnergyAustralia (pp. 2-3)	Consideration should be given to whether generation and market interconnectors only negatively bid where they demonstrate technical constraints.	Noted. See chapter 6.
GDF Suez (p. 2)	Considers that, during periods of low wind generation, there may be insufficient thermal generation if too much thermal generation is shut down to low or negative pool prices, leading to blackouts. Therefore, the negative price signal should be sufficiently strong to address these risks, but not too strong that it would discourage conventional generation for supporting intermittent generation. It believes the recent experience in South Australia should be examined more closely.	Noted. See chapter 6.
MEU (pp. 7-9)	Considers that the Panel is assessing the MFP to avoid harming generators rather than recognising renewable energy policies have resulted in an unexpected outcome where generators recover their fixed costs over a lesser amount of dispatch volume, leading to some generators closing output and others bidding higher to remain viable. The Panel should look at the market risks from higher amounts of intermittent generation reducing the availability of dispatchable generation capacity. Such reductions increase the risk of loss of supply if wind ceases. Increasing the level of the MFP will not address this and is a wider problem related to the market design.	Noted. See chapter 6.

Table A.11 Indexation of MFP

Organisation	Substantive point being made	Panel comments
NGF (p. 4)	Considers the level of the MFP should be indexed downwards (make more negative) at the same rate at which the level of the MPC is currently indexed upwards. This maintains the status quo and addresses the asymmetry between the MFP and MPC.	Noted. See chapter 6.

A.1.5 Summary of other issues

Table A.12 External factors for consideration

Organisation	Substantive point being made	Panel comments
Alinta Energy (pp. 2-3, 16)	<p>Market risk, transmission risk, market structure and climate change policies should only be considered relevant to the review where they impede on the market's ability to balance supply and demand and provide required price signals. This is because company expectations and reasons for changing reliability settings will be different.</p> <p>The market settings for gas markets should be examined with the other energy market settings. Participants are dealing with integrated markets on a daily basis. Therefore, it is questionable whether the current difference between the price caps in the NEM, DWGM and STTM hubs are appropriate, noting they operate on different timeframes.</p>	Noted. See chapters 3 and 4.

Organisation	Substantive point being made	Panel comments
EnergyAustralia (pp. 1-2)	<p>Similar comments to the ESAA. In addition, proposed consideration of:</p> <ul style="list-style-type: none"> • forward contract prices and contract liquidity; • participant's ability to efficiently manage market risk; • retirement of scheduled capacity; and • proposed changes to the regulation of electricity derivatives. 	Noted. See chapters 3 and 4.
ESAA (pp. 1-2), GDF Suez (p. 3)	<p>The Panel should consider the following developments in the NEM:</p> <ul style="list-style-type: none"> • emerging trend of falling aggregate demand; • increasing penetration of intermittent generation at large and small scales, and therefore increasing price volatility; • increasing number of negative price periods; and • future introduction of DRM. 	Noted. See chapters 3 and 4.
Macquarie Generation (pp. 1-6)	<p>The RET scheme could create a serious detrimental impact on NEM reliability. These impacts could include:</p> <ul style="list-style-type: none"> • no new high reliable generation investment to occur; • existing high reliable generation will become less reliable; 	Noted. See chapters 3 and 4.

Organisation	Substantive point being made	Panel comments
	<ul style="list-style-type: none"> • existing generation unavailable to be directed; and • increasing reliance on low reliable generation. 	
MEU (pp. 1-3, 5)	Considers consideration needs to be given to the large changes in electricity prices over recent years as part of this review.	Noted. See chapters 3 and 4.
NGF (pp. 1-3)	The Panel should question the incentives that are driving the standard to be met, rather than the settings. Considers the oversupply in the market is a result of subsidised non-commercial generation. In particular, these are the Queensland Gas Scheme, solar feed-in-tariffs and New South Wales Greenhouse Gas Reduction Scheme, the regulatory determinations based on long run marginal costs (as opposed to market prices to set retailer wholesale energy costs), disposition of capacity between participants, and illiquid nature of asset transfers between participants. Proposes that the Panel review whether the reliability settings are redundant because of this large amount of subsidised non-commercial generation and forced withdrawal of generation capacity due to cumulative losses.	Noted. See chapters 3 and 4.
Origin Energy (pp. 1-2)	Considers that it is important to examine the role and levels of reliability settings in light of the changing generation mix and incentives for that investment. This means considering the consequences and implications of the various government policies and interventions such as carbon price, LRET and SRES.	Noted. See chapters 3 and 4.
St Kitts Associates (p. 4)	The review needs to reflect the impact of DRM rather than the historic approach of estimating costs associated with capex and opex under the traditional solution of OCGT	Noted. See chapters 3 and 4.

Organisation	Substantive point being made	Panel comments
	<p>based capacity.</p> <p>Barriers to potential providers of DSP should be considered. Price signals such as the MPC may not need to be stronger, but actionable for cost effective DSP. The Panel should consider whether the cost and benefits of these alternative arrangements have changed from the attributes of the current market. The cost effectiveness of capacity mechanisms to deliver reliability in terms of consumer costs should be considered.</p>	
St Kitts Associates (p. 4)	Consumers ultimately bear the cost of risk and rely on retailers to manage this risk for them. The Panel needs to communicate their analysis of the trade-off between incentivising investment and introducing additional price risk.	Noted. See chapters 3 and 4.

Table A.13 Other issues

Organisation	Substantive point being made	Panel comments
Alinta Energy (p. 16)	Availability of generation also impacts on generators providing SRAS. Recent AEMO work is likely to be inconsistent with previous Panel positions and community expectations. Market developments will also likely require a greater need for plant availability to manage system security risks, and demand and supply balance.	Noted. See chapters 3 and 4.
Macquarie Generation (pp. 5-6)	Considers that AEMO's reliability directions power may not be effective as an intervention mechanism to ensure supply adequacy. This is because of the RET, where conventional	Noted. See chapter 2.

Organisation	Substantive point being made	Panel comments
	thermal generators have had to shut down. This means future adjustments to the reliability settings may not ensure the reliability standard is maintained, where external policies undermine the returns of high reliability plant.	
St Kitts Associates (p. 2)	Considers that the consumers' ability to participate in the latter stages of the review will be dependent on the Panel's ability to communicate how the NEO is used to assess the reliability standards and reliability settings i.e. how the options considered will be in the long term interests of consumers.	Noted. See chapters 3 and 4.

A.2 Submissions on ROAM's draft report

The Panel published ROAM's draft report on 16 December 2013. Five submissions were received from stakeholders. The key issues are summarised below.

Table A.14 Modelling approach

Organisation	Substantive point being made	Panel comments
Alinta Energy (pp. 1-4)	Does not support the cap defender approach because the assumptions produce outcomes that do not reflect market reality and does not represent the value of lost load upon which the MPC should be based upon. Prefers the extreme peaker approach because it takes into account scarcity of energy at times of extreme peak demand or of low supply. Believes this would be more appropriate because the higher MPC would cover for investors' capital costs.	Noted. See chapter 6.

Organisation	Substantive point being made	Panel comments
EnerNOC (pp. 1-3)	Prefers the extreme peaker approach over the cap defender approach because the extreme peaker is more objective, and does not rely on highly subjective input assumptions. Particular criticisms of the cap defender approach include that: it does not account for different ownership patterns and associated market power; assumes the marginal peaking plant is dispatched perfectly by AEMO; and ignores the effect of a marginal peaking plant being partially dispatched.	Noted. See response to Alinta Energy above.
MEU (pp. 9-22)	Prefers the cap defender approach on the basis that it reflects commercial reality. However, has reservations with the assumptions/sensitivities; in particular, the expected level of SRES renewable generation which has not been considered; the historical data used as it may be biased towards South Australia and Queensland; and the effect of MPC on the wholesale price, which has not been considered. That said, also considers the extreme peaker approach is flawed because it is based on the premise that a new entrant generator is built to only operate as a marginal generator.	Noted. See response to Alinta Energy above.
Origin Energy (pp. 1-2)	Considers that both the cap defender and extreme peaker approaches are highly artificial models of the market. Notes that the current reliability settings have been effective in delivering the reliability standard to date. On this basis, questions the suitability of the extreme peaker approach because this approach suggests that the current reliability settings may not be appropriate in the future.	Noted. See response to Alinta Energy above.

Table A.15 Treatment of DSP in the modelling

Organisation	Substantive point being made	Panel comments
EnerNOC (p. 3)	Supports the consideration of DSP within ROAM's modelling approach. However, considers that the modelling should not assume perfect dispatch, noting a propensity for DSP to higher SRMC and longer start-up times. Also suggests that the increased volumes of DSP uptake under the AEMC's recommended DRM in the Power of Choice review should be used as the basis for the modelling.	Noted. See chapter 6.
Origin Energy (p. 2)	Considers that caution should be exercised in the modelling of DSP because the DRM has not yet been implemented by AEMO.	Noted. See chapter 6.

