

Australian Energy Market Commission

CONSULTATION PAPER

NATIONAL ELECTRICITY AMENDMENT (ENHANCING OPERATIONAL RESILIENCE IN RELATION TO INDISTINCT EVENTS) RULE 2021

PROPONENT

COAG Energy Council

17 DECEMBER 2020

RULE

INQUIRIES

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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.

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SUMMARY

The physical makeup of the NEM is changing rapidly as old thermal generators retire, new wind and solar generators connect, and customers increasingly take up new demand side options. While these changes bring obvious benefits, they also mean that the power system faces new risks. These risks are exacerbated by changes outside the power system itself, particularly the effects of and need to mitigate and adapt to climate change, which will have a growing impact on an increasingly weather-dependent power system.

As the system transition continues, and storms, heatwaves and fires become more intense and frequent, 'indistinct' events are emerging as an increased threat to power system security and supply of energy to customers.

Indistinct events are events that can impact on multiple generators and transmission lines in an unpredictable and uncertain manner. Major storms, widespread bushfires, or cyber attacks all may affect multiple parts of the power system in a hard-to-predict manner.

The Australian Energy Market Commission (AEMC or Commission) has received a rule change request from the COAG Energy Council¹ that is intended to introduce new frameworks for the management of these indistinct events.²

The purpose of this rule change request is to seek amendments to the NER to provide AEMO with mechanisms to enhance power system resilience to indistinct events under abnormal conditions.³

The proposed rule change seeks to implement one of the recommendations from the AEMC's *Mechanisms to enhance resilience in the power system—review of the South Australian black system event (BSE review)*. This was work undertaken by the Commission to explore the changing risk profile of the NEM power system and the measures that may need to be implemented to manage these new risks. In the *BSE review*, the AEMC found that the existing system security framework may be ill-suited to managing indistinct events.⁴ It recommended three key changes to the framework to adapt the system security framework—one of these is the subject of this consultation paper.

The rule change seeks to adapt the system security framework of the NEM to be better able to deal with the changing risk profile. It does so by seeking to:

- introduce the new definition of an 'indistinct event'

1 On 29 May 2020, the Prime Minister announced the establishment of the National Federation Reform Council and the disbanding of COAG. New arrangements for the former COAG Energy Council will be finalised following the National Cabinet Review of COAG Councils and Ministerial Forums which provided recommendations to National Cabinet in late 2020. The Prime Minister has advised that, while this change is being implemented, former Councils may continue meeting as a Ministerial Forum to progress critical and/or well developed work.

2 COAG Energy Council, *Enhancing operational resilience*, rule change request, 26 May 2020, p. 1. Available at: <https://www.aemc.gov.au/rule-changes/enhancing-operational-resilience-relation-indistinct-events>

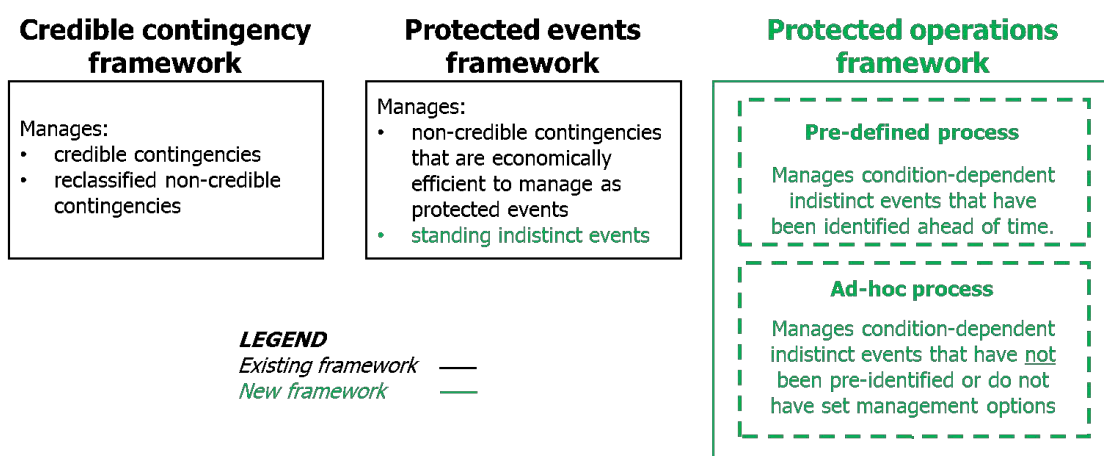
3 COAG Energy Council, *Enhancing operational resilience*, rule change request, 26 May 2020, p. 1. Available at: <https://www.aemc.gov.au/rule-changes/enhancing-operational-resilience-relation-indistinct-events>

4 AEMC, *Mechanisms to enhance resilience in the power system—Review of the South Australian black system event*, Final report, 12 December 2019, pp. 35-36. Available at: <https://www.aemc.gov.au/markets-reviews-advice/review-of-the-system-black-event-in-south-australi>

- clarify that standing indistinct events, or those indistinct events that are not related to external conditions like storms or bushfires, can be managed as a type of protected event, under the existing frameworks
- enhance the protected event approval process to manage standing indistinct events
- implement a new operational tool, called protected operation, for AEMO to manage condition-dependent indistinct events, being those indistinct events that are related to external conditions
- set out two types of protected operation:
 - pre-defined protected operation, and
 - ad-hoc protected operation
- specify governance arrangements for protected operation.

This new framework is shown below.

Figure 1: Proposed framework for managing indistinct events



Generally, the proposed rule change would aim to make operating the power system more efficient and effective by allowing AEMO more flexibility to prepare for and manage indistinct events.

This rule change has a number of potential interactions with the ESB’s post-2025 market design program. These are set out below. The AEMC is working closely as part of the ESB to manage these interactions.

Table 1: Interactions between this rule change and ESB post-2025 workstreams

ESB WORK-STREAM	WORKSTREAM FOCUS	RULE CHANGE INTERACTION
Resource adequacy mechanisms and Ageing thermal generation	The resource adequacy mechanisms and ageing thermal generator strategy market design initiatives, each in their own way, will focus on supporting timely entry of new resources into the market and orderly exits from the NEM throughout the energy transition.	Any framework introduced could lead to more efficient investment in infrastructure, potentially improving power system resilience.
Essential System Services and Scheduling Ahead Mechanism	<p>The focus of this work is to develop a framework to enable the market to progress to more sophisticated ways to value and deliver system services as the system changes, and as technology and market conditions allow.</p> <p>Changes are also being considered to market arrangements to introduce greater visibility and certainty of resources on the system ahead of real time. This will help manage the increasing complexity of the power system.</p>	<p>Under the proposed framework, AEMO and Reliability Panel would need to consider how procured system services affect likelihood and impact of indistinct events. Actions taken by AEMO to address indistinct events would also affect required volumes of system services, including procuring any volumes of system services above the minimum required for system security.</p> <p>Mechanisms considered under this MDI may provide the system operator with more certainty over what is happening in the market, potentially affecting views on resilience.</p>

ESB WORK-STREAM	WORKSTREAM FOCUS	RULE CHANGE INTERACTION
Two-sided markets and Valuing demand flexibility and DER integration	<p>A two-sided market is a market model that promotes direct interaction between suppliers and customers. The focus is on getting the market framework right to accommodate different customer needs and provide appropriate customer protections for consumers. The intention is a progressive shift to a two-sided market that better rewards the value provided to the system by flexible demand and supply.</p> <p>To maximise the value for consumers of DER there is a need for technical, regulatory and market arrangements to support their effective integration.</p>	Proposed framework could help ensure protective mechanisms are in place to help to manage a grid with significant DER resources.
Transmission access and COGATI	The shift to locate generation in different places is a challenge for the existing transmission network, connections to it, and how it is accessed and used. A combination of regulatory and market arrangements are needed to support efficient and timely investment to deliver efficient outcomes to consumers and investors.	(Limited interaction)

The AEMC will assess the rule change by following the standard rule change process. The key dates for the rule change are as follows:

- Submissions for the consultation paper due: Thursday 11 February 2021
- Draft rule determination published: Thursday 22 April 2021
- Submissions on the draft rule due: Thursday 3 June 2021
- Final rule determination published: Thursday 15 July 2021

This consultation paper aims to facilitate public consultation on the rule change request. The Commission invites stakeholders to provide submissions on the COAG Energy Council's rule change request via the AEMC website. Details on how to provide a submission to this consultation paper are detailed in Chapter 8 of this paper.