Table A.16 Treatment of renewable generation in the modelling

Organisation	Substantive point being made	Panel comments
Origin Energy (p. 2)	Considers that caution should be exercised in making assumptions about the treatment of carbon pricing and renewable energy, given the uncertainty in the current policy environment.	Noted. See chapter 6.

Table A.17 Reliability standard

Organisation	Substantive point being made	Panel comments
MEU (pp. 4, 22-23)	Notes that VCR is subject to uncertainty and questions its use in assessing the reliability standard. However, considers that there is not enough evidence to support a move away from the current reliability standard.	Noted. See chapter 5.

Table A.18 Level of MPC

Organisation	Substantive point being made	Panel comments
MEU (pp. 4, 15-22)	Considers that the level of the MPC should be significantly reduced to between \$5,000 and \$6,000, given that the cap defender approach suggests the current MPC is more than sufficient to achieve the reliability standard. Considers that a reduction in the level of the MPC would lead to a reduction in costs to consumers.	Noted. See chapter 6.

Table A.19 Level of MFP

Organisation	Substantive point being made	Panel comments
MEU (pp. 4, 12, 23-24)	Considers that the MFP should have been modelled on shorter cycling periods because the times that market prices are negative occur for shorter periods than a week ahead outlook. Therefore, considers that the level of the MFP should remain at -\$1,000/MWh.	Noted. See chapter 6.

Organisation	Substantive point being made	Panel comments
Snowy Hydro (pp. 1-3)	Concerned that, if the pricing envelope bounded by the MFP and MPC was reduced in magnitude, it would introduce sovereign risk for long term investments. Also considers that the MFP should be based on the same approach to the MPC, whereby the level of the MFP is assessed on how to encourage new entrant technologies to alleviate excess generation. Argues that the level of the MFP needs to be sufficiently negative in value to allow for economic cycling and to account for future growth in renewable generation that are based on shorter cycling.	Noted. See response to MEU above and chapter 6.

Table A.20 Regional MPCs

Organisation	Substantive point being made	Panel comments
MEU (pp. 15-19)	Based on ROAM's modelling, considers that the highest MPC trace is associated with South Australia and that this is setting a higher level of MPC than required across the NEM regions, which have lower MPC traces. Argues that maintaining the reliability standard and MPC across the NEM imposes unnecessary costs on consumers in regions where the MPC could be lower and still achieve the standard. Proposes that if the MPC is weighted in proportion to demand or consumption in each region, then this would produce the most equitable outcome if a single MPC is used.	Noted. See chapter 6.
Origin Energy (p. 2)	Notes the disparity between regions for the MPC under the cap defender approach. Considers that a single reliability standard and reliability settings should apply across the regions, noting the difficulties outweigh the economic	Noted. See chapter 6.

Organisation	Substantive point being made	Panel comments
	benefit of having multiple MPCs. It considers that this is consistent with the Panel's view in 2007.	

A.3 Submissions on the Panel's draft report

The Panel published the draft report on 13 March 2014. Eight submissions and three supplementary submissions were received from stakeholders.¹⁸⁶ The key issues are summarised below.

A.3.1 Summary of issues about the reliability standard

Table A.21 Form and level of the reliability standard

Organisation	Substantive point being made	Panel comments
AEMO (pp. 1-2), AGL Energy (p. 1), Alinta Energy (pp. 1-2), GDF Suez (p. 1), Grid Australia (p. 1), MEU (p. 3), Origin Energy (p. 1)	Support maintaining the current form and level of the reliability standard.	No changes will be made to the current form and level of the reliability standard. See sections 5.1.4 and 5.2.5 for further discussion.
AEMO (pp. 2, 10)	Considers that the communication of the level of the reliability standard in the draft report excluded reference to it being an expected outcome i.e. an average based on a probabilistic assessment covering different demand levels and power plant availability. This potentially leads to wrong expectations being set and is inconsistent with the current	The Panel supports AEMO's view that the reliability standard is a planning standard which is expressed in terms of the maximum amount of electricity expected to be at risk of not being supplied to consumers, per financial year. To ensure that this is clear, the Panel has amended references

¹⁸⁶ As the stakeholders' supplementary submissions on the draft report did not present any new issues from the respective stakeholders' original submissions on the draft report, these have not been included in the tables below.

Organisation	Substantive point being made	Panel comments
	<p>description of the reliability standard.</p> <p>Proposes the final report clarifies that the level of the reliability standard is a probabilistic standard, where the standard is considered met if it is expected to be met on average in the longer term, taking into account any trends in demand and plant performance.</p> <p>Also proposes the current description of the reliability standard, as currently published, be reworded to include discussion on compliance. That is, insert the following text:</p> <p>"Compliance with the Reliability Standard</p> <p><i>Year-by-year 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.</i></p> <p><i>Compliance with the Reliability Standard is based an assessment of whether the standard is expected to be met on average in the longer term. This should take into account actual plant performance and demand characteristics and any trends these are following."</i></p> <p>Considers the next review should address the form of the reliability standard in more detail, and take into account: changes in the composition of generation mix; growth in customer self-generation and DSP; potential additional criteria; and link with VCR.</p>	<p>to the reliability standard in this final report, as appropriate.</p> <p>With respect to AEMO's proposal to amend the description of the published reliability standard to include a discussion on compliance, the Panel notes that no other stakeholders raised this as an issue in submissions on the issues paper and draft report. In light of this, the Panel considers that the current description is sufficiently clear and unlikely to cause significant confusion among stakeholders. It has therefore not made the change proposed by AEMO.</p> <p>See section 5.1.3 for further discussion on this matter.</p>

Table A.22 Value of customer reliability

Organisation	Substantive point being made	Panel comments
AEMO (p. 3)	Supports development of a methodology for VCR to determine the efficient reliability standard before the next reliability standard and reliability settings review. AEMO expects to publish VCR values for all NEM regions in September 2014.	<p>A methodology to derive an appropriate estimate of VCR for use in determining the efficient reliability standard will be developed by the AEMC or the Panel (as appropriate) to help inform the identification of an economically efficient reliability standard.</p> <p>To assist in the process of developing VCR that more accurately represents the true value(s) placed on reliability by customers, the Panel encourages market participants to participate in AEMO's national VCR review.¹⁸⁷</p> <p>See sections 5.3.3 and 5.3.4 for further discussion on this matter.</p>
AGL Energy (p. 1), Origin Energy (p. 1)	<p>Developing a methodology for linking VCR to the reliability standard will not be straightforward. Reiterates caution in incorporating VCR calculations into the reliability standard.</p> <p>AGL Energy prefers maintaining the existing reliability framework, unless there is a full cost-benefit analysis to identify the issues of making a change.</p>	As above.
Alinta Energy (pp. 2-3)	Unconvinced in not linking VCR and the MPC. Considers that the \$30,000/MWh used in ROAM's modelling to associate with the reliability standard suggests that the MPC is inconsistent with VCR. Therefore, argues that there is a bias towards transmission build to achieve the reliability	The Panel acknowledges the views of Alinta Energy. The Panel's approach to considering the relationship between VCR and the reliability standard (rather than between VCR and the MPC) is consistent with the AEMC's reason in its advice to SCER in December 2013. The AEMC

¹⁸⁷ See www.aemo.com.au.

Organisation	Substantive point being made	Panel comments
	standard over the generation build and DSP, which has not been resolved.	recommended linking the reliability standard and reliability settings in the wholesale energy market with VCR. ¹⁸⁸ See section 5.3.3 for further discussion on this matter.
GDF Suez (p. 1)	Supports development of a methodology for VCR, subject to stakeholder consultation.	Noted.
Grid Australia (pp. 1-2)	Supports exploring further linkages between VCR and reliability settings and reliability standard. However, notes developing a methodology for linking VCR to the reliability standard will be a significant task.	Noted.

A.3.2 Summary of issues about the MPC

Table A.23 Level of MPC

Organisation	Substantive point being made	Panel comments
AEMO (pp. 3-5)	Supports maintaining the current level of the MPC in real terms. However, neither the extreme peaker approach nor the cap defender approach should be used to set the recommended MPC because: <ul style="list-style-type: none"> The extreme peaker approach forms the upper bound of 	The Panel notes AEMO's views in relation to the limitations of the two modelling approaches. This matter is discussed further in chapter 6. The Panel notes AEMO's views in relation to the limitations of the two modelling approaches. This matter is discussed further in chapter 6. As noted in this report, the AEMC or the Panel (as appropriate) intends to consider further the role of modelling in recommending the appropriate level of

¹⁸⁸ AEMC 2013, *Advice to SCER on linking the reliability standard and reliability settings with VCR*, Final Report, 20 December 2013, Sydney. See www.aemc.gov.au.

Organisation	Substantive point being made	Panel comments
	<p>the appropriate level of MPC (i.e. a high estimate of required MPC for a peaking generator at the MPC), which may create trading retailer risk and customers cannot directly react to wholesale prices that are above their willingness to pay.</p> <ul style="list-style-type: none"> Although the cap defender approach is more realistic in assessing the MPC level required for delivering the reliability standard, it is unknown whether the MPC level will be too high or low due to its sensitivity to certain assumptions. <p>Prior to the next reliability standard and reliability settings review, the robustness of the cap defender results should be tested against changes in base assumptions.</p>	<p>the MPC in its review of the methodology for future reliability standard and reliability settings reviews. However, this will not constrain the Panel as to which model it will use in the future.</p>
<p>AGL Energy (p. 1), Grid Australia (p. 1), Origin Energy (p. 1)</p>	<p>Supports maintaining the current level of the MPC.</p>	<p>Noted.</p>
<p>Alinta Energy (pp. 2-4)</p>	<p>Did not support the Panel's draft analysis and recommendations for maintaining the current reliability settings (particularly the MPC), labelling them arbitrary, imprecise, unscientific and inconclusive or weak.</p> <p>Considers the Panel's proposals to undertake a number of further reviews prior to the next reliability standard and settings review as undesirable, and suggests this means the current reliability standard and reliability settings review has not fully met its objectives.</p> <p>The first question in assessing the MPC should be: what is the purpose of the MPC? The sole purpose of the MPC is to signal scarcity of supply in the market, and not play a marginal role. The MPC should be high enough to be as</p>	<p>For the purposes of clarification, the Panel notes that the key objective of the MPC is to incentivise sufficient generation capacity and demand-side response to deliver the reliability standard. There are also other objectives, including limiting the financial burden, risk and price volatility. See section 6.1.5 and Appendix B for further discussion on this matter.</p> <p>The Panel acknowledges Alinta Energy's comments in relation to the two modelling approaches explored by ROAM, and its support of the outcomes of the extreme peaker approach. As noted in chapter 3, ROAM's modelling outcomes are one of a number of factors that have been considered in recommending the appropriate level of the MPC required to deliver the reliability standard. All things</p>

Organisation	Substantive point being made	Panel comments
	<p>least distortive as possible.</p> <p>The MPC should not be associated with managing risk, where risk is dealt with through other mechanisms e.g. the CPT, and over-the-counter and futures products for hedging.</p> <p>More flexibility is needed in the reliability settings (e.g. light-handed price regulation in the retail market) to promote competition in the spot market.</p> <p>The current MPC and cap defender-based MPC are values which create a significant market distortion. It assumes generators recover capital costs by relying on both spot price revenue and contract revenue which may not be appropriate for all businesses. This only reflects one particular business model and approach to the recovery of capital costs.</p> <p>Prefers the extreme peaker approach because it encourages new entrant investment to address scarcity of supply and allows for sufficient recovery of capital costs which caters for all business models. Under the extreme peaker approach, the MPC required is greater than the existing MPC and much greater than under the cap defender approach.</p>	<p>considered, the Panel is satisfied that the current level of the MPC remains appropriate to achieve the reliability standard from 1 July 2016, until such time as it is amended.</p> <p>The AEMC or the Panel (as appropriate) will consider further the role of modelling in recommending the level of the MPC required to deliver the reliability standard as part of the review of the methodology for future reliability standard and reliability settings reviews. This work is intended to increase transparency and provide clarity to market participants around the Panel's decision-making framework ahead of its next review (which is due to commence in 2017).</p> <p>See section 6.1.5 for further discussion.</p>
GDF Suez	<p>Supports maintaining the current level of the MPC, but the objectives of this measure and its methodology should be reviewed prior to the next reliability standard and reliability settings review. (p. 1)</p> <p>Considers that the current approach for setting the MPC is simplistic and excludes key risks, resulting in a low bias,</p>	<p>The Panel acknowledges GDF Suez's observations/views on the modelling approaches. This matter is discussed further in section 6.1.5.</p> <p>The Panel welcomes GDF Suez's suggestions in relation to the methodology for setting the level of the MPC (of which modelling is one component). The AEMC or the Panel (as</p>

Organisation	Substantive point being made	Panel comments
	<p>and a broader interpretation of the MPC that needs to be applied. (pp. 1, 2)</p> <p>Prefers the extreme peaker approach (with some adjustments to cater for risks to generators and investors) over the cap defender approach. The extreme peaker approach better assesses marginal capacity at which reliability is delivered and reflects capacity rewards for maintaining a reliable system. The cap defender approach: does not correctly price marginal capacity; confuses energy and capacity revenues; is subject to bidding behaviours; and underestimates required MPC to maintain reliability. (pp. 3-4)</p> <p>Proposes the following principles for setting the MPC:</p> <ul style="list-style-type: none"> • Set the MPC at a level that is marginally above new entrant levels to ensure the MPC does not deter investment i.e. use the extreme peaker approach and not the cap defender approach. • Modelled MPC is "risk adjusted" upwards by (say) over 10 per cent to allow for generator/investor risks. These risks would be based on stakeholder consultation. (pp. 4-5) 	<p>appropriate) will consider the suggested principles further in the context of the review of the methodology for future reliability standard and reliability settings reviews.</p>
MEU (pp. 3-21)	<p>Considers the Panel needs to provide more weight on market evidence in its considerations in assessing whether the reliability settings are achieving the reliability standard. Suggests that market evidence includes electricity price rises and no USE for the past 13 years.</p> <p>Questions why stability and predictability are now considered important but not in the past. Considers not</p>	<p>The Panel notes the MEU's concerns in relation to the recommendation to retain the current level of the MPC from 1 July 2016 (in real terms) and the MEU's comments regarding the assessment of the modelling before the next reliability standard and reliability settings review. The Panel is satisfied that retaining the current level of the MPC is sufficient to ensure the reliability standard will be satisfied from 1 July 2016, until such time as it is amended, without</p>

Organisation	Substantive point being made	Panel comments
	<p>changing the MPC for this reason is inconsistent with the NEO.</p> <p>Considers that there is market evidence that an MPC of \$10,000/MWh delivers more than the required reliability standard, which consumers are paying a premium for unnecessarily high reliability in the wholesale spot market where reliability has been infrequently breached.</p> <p>The Panel should have reduced the MPC in this review, given: the more robust modelling via the cap defender approach; lack of need for dispatchable generation over the next decade onwards; and market evidence. Not reducing the MPC and paying for more reliability than required are inconsistent with the NEO.</p> <p>Considers that the change in the MPC value in 2010 was based on a flawed model (extreme peaker approach), which resulted in \$12,500/MWh. Retaining this value would perpetuate a flawed model.</p> <p>Supports assessing modelling of the market, including the MPC, before the next reliability standard and reliability settings review. However, considers this defers the current review, which it considers to be disingenuous.</p>	<p>creating additional risk and costs for market participants, and ultimately consumers. The Panel has considered a number of factors, including the outcomes of modelling carried out by ROAM, to help inform this view.</p> <p>Recognising that stakeholders have expressed some uncertainty around the Panel's decision-making framework for this review, the Panel has recommended a review of the methodology for future reliability standard and reliability settings reviews.</p> <p>The Panel acknowledges the MEU's concern that applying a higher MPC than is necessary to deliver the reliability standard may result in customers paying more for their electricity than is necessary. However, the effect of lowering the MPC on prices to consumers will depend on a number of factors and may not be as straight forward as implied by the MEU.</p> <p>See section 6.1.5 for further discussion on these matters.</p>
Snowy Hydro (pp. 1-4)	Supports maintaining the level of the MPC at \$13,500/MWh from 1 July 2014, but suggests no indexation be applied until the next reliability standard and reliability settings review. See below on comments related to indexation of the MPC.	See section 6.4.1 for further discussion on this matter.