CONTENTS

1	Introduction	1
2	Background and details of the rule change request	2
2.1	Introduction	2
2.2	Changing risks on a transitioning power system	2
2.3	Background	4
2.4	Interactions with the ESB post 2025 market design work program	5
2.5	The proposed rule	8
3	Assessment framework	10
3.1	Achieving the NEO	10
3.2	Robustness to climate change risks	11
3.3	Assessment principles	13
3.4	Making a more preferable rule	14
3.5	Making a differential rule	14
4	Definition of indistinct events	15
4.1	Differentiating between contingency and indistinct events	15
4.2	Proposed change to definition of contingency events and indistinct events	18
4.3	Defining indistinct events	19
4.4	Issues for consideration	19
5	Proposed arrangements to determine and manage indistinct events	21
5.1	Introduction	21
5.2	Existing framework for system security	21
5.3	Issues with managing indistinct events under the existing framework	23
5.4	Proposed framework for managing indistinct events — overview	24
5.5	Proposed framework for managing condition independent indistinct events	25
5.6	Proposed framework for managing condition dependent indistinct events	27
5.7	Consultation, transparency and oversight	31
5.8	Options for implementation	34
6	Governance, responsibilities and enforcement	37
6.1	Principles for allocating responsibility	37
6.2	Responsibilities	37
7	Costs and benefits	44
7.1	Challenges in calculating costs and benefits for indistinct events	44
7.2	How the proposed rule seeks to minimise costs	45
8	Lodging a submission	49
	Abbreviations	50
	TABLES	
Table 1:	Interactions between this rule change and ESB post-2025 workstreams	ii
Table 1.1:	Key dates	1
Table 2.1:	Workstream interactions	6
Table 4.1:	Differences between contingency events and indistinct events	18

FIGURES

- Figure 1: Proposed framework for managing indistinct events
Figure 2.1: Proposed framework for managing indistinct events

1 INTRODUCTION

On 26 May 2020, the AEMC received a rule change request from the COAG Energy Council to amend the National Electricity Rules (NER) to implement a framework to manage indistinct events.

The rule change request from the COAG Energy Council followed the completion by the AEMC in 2019 of the Review of the South Australian black system event (BSE report).⁵

The Commission seeks stakeholder submissions on the COAG Energy Council's rule change request. This consultation paper aims to facilitate public consultation on the rule change request.

This paper:

- sets out a summary of, and a background to, the rule change request
- identifies a number of questions and issues to facilitate the consultation on this rule change request
- outlines the process for making submissions.

The expected timetable for the determining the rule change request is as follows:

Table 1.1: Key dates

MILESTONE	DATE
Submissions on the consultation paper	Thursday 11 February 2021
Draft rule determination	Thursday 22 April 2021
Submissions on the draft rule	Thursday 3 June 2021
Final rule determination	Thursday 15 July 2021

⁵ AEMC, Final Report, *Mechanisms to enhance resilience in the power system - review of the South Australian black system event*, 12 December 2019, Appendix B.

2 BACKGROUND AND DETAILS OF THE RULE CHANGE REQUEST

2.1 Introduction

This chapter:

- discusses how changing conditions in the NEM are impacting on power system resilience
- provides background to the rule change request, including its relationship to the previous AEMC report *Mechanisms to enhance resilience in the power system—Review of the South Australian black system event*
- summarises the proposed changes in the rule change request.

2.2 Changing risks on a transitioning power system

As the NEM power system transitions to a low-emissions future, the physical makeup of the system is changing rapidly. These changes are occurring on both the demand and the supply side, as old thermal generators retire, new wind and solar generators connect, and customers increasingly take up new demand side options.

These changes bring with them both benefits and new risks. These risks are exacerbated by other changes outside the power system itself, such as those associated with adaptation and mitigation risk in addressing climate change, which has a growing impact on an increasingly weather-dependent power system.

In 2019, the Commission undertook an extensive review of these changing risks, through its consideration of the resilience of the NEM power system. In the *Mechanisms to enhance resilience in the power system—Review of the South Australian black system event (BSE review)* final report, the Commission identified that these changing risks mean that power system resilience is declining from historic levels. The Commission defined power system resilience as the ability of a power system to avoid, survive, recover and learn from high-impact, low probability (HILP events).⁶

The *BSE review* found that this decline in the resilience of the power system is based around the changing physical characteristics of the power system, and related system phenomena. Some of these changes included:

- reduced amounts of primary frequency control—which is where individual generator control systems are set to respond locally and automatically to a change in frequency by automatically changing power output, helping to manage the frequency performance of the system
- increased likelihood of adverse network and generator control and protection system interactions

⁶ See: AEMC, *Mechanisms to enhance resilience in the power system—Review of the South Australian black system event*, Final report, 12 December 2019, p. 36. Available at: <https://www.aemc.gov.au/markets-reviews-advice/review-of-the-system-black-event-in-south-australi>

- less certainty for how load will behave if certain events occur, given the increased deployment of distributed energy resources (DER) and intelligent load control systems
- the increased variability of a changing generation mix, which can create challenges to the stable and predictable behaviours of key system phenomena, such as frequency and voltage.⁷

Historically, the NEM's generation mix comprised a relatively small number of large, synchronous thermal and hydroelectric generators, connected at the high voltage transmission grid. These generators are physically synchronised to the grid.⁸ The physical dynamics of these synchronous generators and loads has largely determined the power system's response to disturbances. Furthermore, the fact that there were a small number of these large units, and these large units had relatively well-known characteristics, meant that they had relatively predictable and discrete risk profiles.

The NEM's generation mix has changed significantly over the past decade. Many of these large, synchronous thermal units have been retired or mothballed, or have reduced operational profiles. They have been primarily replaced by variable, non-synchronous, inverter-based renewable (IBR) generators, connected at both the transmission and distribution levels—and often being connected at weaker parts of the network.

This change in the generation mix has a number of impacts on the resilience of the power system. For example, changes in output from IBR generators are often not related to internal failure of a unit, but rather are related to weather conditions, such as changes in sunlight intensity or wind speeds, or involve inverter responses to power system waveform disturbances. These changes are often distributed, affecting a significant number of units over a wide area rather than a single specific generating unit. While some of these impacts can be forecast, there is also some uncertainty over how such generators may respond.

The rise of distributed generation on the downstream side of traditional load shedding points may also reduce the effectiveness of last resort underfrequency load shedding schemes (UFLS). UFLS are special protection schemes that trip "load blocks"⁹ to restore the generation/load balance following a severe generation contingency (like the loss of multiple generating units), which is essential to maintain system frequency and prevent a more widespread blackout. The effectiveness of UFLS relies on the load within these load blocks being stable and predictable. As volumes of DER increase behind customer meters, the load that is actually shed when these load blocks are tripped may be less predictable. This may reduce the effectiveness of UFLS. During sunny conditions, where DER output is high, less load may actually be available to trip, making it harder to maintain system frequency following a severe contingency event. Under extreme conditions, where there are very large volumes of DER within a load block, the block may even be functioning as a net generator (energy output from DER exceeds customer load within the block), meaning that the tripping

7 Ibid.

8 This means that the equipment of the generator is electromechanically coupled to the power system, and "spins" at the same speed as every other synchronous generator that is connected to the system.

9 More specifically, this refers to the load situated behind a distribution feeder, being a distinct block of customer load that can be discretely disconnected through the functioning of a protection relay at a substation.

of the “load block” would actually be equivalent to tripping a small generator, exacerbating the frequency disturbance.