Table A.24 Indexation of MPC

Organisation	Substantive point being made	Panel comments
AEMO (pp. 6-7)	Supports ongoing indexation of the MPC to ensure the reliability standard will continue to be met as the cost of OCGTs changes over time. Future reviews of indexation should consider how wide the band is between upper and lower band estimates of OCGT costs and what impact this should have on the MPC estimate.	<p>The Panel does not recommend any changes to the current measure of indexation of the MPC and CPT. That is, the CPI should continue to be used to index MPC and CPT annually. However, the Panel does recommend that a review of the current indexation measure occurs within two years.</p> <p>See section 6.4.1 for further discussion on the measure of indexation.</p>
Origin Energy (p. 1)	Supports ongoing indexation of the MPC.	Noted.
AGL Energy (p. 1)	Supports maintaining the current manner of indexation via the CPI, for reasons of providing stability and certainty to investors and the market to date. Any change to the indexation method in future reliability standard and reliability settings reviews needs to have a strong case.	Noted.
Snowy Hydro (pp. 1-4)	<p>Originally proposed that the MFP should be indexed to align with the indexation of the MPC. However, given the Panel's position in the draft report, now proposes that the MPC and MFP should be left at nominal values until the next reliability standard and reliability settings review i.e. \$13,500/MWh for the MPC and \$1,000/MWh for the MFP from 1 July 2014 to 30 June 2020.</p> <p>This is because it considers: the MPC has a symmetrical relationship with the MFP; the MPC is an artificial construct; there is no need to increase MPC for new generation; and it preserves the current level of access to the regional</p>	<p>The Panel acknowledges the concern raised by Snowy Hydro that the effect of asymmetry on the levels of the MPC and MFP may erode the current level of access for some generators (in certain circumstances), which in turn may lead to a gradual change in the competitive balance of the market.</p> <p>While Snowy Hydro has provided one illustrative example of the potential effect of maintaining asymmetry between the MPC and MFP, the Panel would be interested in understanding further the potential effects under a wider</p>

Organisation	Substantive point being made	Panel comments
	<p>reference node (RRN) for intra-regional generators to sell forward hedge contracts in their own pricing region.</p> <p>Considers that the current market design was based on the premise of protecting access for intra-regional generation where the forward contracts market within a region should be preserved. On this basis, without symmetry of indexation between the MPC and MFP, the current level of access for some generators in certain circumstances could be eroded, leading to a gradual change in the competitive balance of the market.</p> <p>Where the MFP is currently non-indexed and the MPC is indexed, a generator within an intra-region can become further constrained over time. Gradually, the generator may be constrained off, which in turn creates a higher risk profile for generators, contractual liquidity, and lessens competition within that region.</p>	<p>range of scenarios.</p> <p>In addition, the Panel is conscious that the scope of this issue may be broader than reliability of the generation and bulk-transmission sector (for example, as it relates to matters concerning generator access and regional design of the market). As such, this issue would be better considered outside of this review. Alternatively, the matter could be raised in the context of the Panel's recommended future review of the current indexation measure.</p> <p>Notwithstanding the above, the Panel welcomes Snowy Hydro's observations and note their importance in highlighting that cycling impacts may not be the only consideration when reviewing the level of the MFP.</p> <p>See section 6.4.1 and the Panel's response to AEMO for further details.</p>
Alinta Energy (p. 6)	<p>Generally supports annual indexation of the reliability settings, which it considers to be a proxy for annual capital cost increases for new peaking plant. Considers that this means the MPC should be based on peaking investment capital costs (i.e. extreme peaker approach) with a yearly CPI. However, does not consider it appropriate for indexation to track peaker capital costs by adjusting an MPC that does not reflect capital costs (i.e. cap defender approach). Therefore, criticises a further indexation review because this would provide false comfort, where the nominal value of the MPC does not reflect capital cost recovery for peak generation.</p>	<p>Indexation was introduced to allow for the MPC and CPT to increase by the CPI during a four-yearly period prior to each reliability standard and reliability settings review. This was to account for the fact the AEMC did not support an annual or biennial review of the reliability standard and reliability settings. Tracking capital costs was therefore not the sole reason for indexation.</p> <p>See section 6.4.1 for further discussion on this matter.</p>
MEU (pp. 4, 22)	<p>Indexation of the MPC and CPT should be removed because the new cap defender approach does not rely on</p>	<p>Noted. See section 6.4.1 for further discussion on this</p>

Organisation	Substantive point being made	Panel comments
	capital cost assessments, where indexation is meant to track capital cost variation over time.	matter.

A.3.3 Summary of issues about the CPT

Table A.25 CPT level, indexation and review

Organisation	Substantive point being made	Panel comments
AEMO (p. 7), AGL Energy (p. 1), GDF Suez (p. 1), Grid Australia (p. 1), MEU (p. 3), Origin Energy (p. 1), AGL Energy (p. 1)	Support maintaining the current level of the CPT.	Noted. See section 6.2.5 for further details.
AEMO (pp. 7-8)	Proposes that the Panel recommends to the AEMC that the level of the APC, including indexation, should be included within the scope of any future CPT review and, more broadly, as part of the next reliability standard and reliability settings review. Also, the APC should be changed to a reliability setting, given the APC closely interacts with the reliability settings.	The Panel notes that, under the NER, the AEMC is responsible for developing, authorising, publishing and varying (from time to time) an APC for each region. Consideration of the level of the APC, including possible indexation, as well as arrangements around its governance, is therefore beyond the scope of this review. However, the Panel welcomes AEMO's suggestions, and notes that these may be better addressed as part of a rule change request or separate review. See section 6.2.4 for further discussion.
Alinta Energy (pp. 4-5)	Supports a separate review of the CPT further (that departs from the Panel's conclusions in this review). This separate review would cover broader risk considerations, including the separation of the relationship between the MPC and	Noted. See section 6.2.4 for further discussion on this matter.

Organisation	Substantive point being made	Panel comments
	CPT, and setting the CPT at a value that manages risks.	
MEU	<p>If the MPC was reduced, the CPT should also be reduced. (p. 4)</p> <p>Indexation of the CPT should be removed (as discussed above). (pp. 4, 22)</p> <p>Considers that the Panel has been selective in accepting ROAM's modelling regarding the link between the CPT and MPC, but not ROAM's modelling of the cap defender approach. However, agrees with maintaining the link between the MPC and CPT in the interim, subject to more research. (p. 21)</p>	<p>For the purpose of clarification, both the MPC and CPT have a role in capping risk in the wholesale spot market: while the MPC effectively caps half-hourly risk, the cumulative risk of high spot prices is capped by the CPT. Further consideration of the respective roles of the CPT and MPC is beyond the scope of this review. See sections 6.2.4 and 6.2.5 for further discussion on these matters.</p>
Origin Energy (p. 1)	Supports the ongoing indexation of the CPT.	Noted.

A.3.4 Summary of issues about the MFP

Table A.26 Level of MFP

Organisation	Substantive point being made	Panel comments
AEMO (p. 9), AGL Energy (p. 1), Grid Australia (p. 1), MEU (pp. 3-4)	Support maintaining the current level of the MFP.	Noted.
Snowy Hydro (p. 1)	<p>Considers the MFP provides an important investment signal to new technologies, such as battery storage, which are alternatives to excess generation from thermal generators. See above on comments related to the indexation of the</p>	<p>As noted above, the objective of the MFP is to provide a price signal aimed at incentivising efficient cycling decisions by generators at times of low demand. As such, the MFP has not historically been viewed as a tool to incentivise</p>

Organisation	Substantive point being made	Panel comments
	MPC.	generator investment. However, the Panel notes the view of Snowy Hydro that the level of the MFP may be used by investors in new technologies (such as battery storage) as a signal to operate in the market. This issue highlights that cycling impacts may not be the only consideration when reviewing the level of the MFP. However, in the context of this review, in the absence of sufficient evidence to support a change in the current level of the MFP, the Panel considers that it remains appropriate from 1 July 2016, until such time as it is amended.
Alinta Energy (pp. 5-6)	The MFP has other effects than as a turn-off signal, including strategic MFP bidding and no turn-off effect on wind generation, which lead to inefficient outcomes in the spot market and was not contemplated at the time the MFP was introduced. Deferring detailed consideration on these issues because of external policy settings, such as the RET and OFA, fails to address these issues. The Panel should consider options to minimise these inefficiencies.	<p>The Panel acknowledges the views of Alinta Energy. However, as noted in the draft report for this review, issues associated with strategic bidding, including its effect on efficient market outcomes, are expected to be considered in the context of the AEMC's OFA review, which is currently underway. These issues are also being considered as part of the South Australian Minister for Mineral Resources and Energy's rule change request in relation to bidding in good faith, and the AER's rule change request on generator ramp rates and dispatch inflexibility in bidding. It would therefore not be appropriate to consider a matter that is currently under the scope of separate review and/or rule changes.</p> <p>Further, with respect to issues associated with wind generation benefiting at times of MFP, the increasing levels of investment in renewable generation is being driven by external factors outside of the reliability settings. In particular, at this stage, there is uncertainty surrounding government carbon policy and the RET, which affects incentives and investment decision-making more generally.</p> <p>See section 6.3.4 for further details.</p>

Organisation	Substantive point being made	Panel comments
GDF Suez (pp. 1, 5)	Supports maintaining the current level of the MFP. Making the MFP less negative would blunt the oversupply signal, decrease response from generators and increase need for ongoing direction.	Noted.
AEMO (p. 9), GDF Suez (pp. 1, 5)	The OFA should better address issues associated with generator offers behind a binding network constraint, as opposed to changing the level of the MFP.	Noted.
Origin Energy (p. 2)	The level of the MFP should be reviewed in more depth at the next reliability standard and reliability settings review, taking into account the impact of renewable generation, when climate change policies will likely to be clearer.	Noted. See section 6.3.4 for further discussion on this matter.