Although some of the new technologies connecting to the grid can create challenges, others create opportunities to enhance overall system resilience. For example, many of the new technologies connecting to the NEM can adjust and respond to rapidly changing conditions on the power system, such as by rapidly and accurately injecting and absorbing power to stabilise the system, potentially providing very effective support to help manage disturbances.¹⁰

Other challenges to security and resilience are also emerging on the demand side. The amount of frequency dependent load, where the energy consumed by the load changes in direct relationship to a change in frequency (such as traditional induction motors used in air conditioners) has also declined, as devices such as variable speed drives, which decouple machine speed from system frequency, have become more common.¹¹ AEMO forecasts that this trend is likely to continue over the next 20 years.¹² This change reduces the innate resistance of the power system to changes in system frequency caused by contingency events that disturb the generation/load balance.

External changes in the natural environment are also creating new security and resilience challenges for the power system. Particularly important is thinking through adaptation and mitigation risk in addressing climate change. This is increasingly testing the resilience of the system as it gives rise to more severe weather events and other risks, such as bushfires. Coupled with the fact that a high-renewables power system can be somewhat weather dependent, these changes also create new resilience issues to be managed.

These changes, described above, have created a new set of risks that need to be managed in order to maintain and improve the resilience of the power system.

2.3 Background

The South Australian black system event of 28 September 2016 illustrated how the NEM power system faces a new and pressing set of system security and resilience challenges. In December 2016, the COAG Energy Council asked the AEMC to identify and report on any systemic issues that contributed to the black system event or affected the response to it. This review was to be completed after the AER finished its compliance assessment following the black system event itself, which was finalised in December 2018. Therefore, the Commission commenced its review of the *Mechanisms to enhance resilience in the power system—review*

10 The role of the Hornsdale power reserve battery (HPR) is a case in point of these capabilities. The HPR has played a critical role in stabilising the power system in several major disturbances in recent years, by rapidly injecting power to stabilise frequency following a separation of the South Australian region from the rest of the NEM.

11 AEMO, 2019, *Review of NEM load relief: November 2019 update*. Accessed at: https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Ancillary_Services/2019/Update-on-Contingency-FCAS-Nov-2019.pdf

12 AEMO, 2020, *2020 Integrated System Plan for the National Electricity Market*, 30 July 2020, . Accessed at: <https://aemo.com.au/-/media/files/major-publications/isp/2020/final-2020-integrated-system-plan.pdf?la=en&hash=6BCC72F9535B8E5715216F8ECDB4451C>

of the South Australian black system event (BSE review) in early 2019, and published a final report, in December 2019.¹³

The *BSE review* found a decline in power system resilience and identified that the existing system security framework:

- is focused on managing definable, distinct risks that typically occur under a historical generation mix (traditional contingency events, such as the loss of a single generating unit or transmission line);¹⁴ and
- may be ill-suited to managing 'indistinct' events, such as the wide area effect of a major weather system, as an emerging risk.¹⁵

In the *BSE review* final report, the Commission, among other things:

- recommended introducing protected operation as a new operational tool for AEMO to enhance the resilience of the power system to indistinct events¹⁶
- set out a proposed framework for protected operations and suggested an associated rule change request.¹⁷

The Commission included a suggested rule change request as an appendix to the review, which was sent to the COAG Energy Council for its consideration in December 2019.

2.4 Interactions with the ESB post 2025 market design work program

In March 2019, the COAG Energy Council¹⁸ requested the Energy Security Board to advise on a long-term, fit for purpose market framework to support reliability, modifying the NEM as necessary to meet the needs of future diverse sources of non-dispatchable generation and flexible resources including demand side response, storage and distributed energy resource participation.¹⁹ The Post 2025 program has been established as a pathway to a fit for purpose market design for the NEM.

There are seven core market design initiatives being progressed—see below. The ESB recently published a consultation paper to update stakeholders on its work. The next phase is to evaluate potential solutions. Option(s) for future market design will be developed, with an update provided in early 2021. The ESB will provide advice to Energy Ministers on changes to the existing market design, or recommend an alternative market design, to enable the provision of the full range of services to customers necessary to deliver a secure, reliable and lower emissions electricity system at least cost by mid-2021.

¹³ AEMC, *BSE Review*, Final report, 12 December 2019.

¹⁴ *Ibid*, p. 36.

¹⁵ *Ibid*, pp. 35-36.

¹⁶ *Ibid*, pp. 92-93.

¹⁷ *Ibid*, pp. 92-122.

¹⁸ On 29 May 2020, the Prime Minister announced the establishment of the National Federation Reform Council and the disbanding of COAG. New arrangements for the former COAG Energy Council will be finalised following the National Cabinet Review of COAG Councils and Ministerial Forums which provided recommendations to National Cabinet in late 2020. The Prime Minister has advised that, while this change is being implemented, former Councils may continue meeting as a Ministerial Forum to progress critical and/or well developed work.

¹⁹ Energy Security Board, *All about the post-2025 project*, webpage. Accessed at: <https://esb-post2025-market-design.aemc.gov.au/all-about-2025>

There are interactions between these Post 2025 workstreams and this rule change. Initial thoughts on these interactions are set out below. The Commission is working closely with the ESB, AEMO & AER to manage these interactions.

Table 2.1: Workstream interactions

ESB WORKSTREAM	WORKSTREAM FOCUS	RULE CHANGE INTERACTION
Resource adequacy mechanisms and Ageing thermal generation	The resource adequacy mechanisms and ageing thermal generator strategy market design initiatives, each in their own way, will focus on supporting timely entry of new resources into the market and orderly exits from the NEM throughout the energy transition.	Any framework introduced could lead to more efficient investment in infrastructure, potentially improving power system resilience.
Essential System Services and Scheduling Ahead Mechanism	<p>The focus of this work is to develop a framework to enable the market to progress to more sophisticated ways to value and deliver system services as the system changes, and as technology and market conditions allow.</p> <p>Changes are also being considered to market arrangements to introduce greater visibility and certainty of resources on the system ahead of real time. This will help manage the increasing complexity of the power system.</p>	<p>Under the proposed framework, AEMO and Reliability Panel would need to consider how procured system services affect likelihood and impact of indistinct events. Actions taken by AEMO to address indistinct events would also affect required volumes of system services, including procuring any volumes of system services above the minimum required for system security.</p> <p>Mechanisms considered under this MDI may provide the system operator with more certainty over what is happening in the market, potentially affecting views on resilience.</p>

ESB WORKSTREAM	WORKSTREAM FOCUS	RULE CHANGE INTERACTION
<p>Two-sided markets and Valuing demand flexibility and DER integration</p>	<p>A two-sided market is a market model that promotes direct interaction between suppliers and customers. The focus is on getting the market framework right to accommodate different customer needs and provide appropriate customer protections for consumers. The intention is a progressive shift to a two-sided market that better rewards the value provided to the system by flexible demand and supply.</p> <p>To maximise the value for consumers of DER there is a need for technical, regulatory and market arrangements to support their effective integration.</p>	<p>Proposed framework could help ensure protective mechanisms are in place to help to manage a grid with significant DER resources.</p>
<p>Transmission access and COGATI</p>	<p>The shift to locate generation in different places is a challenge for the existing transmission network, connections to it, and how it is accessed and used. A combination of regulatory and market arrangements are needed to support efficient and timely investment to deliver efficient outcomes to consumers and investors.</p>	<p>(Limited interaction)</p>

2.5 The proposed rule

On 26 May 2020, the AEMC received a rule change request from the COAG Energy Council to amend the National Electricity Rules (NER). This rule change is largely based on recommendations made by the Commission in its *BSE Review* final report.

2.5.1 Objective and identified issues

The purpose of this rule change request is to seek amendments to the NER to provide AEMO with mechanisms to enhance power system resilience to indistinct events under abnormal conditions.²⁰

The rule change request notes that the *BSE Review* identified a need to amend existing frameworks to allow for management of 'indistinct events'.²¹

2.5.2 Proposed changes

The proposed rule change would amend the NER to provide AEMO with mechanisms to manage indistinct events, including by implementing a protected operations framework.²²

The rule change request proposes to amend the NER to:

- introduce the new definition of an 'indistinct event'
- clarify that standing risks from indistinct events can be managed as a type of protected event
- enhance the protected event approval process to manage standing indistinct events
- implement a new operational tool, protected operation, for AEMO to manage condition-dependent indistinct events
- set out two types of protected operation:
 - pre-defined protected operation, and
 - ad-hoc protected operation
- specify governance arrangements for protected operation.

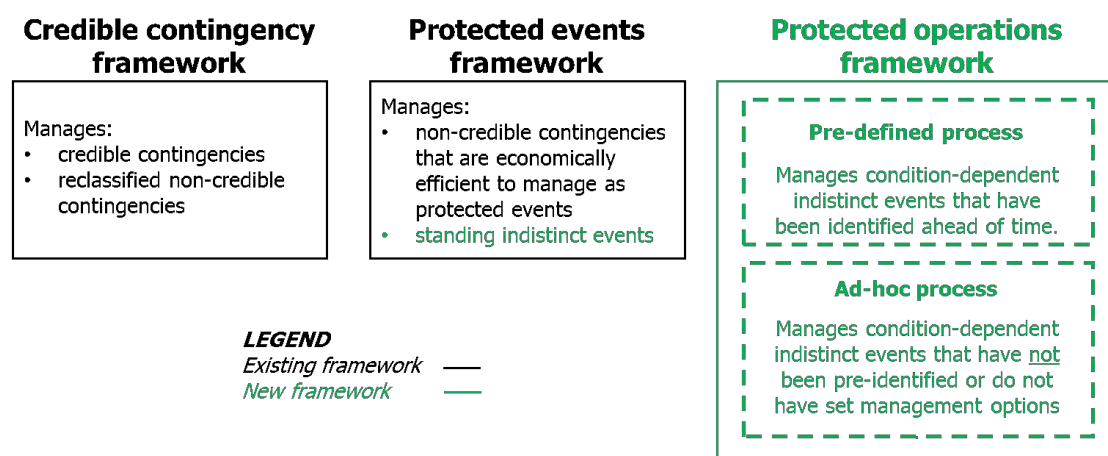
This new framework is shown below.

20 COAG Energy Council, *Enhancing operational resilience*, rule change request, 26 May 2020, p. 1. Available at: <https://www.aemc.gov.au/rule-changes/enhancing-operational-resilience-relation-indistinct-events>

21 Ibid, p. 6

22 Ibid, pp.1-2.

Figure 2.1: Proposed framework for managing indistinct events



The proposed protected operation framework, if implemented, is expected to allow AEMO to take additional actions such as constraining the dispatch of generation, limiting inter-connector flows, or directing on certain generators. This includes:

- taking action when necessary to protect the system from indistinct risks, which will reduce the risk of load shedding and maintain a secure supply of energy
- adjusting the settings of the power system during abnormal conditions, such as extreme weather, to account for the increased risk that the system will be severely impacted by the abnormal conditions.²³

Chapter 4, Chapter 5, Chapter 6 and Chapter 7 in this consultation paper discuss these proposed changes in detail.

The rule change request does not include a proposed rule.

Stakeholders can access a copy of the rule change request at the *Enhancing operational resilience in relation to indistinct events* webpage at: <https://www.aemc.gov.au/rule-changes/enhancing-operational-resilience-relation-indistinct-events>

²³ AEMC, *BSE review*, final report, p. ii.

3 ASSESSMENT FRAMEWORK

This chapter sets out the assessment framework the Commission intends to use to assess the COAG Energy Council's proposed rule, including:

- how the Commission will assess the rule change request against the NEO;
- how we will have regard to mitigation and adaptation risks associated with climate change; and
- the principles the Commission will use to identify options and make recommendations.

3.1 Achieving the NEO

Under the NEL the Commission may only make a rule if it is satisfied that the rule will, or is likely to, contribute to the achievement of the national electricity objective (NEO).²⁴ This is the decision-making framework that the Commission must apply.

The NEO is:²⁵

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.

Based on a preliminary assessment of the rule change request the Commission considers that the relevant aspects of the NEO are the efficient investment in, and operation of electricity services in the long-term interests of consumers with respect to:

- the price, and security of supply of electricity; and
- the security of the national electricity system.

As with the distinct events associated with the existing contingency classification framework, indistinct events bring with them significant implications for the security of supply. Indistinct events like a major storm system or a wide area firestorm can impact on multiple generators and transmission lines in an unpredictable and uncertain manner. This in turn results in significant security risks, related to the potential failure of one or more of these assets or cascading failures. It follows that developing new rules frameworks to identify and manage these indistinct events may enhance the security of the system by better enabling AEMO to operate the system to mitigate their impacts.

However, any arrangements developed need to bear in mind the efficiency implications. Building more resilience into the system will have benefits by being able to mitigate impacts of indistinct events, but it also carries costs, which consumers will ultimately pay for. These impacts need to be balanced against each other—ultimately with arrangements put in place that promote efficient operation and investment.

²⁴ Section 88 of the NEL.

²⁵ Section 7 of the NEL.

3.2 Robustness to climate change risks

As discussed above, the Commission makes its decisions on rule changes with reference to the NEO. The NEO does not specifically require the Commission to have regard to the long-term interests of consumers with respect to climate change or the environment.²⁶

However, in order to make decisions that meet the NEO, the Commission considers whether its decisions are robust to mitigation or adaptation that may manifest due to climate change.²⁷

For this rule change, the Commission will consider climate change adaptation and mitigation risks in the following ways.

3.2.1 Adaptation

One of the key modelled impacts of anthropogenic climate change is an increase in the frequency and severity of extreme weather events.²⁸ This will contribute to, and exacerbate, other extreme events, such as major bushfires.

Bushfires

The *Report of the Royal Commission into National Natural Disaster Arrangements*, focusing on the Black Summer bushfires of 2019-20 and other natural disasters, identified that “extreme weather has already become more frequent and intense because of climate change” and “further global warming over the next 20 to 30 years is inevitable.”²⁹ As a result, natural disasters like the Black Summer bushfires will “regrettably, be more frequent and more severe in the future.”³⁰ The Royal Commission noted that these natural disasters threaten “not only lives and homes, but also the nation’s economy, critical infrastructure and essential services, such as our electricity, telecommunications and water supply.”³¹

Compound events

Climate change will also drive an increased risk of ‘compound events’, where extremes of variables like windspeed and rainfall occur at the same time.³² “[C]onsecutive and compounding natural disasters will place increasing stress on existing emergency management arrangements.”³³ The Royal Commission noted that there is scope to “improve

26 AEMC, *Applying the energy market objectives*, 8 July 2019, pp.8-9.

27 Mitigation refers to measures associated with actively reducing the extent of the impacts of climate change. Adaptation to measures taken to manage and adapt to the consequences of climate change.

28 See: Seneviratne, S.I., N. Nicholls, D. Easterling, C.M. Goodess, S. Kanae, J. Kossin, Y. Luo, J. Marengo, K. McInnes, M. Rahimi, M., Reichstein, A. Sorteberg, C. Vera, and X. Zhang, 2012: Changes in climate extremes and their impacts on the natural physical environment. In: *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation* [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.)]. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (IPCC). Cambridge University Press, Cambridge, UK, and New York, NY, USA, pp. 109-230. Available at: https://www.ipcc.ch/site/assets/uploads/2018/03/SREX-Chap3_FINAL-1.pdf

29 Royal Commission into National Natural Disaster Arrangements, *Report of the Royal Commission into National Natural Disaster Arrangements*, 28 October 2020, p. 28. Accessed at: <https://naturaldisaster.royalcommission.gov.au/system/files/2020-11/Royal%20Commission%20into%20National%20Natural%20Disaster%20Arrangements%20-%20Report%20%20%5Baccessibility%5D.pdf>

30 Ibid, p. 5

31 Ibid, p. 22.

32 Australian Bureau of Meteorology, *State of the Climate*, 2018.

the identification, and mitigation, of natural disaster risks to electricity and telecommunications critical infrastructure assets.^{33,34}

Power system impacts

Extreme weather is likely to impact the power system by increasing the extent to which generation and network assets may be damaged or removed from service, and by driving uncertainty around generation availability from an increasingly weather-dependent generation fleet. It may also impact on demand patterns, such as more extreme heat events driving increases in the rate of change of demand, as well as the absolute values of maximum and minimum demands, while simultaneously placing additional stress on the system.