A.3.5 Summary of other issues

Table A.27 Regional MPCs

Organisation	Substantive point being made	Panel comments
AEMO (p. 6)	Supports maintaining one NEM-wide MPC, given the complexity and potential peculiar market incentives created by different MPCs for the different NEM regions which outweighs any positive benefits.	The Panel has decided not to review this matter further. See section 6.1.5 for further discussion on this matter.
Origin Energy (p. 1)	Supports maintaining one NEM-wide MPC, given regional MPCs would be impractical and likely distort the market.	Noted.
MEU (p. 3)	Supports a single MPC between regions.	Noted.

B Introduction of the reliability standard and reliability settings to the NEM

This appendix provides a summary of the early proposals made by National Electricity Code Administrator (NECA), and final decisions made by the Australian Competition and Consumer Commission (ACCC), in relation to the introduction of the reliability standard and the reliability settings in the National Electricity Market (NEM).

B.1 Reliability standard

Prior to the commencement of the NEM in 1998, each jurisdiction established its own standards for reliability and applied these in decisions relating to the installation of new generation capacity.¹⁸⁹ Long standing practice had generally been to manage the number of times interruptions to supply were likely. This was achieved by ensuring that sufficient generation reserve was available to replace the failure of the largest one, two or three generating units relatively quickly (the number varied between jurisdiction and over time).

In 1998, NECA's Reliability Panel conducted a review to determine the power system reliability standards to apply in the new NEM. It also needed to form the guidelines for market intervention by National Electricity Market Management Company (NEMMCO) as a last resort to maintain the reliability standard.¹⁹⁰ The Panel's review was informed by advice from NEMMCO which was based on:

1. setting a level of reliability which "relates as directly as possible to the continuity of supply to customers"; and
2. developing a threshold level of generation reserve as a trigger for NEMMCO intervention.

In respect of the reliability standard, the Panel considered both the units of measurement of reliability; and the level of reliability to apply in the national market:

- On the former, it determined to adopt the percentage of unserved energy (USE) in a region as the relevant measure of reliability.¹⁹¹ This decision was guided by the Panel's view that the reliability standard in a market environment should be focussed towards individual customer reliability, rather than on managing the

¹⁸⁹ NECA Reliability Panel 1998, *Power system reliability standards and guidelines for market intervention, Discussion Paper*, February 1998, p. 17.

¹⁹⁰ See: NECA Reliability Panel 1998, *Power system reliability standards and guidelines for market intervention, Discussion Paper*, February 1998; NECA Reliability Panel 1998, *Determination on reserve trader and direction guidelines*, June 1998.

¹⁹¹ The measures developed for use by utilities under the centralised industry structure varied widely, from simple capacity margins through to sophisticated statistical indicators focussing on particular aspects of reliability (for example, the amount of energy likely not to be able to be supplied (USE) and the number of hours in a period in which some load will not be able to be supplied).

number of occurrences of interruption (the focus of the previous jurisdictional based reliability standards).

- On the latter, the Panel determined that the reliability standard in the national market would be set at a maximum of 0.002 per cent of USE in any region over the long term. The level of reliability was the critical element of the Panel's determination. The major issue for the Panel, at the time, was "a desire to introduce a common approach across the National Market at a level which balances natural energy market outcomes and avoids undesirable reliability shocks." The Panel noted that it was "acutely aware of the risk of destroying confidence in the reform process by setting inappropriately high or low standards for the opening of the market."¹⁹²

The Panel, therefore, established a uniform approach to the NEM's reliability standard at approximately the same level as the existing standard in each jurisdiction. This was "an on balance decision, taking into account the stage of development of the market and an assessment of wider community expectations".¹⁹³

B.2 Reliability settings

B.2.1 Market price cap and cumulative price threshold

Inclusion of a price cap in the NEM design

In general, competitive markets do not have a price cap. Inclusion of a price cap in the NEM design required authorisation under the *Trades Practices Act 1974* by the ACCC at the time the National Electricity Code (Code) was authorised.¹⁹⁴

The ACCC accepted that a price cap was warranted in the early stages of the market to guard against the consequences of unmanageable market risk at what was anticipated would be a potentially volatile and uncertain period. Inclusion of a price cap was also justified on the basis of there being minimal opportunities available for demand-side response to actively participate in the market. The ACCC recognised that such opportunities were an important mechanism for buyers to counteract the potential price setting power of the supply-side.¹⁹⁵

¹⁹² NECA Reliability Panel 1998, *Determination on reserve trader and direction guidelines*, June 1998, p. 8.

¹⁹³ *ibid.*

¹⁹⁴ In November 1996, NEMMCO and NECA formally applied to the ACCC for authorisation of the National Electricity Code (Code) under the Trade Practices Act. The submission that accompanied that application set out the rationale for including a price cap (termed value of lost load (VoLL)) in the NEM design.

¹⁹⁵ Without price transparency to end-use customers, there is little incentive for them to reduce load at times of high market prices. Under these circumstances, retailers have no option but to continue to supply at a potentially substantial loss. A cap on these potential losses was considered desirable in view of this lack of short term elasticity of demand.

In seeking approval from the ACCC for the price cap, NEMMCO and the NECA recommended that the value of lost load (VoLL) (the term given to the market price cap) initially be set at \$5,000/MWh. This value was considered appropriate to ensure that market risks were capped at an acceptable level. It was also noted that this value was consistent with that used in the England-Wales market at that time.¹⁹⁶

In its determination, the ACCC acknowledged that the proposed value of VoLL was arbitrary. However, it recognised that it was not in a position to recommend a more appropriate level. The ACCC accepted the proposed level of \$5,000/MWh and anticipated that a revision would occur within 12 months of market start, and annually thereafter.¹⁹⁷

Review of VoLL by the Reliability Panel

In July 1999, in line with its obligations under the Code, NECA's Reliability Panel commenced its first annual review of VoLL.¹⁹⁸ In the issues paper for the review, the Panel considered the role that VoLL was intended to play in the market. It noted the following:¹⁹⁹

“The Code's term, "VoLL" is an acronym for "value of lost load", suggesting its role in the market is that of surrogate bid, representing the price at which customers will be indifferent to having their loads curtailed.

The Code also refers to VoLL as a "price cap", as did the application to the ACCC authorising the Code. This suggests VoLL's role is to balance the objectives of allowing unfettered market operation on the one hand, and maintaining an acceptable risk environment on the other.”

¹⁹⁶ The Electricity Pool of England and Wales (the Pool) was a mandatory auction spot market established in 1990. The Pool included capacity payments to encourage generators to invest and provide reserve capacity. Capacity payments were aimed at reflecting the expected cost to the user of a supply interruption, measured by VoLL. VoLL was set administratively at £2,000/MWh in 1990 and was then increased annually by the retail price index. In 2000, it stood at £2,816/MWh.

¹⁹⁷ Following approval of the National Electricity Code at market start, the ACCC was responsible for authorising any changes to the Code, including changes to the level of the reliability settings. Following a number of subsequent changes to the Code (which included requiring the NECA Reliability Panel to conduct, in consultation with market participants, annual reviews of the level of VoLL in the NEM), the ACCC is no longer involved in decisions relevant to the market price cap.

¹⁹⁸ NECA Reliability Panel 1999, *Review of VoLL in the national electricity market, Issues Paper*, 12 May 1999; NECA Reliability Panel 1999, *Review of VoLL in the national electricity market, Final Report*, July 1999.

¹⁹⁹ NECA Reliability Panel 1999, *Review of VoLL in the national electricity market, Issues Paper*, 12 May 1999, p. 11.

The Panel considered that clarification of the role of VoLL in the NEM was a vital first step as it would ultimately lead to its recommendation on how the level of VoLL was set. The Panel concluded the following:²⁰⁰

“The primary role of VoLL should be that of a price cap which strikes a balance between allowing the market to clear with minimal intervention and containing market risk to tolerable levels. A secondary role, that of surrogate bid, would only be appropriate if it was concluded that significant ongoing intervention by the market operator to clear the market was inevitable. It would then be reasonable for the focus of the price cap to shift to promoting economically-appropriate prices during intervention.”

The core principle guiding the Panel's review of VoLL was, therefore, the need to balance the ability of the market to consistently clear on a voluntary basis, within the reliability standard set by the Panel, in all but the most extreme circumstances, against risk. The strength of the incentive provided by the market price at peak times was, therefore, considered critical in satisfying the core principle.²⁰¹

In reviewing the appropriateness of the initial level of VoLL, the Panel found that a price cap of \$5,000/MWh would be unlikely to maintain supply reliability consistent with the reliability standard, without some form of central intervention. In other words, the level of VoLL was too low to ensure the market would continue to consistently clear on a voluntary basis.²⁰²

In considering a more appropriate level of VoLL, the Panel analysed possible supply and demand-side responses. On the supply-side, the Panel found that VoLL would need to be set at a level of at least \$10,000/MWh, and possibly as high as \$20,000/MWh, in order for there to be a reasonable prospect of supply-side resources emerging to voluntarily clear the market for all but the five hours per year over the long run (the reliability standard).