The AEMC seeks to implement frameworks that are robust to climate change adaptation risks, in that the regulatory frameworks we have introduced are scalable, and can be adapted to account for impacts of anthropogenic climate change in the future, particularly in regard to more extreme weather. More generally, the regulatory frameworks should be designed to make the power system adaptable to the likely future impacts of climate change. It should support the efficient and secure operation of the power system in the face of prospective risks and societal adaptations associated with anthropogenic climate change.

3.2.2

Mitigation

Amongst the various economy-wide measures being used to mitigate the impacts of climate change, the rollout of non-synchronous, inverter based resource (IBR), variable renewable generation is the primary measure impacting the NEM power system.

The specific characteristics of this generation means that, historically, it has not automatically provided the same kinds of synchronous system stabilising services that were provided by thermal, synchronous generators.³⁵ The varying energy output from wind and solar resources also impacts the generation mix, with greater reliance on peaking generators, which can be shut down for long periods, and on storage.

Grid following IBR generators also interact with the power system in different ways to synchronous generators like hydro, coal and gas. In simple terms, existing IBR technology can require a stable voltage wave form on the power system in order to remain connected; the more IBR that connects, the greater the demand for services to stabilise the grid.

This removal of system services that used to be provided as a “byproduct” of synchronous generation, coupled with the increasing demand from some forms of IBR technology, has direct implications for the risk profile of the power system.

The Commission therefore seeks to make rules that are robust to climate change mitigation risks, in that they are designed to account for the physical implications of mitigation

33 Royal Commission into National Natural Disaster Arrangements, *Report*, p. 5.

34 *Ibid*, p. 226.

35 This is not to say that all variable, non-synchronous generation cannot provide some system services; historically however, not many of these types of generators have elected to do so. The Commission notes recent trials by various wind farms to offer some system services, and the capability of non-synchronously connected battery storage to do so. Furthermore, it is also noted that grid forming technologies are emerging, which will also increase the capability of these units to provide system services.

measures impacting the NEM, including the shift in the generation mix to being predominantly based around variable and non-synchronous IBR generation.³⁶

3.3 Assessment principles

In addition to the NEO, the Commission is proposing to use the following principles to guide its assessment of options on potential changes to market and regulatory frameworks relevant to this rule change. These principles are:

- **Efficient investment and operation of the power system** — When considering potential changes or additions to the regulatory frameworks we will examine whether the benefits of these modifications are balanced against costs in an efficient and proportional way, to best promote the long-term interests of consumers. In this case the rule, if made, should provide a framework that balances additional costs to consumers against the benefits consumers would receive from improved system security outcomes. Ultimately this should result in more efficient investment and operation of the power system.
- **Technology neutrality** — We will apply the principle that regulatory arrangements should be designed to take into account the full range of potential solutions. They should not be targeted at a particular technology, or be designed with a particular set of technologies in mind. Technologies are changing rapidly and, to the extent possible, a change in technology should not require a change in regulatory arrangements. Equally, however, regulatory frameworks should not form a barrier to new technologies, to the extent that the use of those technologies is consistent with the physical safety and security requirements of the NEM.
- **Flexibility** — Regulatory arrangements should be flexible to changing conditions. They should remain effective in achieving system security over the long term in a changing market and power system environment. Solutions should also be flexible enough to accommodate different circumstances in different jurisdictions.
- **Risk allocation** — Risk allocation and the accountability for decisions related to the management of risk should rest with those parties best placed to manage them.
- **Effective governance** — When assessing new regulatory frameworks, we will consider whether these new frameworks adhere to good governance principles, including:
 - **Stability and transparency** — Maintenance of a secure and safe power system supports efficient investment and operational decisions. This confidence will be enhanced where changes to the regulatory frameworks for power system security are made and applied in a transparent way.
 - **Appropriate allocation of responsibilities** — Roles and responsibilities should be allocated on the basis of organisational experience and expertise. Allocation of responsibilities should also reflect the primary function of the organisation.

³⁶ There are also significant volumes of other work ongoing, within each of the market bodies and through the ESB's p2025 program, addressing these issues.

- **Clear and transparent objectives** — Organisations should have clearly defined objectives and adequate operational scope to meet those objectives within the overarching governance framework.
- **Accountability** — Organisations should be accountable for how they have met their objectives. This should be enabled through obligations to consult and regular reporting obligations.

QUESTION 1: ASSESSMENT PRINCIPLES

- Do stakeholders support using the proposed assessment framework?
- Are there any other principles that the Commission should consider when assessing the proposed rule?

3.4 Making a more preferable rule

Under s. 91A of the NEL, the Commission may make a rule that is different (including materially different) to a proposed rule (a more preferable rule) if it is satisfied that, having regard to the issue or issues raised in the rule change request, the more preferable rule will or is likely to better contribute to the achievement of the NEO.

3.5 Making a differential rule

Under the Northern Territory legislation adopting the NEL, the Commission may make a differential rule if, having regard to any relevant MCE statement of policy principles, a differential rule will, or is likely to, better contribute to the achievement of the NEO than a uniform rule. A differential rule is a rule that:

- varies in its term as between:
 - the national electricity system, and
 - one or more, or all, of the local electricity systems, or
- does not have effect with respect to one or more of those systems

but is not a jurisdictional derogation, participant derogation or rule that has effect with respect to an adoptive jurisdiction for the purpose of s. 91(8) of the NEL.

As the proposed rule related to parts of the NER that currently do not apply in the Northern Territory, the Commission has not assessed the proposed rule against additional elements required by the Northern Territory legislation.³⁷

³⁷ From 1 July 2016, the NER, as amended from time to time, apply in the NT, subject to derogations set out in regulations made under the NT legislation adopting the NEL. Under those regulations, only certain parts of the NER have been adopted in the NT. (See the AEMC website for the NER that applies in the NT.) National Electricity (Northern Territory) (National Uniform Legislation) Act 2015.

4 DEFINITION OF INDISTINCT EVENTS

This chapter:

- describes contingency events and indistinct events, and their differences
- summarises issues identified in the BSE review and rule change request with definitions in the current framework
- details the proposed definition for an 'indistinct event'.

4.1 Differentiating between contingency and indistinct events

4.1.1 Contingency events

Categories of contingency event

The NER currently define a contingency event as follows:³⁸

4.2.3 Credible and non-credible contingency events and protected events

- (a) A **contingency event** means an event affecting the *power system* which AEMO expects would be likely to involve the failure or removal from operational service of one or more *generating units and/or transmission elements*.

Contingency events are disturbances that pose a risk to, and uncertainty in, the stable and secure operation of the power system. Contingency events involve the independent failure or removal from service of specific generating units or network elements. A contingent event is an event that affects the power system in a way that would likely involve the failure or sudden and unexpected removal from operational service of a generating unit or transmission element.

There are two categories of contingency events in the NER:³⁹

- **credible contingencies** — events that AEMO considers are reasonably possible given prevailing conditions, for example the unexpected disconnection of one transmission or generation asset
- **non-credible contingencies** — contingency events that are not credible contingencies, for example, simultaneous disruptive events like multiple generation asset failures.

The concept of a contingency event is fundamental to the regulatory frameworks that set out how the power system is planned, operated and used by AEMO, networks, generators and customers. It informs network planning processes, the development and settings of protection equipment, and the levels of the technical standards that must met by participants when they connect to the power system.

From the perspective of this rule change request, contingency events are most relevant in that they directly influence the way that AEMO operates the power system and the regulatory

³⁸ NER cl. 4.2.3(a)

³⁹ NER cl.4.2.3 (a) and (e).

obligations that it faces when doing so. For example, AEMO must determine those contingencies which it considers reasonably possible given prevailing conditions and then operate the high voltage parts of the power system on the basis of managing for that event.

Reclassification

AEMO is required to form a view on whether a contingency event is “reasonably possible” given the prevailing circumstances.⁴⁰

The current framework allows AEMO to reclassify non-credible contingencies as credible contingencies under certain circumstances.

Non-credible contingencies that are more likely to occur under abnormal conditions may be reclassified as credible if AEMO considers the occurrence to be reasonably possible having regard to all relevant facts and circumstances.⁴¹ For example, during a bushfire, the simultaneous trip of two transmission circuits running on the same double circuit towers or within the same easement, which would normally be non-credible, may become credible. The NER defines abnormal conditions as conditions posing added risks to the power system including, without limitation, severe weather conditions, lightning, storms, and bushfires.⁴² AEMO is required to develop and publish criteria for deciding whether any non-credible contingency has become ‘reasonably possible’ given such conditions.⁴³

On identifying the existence of abnormal conditions, AEMO is required to seek information to identify any non-credible contingency event which has become ‘more likely’ and notify the market.⁴⁴ Should the identified event then proceed to becoming ‘reasonably possible’, AEMO is then required to re-classify the normally non-credible contingency as credible and notify the market.⁴⁵ A decision to reclassify allows AEMO to take ex-ante action to maintain the system in a secure state for the event, including by:

- adjusting the technical envelope (such as by limiting interconnector flows) and/or
- procuring appropriate levels of ancillary services to maintain voltage and frequency within appropriate bands following occurrence of the event.

4.1.2

Differences between contingency events and indistinct events

The current frameworks were implemented at a time when the NEM was made up of a limited number of generally controllable, scheduled, thermal generation units, typically located in centralised generation centres and connected to highly meshed, high voltage parts of the network. The major risks and uncertainties to system security at that time involved the sudden, unplanned trip of one or more of these units, or the transmission lines linking these units to load centres. As discussed above, such events are captured in the NER definition of contingency events.

40 Clause 4.2.3(b) of the NER

41 Clause 4.2.3A(e) of the NER.

42 Clause 4.2.3A(a) of the NER.

43 Clause 4.2.3B of the NER.

44 Clause 4.2.3A(b)(2) and (c) of the NER.

45 Clause 4.2.3A(g) of the NER.

The arrangements for reclassification of contingency events were implemented following an AER investigation of the events of 16 January 2007, when bushfires caused transmission lines between Victoria and New South Wales to fail, interrupting around a quarter of Victoria's demand.⁴⁶ These arrangements require AEMO to:⁴⁷

- develop and then apply pre-determined risk assessment criteria when considering whether to re-classify a contingency event; and
- provide market participants with information about potential and actual reclassifications of contingency events.

Contingency events typically involve the sudden, unexpected loss of an individual, discrete generating unit or network element. This may be caused by mechanical, electrical or operational faults, which may be driven by external events, such as a lightning strike on a transmission line that results in that line being taken out of service. The risks of contingency events can be described as being 'distinct', in that they can be traced back to the failure of one or more specific assets.

The risk assessment and management approach for different types of contingency events differs in terms of the actions that are taken to manage them. This is discussed in more detail in the next section.

The *BSE review* explored the nature of contingency events and identified that a particular kind of event, described as an 'indistinct event', was likely to become more prevalent in the power system.

Indistinct events, in contrast to the distinct event contingencies described above, are caused by external events and can affect multiple generation and network assets in a given area over time. As such, these indistinct events may be distinguished from distinct contingency events in that they are dispersed over time, as well as over space. Security risks from these events are therefore indistinct because they arise from the aggregate response of the affected generation and network assets, rather than any specific individual assets. They are also indistinct in that they may occur over a period of time rather than at a specific moment.

Risk assessment for indistinct events requires consideration of multiple factors, including the probability an external event will occur, its likely severity and duration, its consequent effects and the power system's likely resulting response. Unlike distinct contingency events, the risk associated with indistinct events is not associated solely with when the event might occur, but also with the nature of the event itself.

Table 4.1 shows the main differences between contingency events and indistinct events.

⁴⁶ AER, *The events of 16 January 2007 Investigation Report*, September 2007.

⁴⁷ AEMC, *Reclassification of Contingency Events*, Final Rule Determination, 2 October 2018.

Table 4.1: Differences between contingency events and indistinct events

	DISTINCT CONTINGENCY EVENTS	INDISTINCT EVENTS
What are typical examples?	Operational, mechanical or electrical failure that can be traced to specific generation or transmission assets. For example: <ul style="list-style-type: none"> • a generating unit is accidentally taken offline because of operator error • a generating plant trips offline because of an electrical fault • one or more transmission lines go out of service because a tower collapses. 	External events that may affect multiple assets in a region over a time period, with the exact assets affected being unclear. This could include: <ul style="list-style-type: none"> • extreme weather events (wide area storm events or severe bushfires, such as firestorms, or multiple fires causing heavy smoke pollution over a wide area) • cyber attack on a network or on AEMO.
Risk assessment approach	Binary (events are either credible or non-credible).	Multifactor (risk analysis needs to consider both the probability of the event and its likely severity).
Modelling	Credible contingency events can be easily modelled because they affect either one or few power system components.	Difficult to model because its likelihood and severity are not clear and it is not clear what assets may be affected.

4.2 Proposed change to definition of contingency events and indistinct events

The *BSE review* identified issues with the current definition for contingency events.⁴⁸ Clause 4.2.3(a) of the NER defines a credible contingency event quite broadly with significant room for interpretation. In the *BSE review*, taking into account input from the AER, the Commission found that this definition could potentially be interpreted to encompass some types of indistinct events.

However, in the *BSE review*, the Commission found that the NER are somewhat unclear about whether indistinct, weather-dependent events can qualify as contingency events.⁴⁹ It also acknowledged that there may be some uncertainty about whether such events are captured by the existing protected event frameworks. It may therefore be important to have a contingency event definition which is clear as to its applicability to the range of sources of risk to power system security.

⁴⁸ AEMC, *Mechanisms to enhance resilience in the power system—review of South Australia black system event*, discussion paper, 15 August 2019, p. 8

⁴⁹ *Ibid*, p. 29

Expressed another way, the current NER may lack a clear definition for indistinct events.

The COAG Energy Council's rule change request proposes to define 'indistinct event' in the NER.⁵⁰ This is discussed in the next section.

4.3 Defining indistinct events

The rule change request proposes a definition for indistinct events. Such a definition may be necessary in order to incorporate the concept into the NER:

An indistinct event may be defined as an event affecting the power system which:

- occurs over a period of time, rather than being sudden or instantaneous;
- can be widespread or otherwise affect more than one single power system element; and
- involves the non-credible failure or removal from operational service of multiple generation units and/or transmission elements that are not reasonably identifiable.

4.4 Issues for consideration

Introducing the concept of indistinct events into the NER could help:

- identify the characteristics for indistinct events and distinguish between them and contingency events
- clarify the boundaries between the protected events framework and the proposed protected operations framework (discussed in Chapter 5).

This could help make the NER framework, and so power system operation, more fit for purpose given the changing nature of the system. Doing so could help AEMO, the Reliability Panel and stakeholders more easily understand the rules and clarify which events should be managed under each framework, which could improve administrative and operational efficiency.

However, any definition should ideally be broad enough to remain relevant over time and effectively capture emerging events on the power system. Essentially, any definition needs to balance clarity and efficiency with flexibility and effectiveness: the clearer a definition, the more focused and precise the NER can be about the responsibilities of participants and focus of this new framework.

⁵⁰ COAG Energy Council, *Enhancing Operational Resilience*, rule change request, 26 May 2020, p. 1.