While very aware of the limitations of available data on end-use customer value of lost load, the Panel nonetheless concluded that a significant demand-side contribution would be unlikely below a level of at least \$15,000-\$20,000. That is, at the level at which a marginal supply-side response was probable.

In its assessment of the public benefits of increasing VoLL to \$20,000/MWh, NECA argued that it was important to examine the increase in VoLL in conjunction with the development of a cumulative price threshold (CPT). It considered that imposing a cap (the administered price cap (APC)) on the market price, if the cumulative effect of high

200 Ibid, p.12.

201 NECA Reliability Panel 1999, *Review of VoLL in the national electricity market, Final Report*, July 1999, p. 6.

202 While the Panel recognised that there were a number of new investments occurring and planned, it did not consider that these were not demonstrative of the core principle (that is, the ability of the market to clear voluntarily) being met purely from market signals at peak times.

spot prices exceeded a threshold level (the CPT), would balance the increase in risk that would be introduced into the market with an increase in VoLL.²⁰³

NECA argued that the joint impact of VoLL and the new CPT meant that, while hourly risk was still capped to the level of VoLL, the cumulative effect would now be capped by the CPT. The rate at which risk would accumulate would be directly related to the level of VoLL. Therefore, risk, due to short periods of extreme prices, would be higher under the proposed changes, but the accumulated level would be capped by the CPT.

The Panel subsequently recommended that the following changes be made to the Code:

- VoLL be increased in two steps: to \$10,000/MWh in September 2001; and to \$20,000/MWh in April 2002.
- A rolling three-year schedule of VoLL be introduced, extended by one year in each annual review.
- A cap on the market price be imposed if the cumulative effect of high spot prices exceeded a threshold level. Specifically, if the spot price in the preceding week (336 trading intervals) exceeds a cumulative price threshold (CPT) of \$300,000, the market price cap would be reduced to the APC.²⁰⁴

In effect, NECA's proposed Code changes sought to separate the economic price signalling and risk capping roles that VoLL had previously provided. The changes would ensure that VoLL was set primarily on the basis of the market clearing signal it would provide with the revised force majeure provisions. The CPT would be the primary codified mechanism for capping risk.

On 29 September 1999, NECA lodged an application with the ACCC for authorisation of the recommendations made by the Reliability Panel in the VoLL review.²⁰⁵

Authorisation of changes to VoLL by the ACCC

In its determination on the proposed changes, the ACCC stated that an increase to \$20,000/MWh would introduce significant additional risk to market participants, which might not easily be accommodated. It also expressed concerns over potential generator market power and possible consequences for higher power prices across the NEM resulting from the higher price cap.

203 The CPT was considered to provide a more certain cap on risk than the previous force majeure provisions. Under the force majeure provisions, an administered price would be triggered by a period of involuntary load shedding. In contrast, the CPT mechanism provided an objective trigger based on price.

204 The Reliability Panel recommended that the CPT be set to the same level as the initial force majeure limit. This meant that the APC would be applied after 30 hours of VoLL if VoLL was at \$5,000/MWh and 7.5 hours if VoLL was set to \$20,000/MWh.

205 This application was accompanied by a number of other applications for changes to the Code in relation to capacity mechanisms and price floor arrangements.

The ACCC acknowledged that the proposed increase in VoLL would provide a public benefit on the basis that it would encourage investment in peaking capacity in circumstances where demand peaks occur for only a few hours a year. However, it did not consider that the other major public benefit presented by NECA (that VoLL provided the incentive for reliability of supply through improved demand-side response) had been demonstrated. As such, the ACCC did not consider that an increase in VoLL to \$20,000/MWh would deliver sufficient public benefit to outweigh the potential anti-competitive detriments noted above.

The ACCC noted NECA's arguments that the CPT provisions were intended to replace VoLL as the primary mechanism for controlling risk in the NEM. It noted NECA's argument that any additional risk, introduced through an increase in VoLL, would be manageable through the CPT. However, the ACCC questioned the degree to which the CPT, if set at the value proposed by NECA, would provide protection to market participants from high spot prices.

In effect, the spot price would need to remain at \$20,000/MWh for up to 7.5 hours before an APC was triggered. The ACCC considered that sustaining prices at that level for that period of time would impose significant additional risk on market participants (in particular retailers). However, it considered that this risk could be mitigated to some extent by either setting VoLL at a level less than \$20,000/MWh, and/or setting the CPT at a level below the proposed \$300,000.

The ACCC, therefore, proposed to limit the increase in VoLL to \$10,000/MWh, and to delay the increase until April 2002 to allow market participants sufficient lead-time to put in place necessary arrangements to accommodate the increase in risk. The ACCC also determined to reduce the CPT to \$150,000, reducing the risk of market participants being exposed to prolonged periods of high prices.

B.2.2 Market floor price

Prior to market start, the Code required all slow start generators to provide at least one negative, offloading bid, reflecting the amount that they would be prepared to pay to remain on line at minimum load. Despite the obligation to input one such bid, and the right to offer any further load at negative prices if a generator or market network service provider wished to do so, the Code prohibited the pool price seen by market customers going below zero. In the instance an excess generation period was declared, the pool price for customers was set to zero, while generators would be charged for supply at the negative clearing price.

In its 1997 determination on the National Electricity Code, the ACCC noted its intention to allow the existing zero spot floor price to continue, but only as an interim measure. It considered that retaining the floor, at least initially, would address concerns in relation to the maturity of the demand-side response market. However, a condition of authorisation was that the Code be amended to remove the zero spot price

floor during an excess generation period within one year from market commencement.²⁰⁶

In September 1999, NECA proposed a Code change necessary to fulfil this obligation. The following amendments were proposed:

- Remove the zero price floor and the accompanying excess generation provisions that were necessary to allow controlled off-loading of generators.
- Implement a new negative price floor, initially set at $-\$1,000/\text{MWh}$. A floor at some level is essential in order to set a bound on the despatch algorithm and provide some cap on the risk to participants. The level of the market floor price will be reviewed by the Reliability Panel concurrently with its next review of the market price cap of VoLL.
- Provide for negative administered prices, based on arrangements that precisely mirror the ceilings represented by the APC at the top end of the market.²⁰⁷

NECA argued that the proposed Code changes would allow the market to move freely between positive and negative prices using the same mechanisms, thus improving the price signals in the market by allowing customers to see the marginal value of electricity more often. It also added that initially setting the market floor price at $-\$1000/\text{MWh}$, significantly below the lowest current market outcome for dispatch prices, would ensure that it did not interfere with the normal clearing of the market, while providing some protection to participants from extremely high prices.

Further, NECA argued that as well as capping participant risk, a price floor at some level is essential in order to set a bound in the dispatch algorithm.

On 20 December 2000, the ACCC made a determination on NECA's proposal. The ACCC reiterated its view put forward in 1997 that not allowing market customers to see negative prices had anti-competitive effects that impact on the efficiency of market outcomes. It argued the following:

- Retaining non-negative pricing for market customers would deny them the market benefits of negative prices at times of low demand. The ACCC considered that, in a market where customers are exposed to positive pricing outcomes in times of high demand, there is generally no justification for asymmetry in the rare event of a negative price outcome.
- Non-negative pricing distorts price signals by not allowing the market to function unimpeded and formulate an appropriate response. The ACCC noted that prices provide a signalling mechanism to customers; if customers are not exposed to appropriate pricing, then the efficiency benefits arising from changing demand patterns are lost.

²⁰⁶ ACCC, Applications for Authorisation, National Electricity Code, 10 December 1997, pp.76-82.

²⁰⁷ NECA, Removal of zero price floor, September 1999.

The ACCC considered that the amendments proposed by NECA to the Code would address these concerns. It considered that a floor price of -\$1000/MWh would provide customers with the benefits of negative prices at times of low demand and would allow the appropriate market signals to be sent, thereby removing a possible source of distorted market behaviour.

C Current and past work related to the reliability standard and reliability settings

The Reliability Panel (Panel) has undertaken a number of reviews examining the reliability standard and reliability settings in the past. These reviews include the Panel's Comprehensive Reliability Review completed in 2007, and the most recent review of the Reliability Standard and Reliability Settings completed in April 2010.

In addition, more recent reviews relevant to this 2014 Reliability Standard and Reliability Settings Review include the AEMC's Value of Customer Reliability (VCR) review, and AEMO's 2013-14 VCR review. These reviews are particularly relevant, given the number of stakeholders who have commented on the link between VCR and the reliability standard and reliability settings.

C.1 Comprehensive Reliability Review (2007)

The Comprehensive Reliability Review was completed by the Panel in 2007.²⁰⁸ The review, carried out with extensive consultation with stakeholders, considered the level and scope of the reliability standard, the provisions for the reliability settings, as well as the Reliability and Emergency Reserve Trader (RERT) and the availability of information in the National Electricity Market (NEM). The Panel's recommendations from this review was submitted as a rule change request from the Panel to the AEMC for its determination.