QUESTION 2: DEFINING INDISTINCT EVENTS

- Is it necessary to create a definition of indistinct events in the rules?
- Can stakeholders suggest any changes to the proposed definition to:
 - better describe indistinct events?
 - delineate between indistinct events and contingency events?

5 PROPOSED ARRANGEMENTS TO DETERMINE AND MANAGE INDISTINCT EVENTS

5.1 Introduction

This chapter summarises:

- the existing framework for power system security (section 5.2.1)
- issues that the rule change request identifies with managing indistinct events under the existing framework (section 5.3)
- the framework proposed under the rule change request to determine and manage indistinct events (section 5.4).

5.2 Existing framework for system security

Chapter 3 of the *BSE review* final report provides an extensive overview of the existing framework for maintaining power system security. This section summarises the most relevant aspects of this framework to provide context for the issues that the COAG Energy Council has identified in its rule change request.

5.2.1 Existing mechanisms to manage contingency events

As discussed in Chapter 4, existing frameworks for system security are built around managing the consequences of a 'contingency event'.

Managing credible contingencies

AEMO is required to take ex-ante actions to manage the system for credible contingencies. These are the events that AEMO considers to be reasonably possible in the surrounding conditions. At its core, this translates to:

1. an obligation for AEMO to keep the system within its technical limits following a credible contingency, and
2. to avoid the shedding of customer load for a credible contingency.

AEMO is required by the NER, to the extent practicable, to maintain the power system in a secure operating state.⁵¹ This means that all system parameters are within physical limits, and that they will remain within those limits following the occurrence of a credible contingency.

More specifically, AEMO defines a 'technical envelope', within which the power system is to be operated, and uses this as the basis of determining events considered to be credible contingency events.⁵² The technical envelope represents the operating limits applied to each element of the power system such that a satisfactory state, without load shedding, is achieved following the occurrence of any credible contingency event.

⁵¹ NER clause 4.2.6(a) and 4.2.4.

⁵² Clauses 4.2.4(b)(2) and 4.2.5 of the NER.

AEMO adjusts the technical envelope through constraints applied to the operation of the power system. These constraints include inter-regional interconnector flows, intra-regional transmission flows, and generator dispatch reflecting thermal, voltage, and transient stability limits in the power system. AEMO also makes sure that there are sufficient contingency capacity reserves of both reactive power and active power (frequency response) to maintain voltage and frequency with the limits defined by power system security standards for any credible contingency that may arise.

Managing non-credible contingencies

AEMO is not required to maintain the power system in a secure state for non-credible events. Instead, AEMO is obliged to co-ordinate with Network Service Providers to implement emergency frequency control schemes which shed load to reduce the risk of cascading outages and major supply disruption (such as a system black) should a non-credible contingency occur.⁵³

5.2.2

Mechanisms to enhance power system resilience

The Commission has defined power system resilience as the ability of a power system to avoid, survive, recover and learn from high-impact, low probability (HILP) events.⁵⁴ As discussed in section 2.2, a range of factors is impacting on the NEM's ability to survive and recover from HILP events.

As discussed in section 5.2.1 the existing framework for power system security is focused on managing contingency events. However, the existing framework contains two primary mechanisms that allow AEMO to enhance power system resilience and manage HILP events. These mechanisms are:

- the contingency reclassification framework, described in section 4.1.1
- the protected events framework, described below.

Protected events framework

The existing protected events framework comprises two key elements:

- the Power System Frequency Risk Review (PSFR)
- protected event declaration.⁵⁵

The PSFR considers non-credible contingency events that could involve uncontrolled increases or decreases in frequency that could lead to cascading outages or major supply disruptions. AEMO is required to develop the PSFR in collaboration with TNSPs and publish it at least every two years.⁵⁶

⁵³ Clauses 4.3.1(pa) and Schedule 5.1, clause S5.1.10.1 of the NER.

⁵⁴ *BSE review*, final report, p. 63.

⁵⁵ AEMC, *BSE Review*, final report, p. 95.

⁵⁶ The Commission is currently considering a separate rule change request from the COAG Energy Council, which proposes an expansion of the PSFR Review into a broader, generalised risk review. See: <https://www.aemc.gov.au/rule-changes/implementing-general-power-system-risk-review>

If AEMO identifies a non-credible contingency event in the PSFR and it considers it may be economically efficient to actively manage that event, AEMO can submit a request to the Reliability Panel to have the event declared to be a 'protected event'. If AEMO submits such a request, the Reliability Panel would undertake cost-benefit analysis and declare the non-credible contingency event a protected event if the benefits outweigh the costs.

Declaring a non-credible contingency event as a protected event allows AEMO to actively manage the event to avoid a cascading failure. Broadly, AEMO can actively manage a protected event in a similar way to a credible contingency event. A crucial difference is that, while load shedding should not occur for a credible contingency,⁵⁷ load shedding can occur for protected events.

5.3 Issues with managing indistinct events under the existing framework

The rule change request identifies that:

- existing frameworks are built around the concept of a contingency event (which we have described earlier as 'distinct' events)⁵⁸
- indistinct events are becoming more significant as the power system transitions to more distributed non-synchronous generation⁵⁹
- indistinct events are difficult to manage under existing arrangements.

The rule change request notes that the *BSE review* identified a need to amend existing frameworks to allow for management of 'indistinct events'.⁶⁰ The rule change request invites stakeholders to consider the issues outlined in Chapter 8 of the AEMC's *BSE review*.⁶¹

The *BSE review* identified several reasons why the existing framework for maintaining power system security may be ill-suited to managing indistinct events:⁶²

- The protected events framework was originally designed for the purpose of managing the risks of distinct, non-credible contingency events. It was not explicitly designed to manage indistinct, condition dependent risks.
- Existing frameworks are binary and deterministic, based on the probability of an event occurring. They do not require or allow AEMO to consider the consequences of an event, when deciding whether to reclassify. If an event is likely to significantly impact power system security, it may be prudent to consider its consequences, even if it has a lower probability of occurring (i.e. it may not be possible to define it as reasonably possible).
- The current framework normally considers that the failure of a single generator or network component is credible (and should therefore be managed), but the failure of two or more unrelated and dispersed assets is not-credible (and is therefore out-of-scope).

57 AEMC, Emergency frequency control schemes rule, final determination, p. 64.

58 COAG Energy Council, *Enhancing Operational Resilience*, rule change request, 26 May 2020, p. 5.

59 Ibid, p. 6.

60 Ibid.

61 Ibid, p. 1.

62 *BSE review*, final report, pp. 27, 98-99.

This makes it difficult to manage indistinct events, which affect multiple assets and require a multi-factor risk assessment approach.

While the protected events framework goes part way to addressing some of these issues, AEMO also identified issues with this framework in its submission to the *BSE review* issues and approach paper.

AEMO considered that the existing protected event framework is significantly challenging and forms a barrier to justifying the declaration of a protected event. This makes the protected events framework an impractical tool to manage risks associated with non-credible contingency events in all but the simplest and most severe examples.⁶³

5.4 Proposed framework for managing indistinct events — overview

The proposed rule seeks to address the above issues by amending the NER to include the framework to manage indistinct events that is as generally described in Chapter 8 of the *BSE Review* final report.⁶⁴

Under this framework, indistinct events would fall under two categories:⁶⁵

- **standing indistinct events** — indistinct events that could occur at any time under any conditions. Examples include cyber attack, protection system malfunction, or unpredictable responses from new technologies to power system conditions.
- **condition-dependent indistinct events** — indistinct events that only occur and become more severe during abnormal conditions. Examples include equipment failure due to severe, wide area storms or bushfires.