The Panel's conclusions for the review in 2007 were as follows:

- The use of unserved energy (USE) were maintained as the form of the reliability standard. However, changes were made to the description of the standard to increase clarity. Stakeholders' submissions on this review supported maintaining the use of USE.
- The level of the reliability standard remained at 0.002 per cent of USE. This was because any tightening of the reliability standard could have a substantial cost in terms of signalling the need for new investment. In addition, 0.002 per cent of USE was comparable to other jurisdictions. There was also no support from stakeholders to change the level of the standard.
- The level of the MPC should be increased from \$10,000/MWh to \$12,500/MWh, effective 1 July 2010. This recommendation took into consideration modelling carried out by CRA International and the views of stakeholders. (Following the AEMC's consideration of the Panel's rule change request, the AEMC made a rule to adopt the recommended MPC).
- The level of the cumulative price threshold (CPT) should remain at 15 times the value of the MPC (\$12,500/MWh) – that is, it should be set at \$187,500 from 1

²⁰⁸ Available at: www.aemc.gov.au.

July 2010. The philosophy underpinning the establishment of the CPT was to act as a financial safety net without hindering investment. The Panel considered that the level of the CPT should only be exceeded in extreme conditions, and increasing it would add to the financial risks imposed on market participants without a corresponding reduction in USE.²⁰⁹

- No changes should be made to the level of the market floor price (MFP) of - \$1,000/MWh. The modelling undertaken by CRA International suggested that the level of the MFP was unrelated to investment signals and, therefore, the setting would have little or no effect on USE. Stakeholders also supported no change in the level of the MFP.

C.2 Reliability Standard and Reliability Settings Review (2010)

The Panel completed a review in April 2010 which, similar to this current 2014 review, required the Panel to examine the reliability standard and reliability settings that should apply from 1 July 2012.²¹⁰ In undertaking the 2010 review, the Panel considered stakeholders' views and modelling undertaken by ROAM Consulting (ROAM). The Panel's recommendations from this review was submitted as a rule change request from the Panel to the AEMC for its determination.

The Panel's conclusions for the 2010 review were as follows:

- The Panel determined to maintain the current form and level of the reliability standard at 0.002 per cent of USE. The Panel did not consider there was any compelling evidence that changing the reliability standard would provide net benefits, and considered that the costs of delivering the reliability standard and the benefits to customers appeared to be balanced at the existing level. Stakeholders also generally supported maintaining the existing form and level of the reliability standard. The Panel did, however, make changes to the description of the reliability standard to clarify the application of, and compliance with, the standard.
- The Panel recommended that the level of the MPC should be maintained at \$12,500/MWh and, similarly, the level of the CPT should be maintained at \$187,500. The Panel expressed concern that increases in the MPC may reach a tipping point beyond which the benefits of increasing the MPC (and CPT) would not offset the costs in terms of market risks. These risks included prudential risk, risk associated with increasing price volatility, and the potential for increased outages and congestion to occur.
- The Panel recommended that the MPC and CPT should be indexed on an annual basis. While the Panel did not recommend an increase in the level of the MPC or

²⁰⁹ Following this review, the Panel submitted a rule change request to give effect to its recommendations. The AEMC made a rule to adopt the recommended CPT of \$187,500 from 1 July 2010).

²¹⁰ Available at: www.aemc.gov.au.

CPT, it considered that if the levels of the MPC and CPT were fixed for too long a period, the real values would be eroded. In addition, the Panel recommended the introduction of an annual review process to determine whether: higher increases in the levels of the MPC and CPT would be necessary; and any significant changes had occurred over the financial year to the economics and mechanism for delivering the reliability standard.

- With respect to the MFP, the Panel noted that few stakeholder submissions to the review had commented on the MFP, and there was no evidence to support a change to the MFP. Therefore, the Panel did not make any recommendations to change the MFP.²¹¹

C.3 Review of the Effectiveness of the NEM Security and Reliability Arrangements in light of Extreme Weather Events (2010)

The Review of the Effectiveness of the NEM Security and Reliability Arrangements in light of Extreme Weather Events (Extreme Weather Events Review) was completed by the AEMC in 2010.²¹² It involved a review of the current arrangements for managing security and reliability in the NEM under the scenario that extreme weather events become more frequent. In undertaking this review, the AEMC considered stakeholders' views and modelling undertaken by ROAM, which was peer reviewed by EGR Consulting. The AEMC's recommendations from this review was submitted to the Ministerial Council on Energy for its consideration.

The AEMC made the following recommendations for the review as it related to the reliability standards and reliability settings:

- Efficient investment in reliability across the supply chain can be achieved by investing to VCR for those consumers most affected by the investment. The AEMC recommended that, for generation investment, VCR for residential consumers should be used because this class of consumer placed the lowest value on reliability and would usually shed first during a reliability event. For transmission network investments, the AEMC recommended that VCR should reflect the class or classes of consumers that would be affected by the investment.
- The Annual Market Performance Review (AMPR), currently undertaken by the Panel, should be expanded to better examine: the performance of the power system as a whole (as experienced by consumers at the point of consumption); and the individual segments of the power system (including distinguishing between main system reliability and security events). The AEMC should review the findings of the AMPR from the perspective of market design and, if it was

²¹¹ Following the AEMC's consideration of the Panel's rule change request (submitted after this review), the AEMC made a rule for the MPC and CPT to be indexed annually. The Panel's proposed annual review process was replaced by a requirement for a four-yearly comprehensive review of the reliability standard and reliability settings, including a review of the indexation provisions, to be undertaken by the Panel.

²¹² Available at: www.aemc.gov.au.

found that the current market design would no longer efficiently meet the expectations of consumers for quality of supply, changes should be recommended to the Ministerial Council on Energy (MCE), as appropriate.

- An arrangement that would allow a different MPC in each region to recognise differences in jurisdictional reliability expectations was examined. The AEMC recommended that an arrangement allowing the level of the MPC to vary between regions should not be pursued further. Introducing new regional specific arrangements into the interconnected NEM would most likely be detrimental to overall NEM efficiency and would be unlikely to contribute to the achievement of the national electricity objective. Such an arrangement would also present problematic implementation issues. In addition, the AEMC considered that introducing multiple MPC values was unnecessary, given the assumption that the reliability expectations of residential consumers were consistent in all NEM regions.
- An explicit requirement for the reliability standard and reliability settings to reflect the level of reliability valued by consumers should be included in the National Electricity Rules (NER).
- The MPC and VCR should be checked against each other to assess whether the reliability parameters are consistent with the value that consumers place on reliability.
- The reliability standard and reliability settings should be reviewed, and amended where necessary, by the AEMC every five years.
- The reliability standard and reliability settings should be specified and given effect in a schedule referred to in the NER.
- AEMO should use the same VCR for its transmission planning activities as used for determining the reliability parameters.
- The methodology and assumptions that should be applied to determine the reliability standard and reliability settings, minimum reserve levels (MRLs) and VCR should be subject to public consultation, and should be established before the process for determining these parameters commences.
- The AEMC considered some of the possible alternative market mechanisms which could be implemented to deliver satisfactory reliability in the NEM, including a capacity market, forms of standing reserve and a reserve ancillary service. The AEMC considered that implementation of alternative mechanisms was not needed, at that stage, as there was no evidence to suggest that reliability in the NEM had not been achieved with the application of the current reliability standard and reliability settings.

C.4 AEMC's Advice to SCER on Linking the Reliability Standard and Reliability Settings with VCR (2013)

The AEMC provided advice to the Standing Council on Energy and Resources (SCER) in 2013 on linking the reliability standard and reliability settings in the wholesale electricity market with VCR.²¹³ SCER requested this advice in response to the AEMC's Extreme Weather Events Review in 2010.

In the Extreme Weather Events Review, the AEMC made a number of recommendations to SCER, including a recommendation for a new requirement in the NER for VCR, based on the residential consumer class, to be considered when determining the level for the reliability standard and recommending the levels for the reliability settings.

SCER provided a response to the AEMC's final recommendations for that review in 2012. While the majority of the AEMC's recommendations were endorsed, SCER requested additional advice on the matter of setting the reliability standard and reliability settings with reference to agreed VCR.

In its advice to SCER, the AEMC indicated its preferred approach for linking the reliability standard and reliability settings in the wholesale electricity market with VCR. The approach was similar to the current process for determining the wholesale electricity market reliability standard and recommending the reliability settings. The key difference was the inclusion of a requirement for VCR, estimated for the customers most affected by a supply shortfall, would be used as a cross-check on the reliability standard.

This approach would provide for the level of supply reliability to customers, from the generation and bulk-transmission sectors of the NEM, to broadly reflect the value that customers place on receiving a reliable supply of electricity. This would promote efficient market outcomes that would be, at least, consistent with those delivered by the NEM's current reliability standard and reliability settings.

C.5 AEMO's National Value of Customer Reliability Review (2013 to 2014)

AEMO is currently undertaking a national review of VCR.²¹⁴ AEMO's VCR review has some relevance to the Panel's current 2014 review because it proposes national VCR which could be considered in the context of the reliability standard.²¹⁵

AEMO's review arose for the following reasons:

- to respond the AEMC's Extreme Weather Events Review in 2010;

213 Available at: www.aemc.gov.au.

214 Available at: www.aemo.com.au.

215 Further discussion on VCR is discussed in chapter 5 of this paper.

- to provide a detailed survey on VCR;²¹⁶
- to develop regional or sector-specific VCRs that could be used for planning and revenue setting purposes; and
- to reconcile different VCRs used for Victoria and New South Wales.²¹⁷

AEMO's intention for this review is to improve the understanding of the level of reliability that customers expect by producing a range of VCR values for residential and business customers across the NEM.

AEMO published an updated statement of approach in March 2014, following on from its original version which was released in November 2013.

The updated statement of approach sets out AEMO's intention to:

- deliver VCRs nationally for four different customer categories (including different sector types);
- be able to produce VCRs at the transmission node level in the NEM, including specifying a methodology for businesses themselves to calculate VCR at the transmission node level;
- develop VCRs that incorporate a number of attributes to account for uncertainty. This includes outage duration, severity and time of day; and
- conduct a survey based on choice modelling and validate the survey results using contingent valuation questions to obtain VCRs.

AEMO's statement of approach was accompanied by a methodology paper, which sets out AEMO's underlying survey design and methodology for calculating VCR values.

In its updated statement of approach, AEMO sets out its proposed amendments to the residential and business survey design and processes in order to better meet its project objectives.

Over July-September 2014, AEMO intends to:

- Publish its draft VCR values.
- Publish guidelines for use of VCR values.
- Hold a stakeholder workshop to discuss, among other things, industry application of VCR values.

²¹⁶ Such a detailed survey had not been undertaken in Victoria since VENCORP's 2007 survey.

²¹⁷ This followed from the AEMC's work on developing New South Wales VCR in its New South Wales workstream on Distribution Reliability Standards and Outcomes in 2012.

This review is expected to be completed in September 2014. See AEMO's website for further information.

D Reliability standard and reliability settings - past key determinations, recommendations and amendments

The table below sets out the key reviews and rule changes relating to the NEM reliability standard and reliability settings undertaken by: the NECA Reliability Panel and the ACCC up until 2006; and the AEMC Reliability Panel and AEMC from 2006 onwards.

Table D.1 Reliability parameter amendments since market start

Year	Work	Title	Outcome
1997	Code change authorisation ACCC	<i>National Electricity Code</i>	Conditions of authorisation (as relevant to the price cap and floor price): <ul style="list-style-type: none"> The Reliability Panel must conduct yearly reviews of the value of lost load (VoLL) and any changes to the value of VoLL must take effect six months after notification. Zero dispatch pricing during an excess generation period will apply for only one year from the commencement of the NEM.²¹⁸
1998	Review NECA Reliability Panel	<i>Power system reliability standards and guidelines for market intervention</i>	Determination: <ul style="list-style-type: none"> Set reliability standards for the wholesale market at a maximum of 0.002 per cent of unserved energy in any region over the long term (standards establish a uniform approach across the market while ensuring consistency with past jurisdictional standards).
1999	Review NECA Reliability Panel	<i>Review of VoLL 1999</i>	Recommendations: <ul style="list-style-type: none"> Increase VoLL in two steps: to \$10,000/MWh in September 2001 and to

²¹⁸ Conditions were also put in place in relation to the distribution of funds accumulated during an excess generation period.

Year	Work	Title	Outcome
			<p>\$20,000/MWh in April 2002.</p> <ul style="list-style-type: none"> • Introduce rolling three-year schedule of VoLL, extended by one year in each annual review. • Introduce risk arrangements such that if spot price in the preceding week (336 trading intervals) exceed cumulative price threshold (CPT) of \$300,000, reduce VoLL to administered price cap, which was proposed to be set at \$300/MWh in peak periods and \$50/MWh in off-peak periods.
2000	<p>Code change authorisation ACCC</p>	<p><i>VoLL, Capacity Mechanisms and Price Floor</i></p>	<p>Code amendments:</p> <ul style="list-style-type: none"> • Increase VoLL to \$10,000/MWh from April 2002. • Introduce risk arrangements such that if spot price in the preceding week (336 trading intervals) exceeds the cumulative price threshold (CPT) of \$150,000, reduce VoLL to administered price cap (APC). • Remove the zero price floor and introduce a negative price floor set at - \$1,000/MWh.
2001	-	-	-
2002	<p>Review NECA Reliability Panel</p>	<p><i>Review of VoLL 2002</i></p>	<p>No change recommended.</p>
2003	<p>Review NECA Reliability Panel</p>	<p><i>Review of VoLL and cumulative price threshold 2003</i></p>	<p>No change recommended.</p>
2004	-	-	-

Year	Work	Title	Outcome
2005	Review NECA Reliability Panel	<i>Review of VoLL and cumulative price threshold 2005</i>	No change recommended.
2006	Review AEMC Reliability Panel	<i>VoLL 2006 Review</i>	No change recommended (Comprehensive Reliability Review in progress).
2007	Review AEMC Reliability Panel	<i>VoLL 2007 Review</i>	No change recommended (Comprehensive Reliability Review in progress).
	Review AEMC Reliability Panel	<i>Comprehensive Reliability Review</i>	Recommendations: <ul style="list-style-type: none"> • Increase in VoLL from \$10,000/MWh to \$12,500/MWh, effective from 1 July 2010. • Define CPT in rules as 15 times VoLL. • Term "value of lost load (VoLL)" be changed to "market price limit (MPL)". • Current annual review of VoLL be replaced with a reliability standard and settings review to take place every two years, with two years' notice of any change.
2008	Review AEMC Reliability Panel	<i>VoLL 2008 Review</i>	No change recommended (Comprehensive Reliability Review recently completed).
	Review AEMC	<i>Determination of Schedule for the Administered Price Cap</i>	The schedule for the APC was amended and set at \$300/MWh for all regions in the NEM, for all time periods. ²¹⁹

²¹⁹ Prior to this amendment, the APC was set for all regions at \$100/MWh between 7:00 am and 11:00 pm during business days and \$50/MWh at all other times.

Year	Work	Title	Outcome
2009	Review AEMC Reliability Panel	<i>VoLL 2009 Review</i>	No change recommended (Comprehensive Reliability Review rule change in progress).
	Rule change AEMC	<i>NEM Reliability Settings: VoLL, CPT and Future Reliability Review</i>	NER amendments: <ul style="list-style-type: none"> • Increase in VoLL from \$10,000/MWh to \$12,500/MWh, effective from 1 July 2010. • Set CPT at an absolute level of \$187,500. • Term "value of lost load (VoLL)" be changed to "market price cap (MPC)". • Current annual review of VoLL be replaced with a reliability standard and settings review to take place every two years, with two years' notice of any change.
2010	Review AEMC Reliability Panel	<i>Review of the Reliability Standard and Settings</i>	Determination: <ul style="list-style-type: none"> • No change to reliability standard. Recommendations: <ul style="list-style-type: none"> • No change to market floor price. • Adjust MPC and the CPT in line with changes in the Producer Price Index (Stage 2 PPI) on an annual basis with effect from 1 July 2012. • Panel to conduct annual review to consider whether PPI remains appropriate, whether higher increases in the MPC or CPT are necessary, and whether reliability standard remains appropriate (intended to replace Panel's biennial review process).
2011	Rule change	<i>Reliability Settings from 1 July 2012</i>	NER amendments:

Year	Work	Title	Outcome
	AEMC		<ul style="list-style-type: none"> Adjust MPC and the CPT in line with changes in the Consumer Price Index (CPI) on an annual basis with effect from 1 July 2012. Panel to undertake a four-yearly comprehensive review of the reliability standard and reliability settings, including indexation (to replace Panel's biennial review process).
2012	-	-	-
2013	-	-	-
2014	Review AEMC Reliability Panel	<i>Reliability Standards and Settings Review 2014</i>	Determination: <ul style="list-style-type: none"> No change to the reliability standard. Recommendations: <ul style="list-style-type: none"> No change to the MPC, MFP or CPT.; No change to the measure of indexing the MPC and CPT. AEMC or Panel (as appropriate) to carry out the following work ahead of the next reliability standard and settings review: <ul style="list-style-type: none"> — review of the form of the CPT mechanism; — review of the measure of indexation of the MPC and CPT; — develop a methodology to derive an appropriate estimate of VCR for use in determining the efficient reliability standard; and — develop a methodology for undertaking future reliability standard and reliability

Year	Work	Title	Outcome
			settings reviews.