The proposed rule would amend the NER to:

- enhance the existing protected event framework as a mechanism to manage standing indistinct events⁶⁶
- introduce a new protected operations framework to manage condition-dependent indistinct events.⁶⁷

The rule change would manage indistinct events using the existing protected events framework and a new protected operations framework:

- standing indistinct events would be managed under the existing protected events framework⁶⁸
- condition-dependent indistinct events would be managed under the new protected operations framework:

63 AEMO, Submission to *BSE review* staff discussion paper, p. 17.

64 COAG Energy Council, *Enhancing Operational Resilience*, rule change request, 26 May 2020, p. 1.

65 AEMC, *BSE Review*, final report, pp. 92-122

66 COAG Energy Council, *Enhancing Operational Resilience*, rule change request, 26 May 2020, p. 2.

67 Ibid, pp. 2-4.

68 Ibid, p. 2

- condition-dependent indistinct events that are identified ahead of time would be managed using the pre-defined protected operations process⁶⁹
- condition-dependent indistinct events that are not identified ahead of time would be managed using the ad-hoc protected operations process.⁷⁰

The following section details how AEMO would manage indistinct events under these frameworks.

5.5 Proposed framework for managing condition independent indistinct events

5.5.1 The existing protected events framework would manage standing indistinct events

Proposed approach to managing standing indistinct events

Some indistinct events can occur at any time, regardless of external conditions. These 'standing indistinct events' could include a distributed, wide area event which is not dependent on external conditions. A cyber attack on various parts of the power system forms a potential example of a standing indistinct event.

These kinds of events likely to be managed by deploying some kind of standing measure, such as a capital investment, or a permanent change to power system operational processes, that helps the power system to avoid or survive such an event, whenever it might occur. These investments and/or operational actions would need to be assessed ahead of time to determine whether the cost of taking action to protect the system does not exceed the expected benefits. Therefore, this type of indistinct event may need an approval pathway similar to the existing protected event framework and be approved by the Reliability Panel following consideration of costs and benefits.

Under the framework the Reliability Panel, on the advice of AEMO, would determine which non-credible contingency events and indistinct events/conditions are to be protected events. A request for declaration of a non-credible contingency event as a protected event or for the revocation of such a declaration would only be able to be submitted by AEMO.

An expedited Reliability Panel process would be specified in the rules for AEMO applications that are not considered controversial. For such applications the Panel would issue a consultation paper and consult for a minimum of 10 days. The Panel would publish a single final report if no objections are raised.

It is proposed that:

- AEMO should manage condition-independent indistinct events using the existing protected events framework
- the NER should be amended to clarify that indistinct events can be declared to be protected events.

⁶⁹ Ibid, pp. 2-3.

⁷⁰ Ibid, pp. 3-4.

Issues for consultation

The Commission seeks feedback on how the proposed approach to managing standing indistinct events aligns with the assessment principles in section 3.3. In particular, the Commission seeks comments on whether it is appropriate to manage standing indistinct events using the protected events framework.

As they are not dependent on conditions such as weather events, 'condition-independent' or 'standing' indistinct events are very difficult to predict and can occur at any time—during either normal or abnormal conditions. AEMO may need to manage these type of events using a combination of ex-ante and ex-post measures. Because these events are uncertain and AEMO would need significant flexibility to manage them, any framework for managing standing indistinct events would need to have appropriate governance to make sure that they are managed effectively and at least cost.

The current governance framework for protected events establishes clear responsibilities for:

- reviewing power system frequency risks⁷¹
- declaring and approving a protected event based on robust cost-benefit assessment
- planning and implementing management solutions for certain non-credible contingency events.⁷²

These arrangements are intended to efficiently identify and manage emerging risks in the NEM and support the long-term efficient operation, use and investment in electricity services. The framework allows AEMO to use a combination of ex-ante and ex-post measures to manage protected events. Crucially, the framework allows AEMO to manage significant non-credible contingencies during normal conditions.

Given this, the protected events framework may be an efficient and effective mechanism to manage standing indistinct events going forward. Doing so would:

- allow AEMO, the Reliability Panel and stakeholders to identify possible standing indistinct events and evaluate the costs and benefits of managing them
- allow AEMO to manage these risks using both of ex-ante and ex-post measures
- use an existing, established framework to manage these events, which may be administratively simpler and more proportional than creating a new, additional framework.

However, noting general criticisms of the protected events framework from AEMO, as noted above, it may be that the protected events framework is not necessarily the optimal framework to address these risks.

71 Noting that this process has been proposed to be expanded under the *Implementing a general power system risk review rule change request*.

72 AEMC, *Emergency frequency control schemes*, final determination, p. iv.

QUESTION 3: PROPOSED FRAMEWORK FOR MANAGING STANDING INDISTINCT EVENTS

- Is it appropriate to deal with standing indistinct events using the existing protected events framework, or do standing indistinct events need to be managed using a new, separate process?
- If a new process, what should this look like?

5.6 Proposed framework for managing condition dependent indistinct events

As discussed in section 5.3, the existing protected events framework was not explicitly designed to manage condition-dependent indistinct events. In the *BSE review*, the Commission stated that, while the existing framework does not preclude the use of measures to manage instinct condition dependent risks, it is also important to clarify the treatment of condition dependent indistinct risks, such as those arising from distributed weather events.

The Commission proposed the protected operations framework in the *BSE review* as a new mechanism to manage these condition-dependent indistinct events.⁷³

The “protected operation” would be a new element to the existing protected event framework. As described above, the key difference between protected operation and protected events is that protected operation is designed to deal with indistinct risks that only become more probable where abnormal conditions apply.

Because these indistinct risks only arise from time to time, the most efficient way for AEMO to manage them would be to take operational actions rather than implementing standing measures. Protected operation would allow AEMO to alter how it operates the system by adjusting the technical envelope or taking other actions for the limited time during which the relevant abnormal conditions occur in order to enhance the general resilience of the power system. This would enhance the ability of the system to avoid, survive and recover from the relevant risk, should it occur.⁷⁴

The protected operations framework proposed in Chapter 8 of the *BSE review* would allow for two types of protected operation:

- **pre-defined protected operation** to manage condition-dependent events that AEMO has pre-defined
- **ad-hoc protected operation** to manage condition-dependent events that AEMO has not pre-defined.

The following sections outline the proposed process for these two types of protected operation.

⁷³ AEMC, *BSE review*, final report, p. 102.

⁷⁴ Importantly, as with the existing traditional protected event, this would mean some load shedding could occur, provided that the system stayed stable and an uncontrolled cascading outage was prevented.

5.6.1 Pre-defined protected operation

The rule change request proposes amending the NER to allow AEMO to “declare a period of protected operation to manage risks from specific indistinct events, in accordance with criteria and actions pre-defined for management of risks from these specific indistinct events.”⁷⁵

Pre-defined protected operation would involve AEMO:

- pre-identifying, through the General Power System Review (GPSR) proposed in the *BSE review*, an indistinct event the risk of which increases during abnormal conditions
- for the identified indistinct event, AEMO specifying and publishing:
 - criteria setting out the specific abnormal conditions which would see it enter into a period of protected operation in response to the event
 - its approach to assessing the level of risk arising from the indistinct event, and the actions it would take to prevent a cascading failure, or maintain the system in a secure state (following consideration of the costs and benefits), given the occurrence of the abnormal conditions.⁷⁶

The NER would set out requirements for the criteria specified and published by AEMO.

The proposed rule would allow AEMO to take actions to manage risks arising from pre-identified indistinct events.

In determining what actions should be taken, the proposed rule would require AEMO to follow a cost minimisation principle, which will be defined in the NER.

The rule change request states that:

- “the cost minimisation principle should not conflict or impede AEMO’s obligation to meet its power system security responsibilities”
- “this rule change request should read to be clear that this is the case.”⁷⁷

This would mean that, in terms of the actions taken during a period of protected operation, AEMO must, at a minimum, take actions to minimise the risk of a cascading failure. However, AEMO may also elect to take actions above this, to maintain the power system in a secure state, without load shedding.

To support transparency, AEMO must assess, consult on, and publish details of the cost and benefit assessment used to determine the efficiency of the proposed set of management actions.⁷⁸ It should publish the criteria for entering a protected operating period and the range of actions that would be taken by AEMO during a protected operation period.⁷⁹

75 COAG Energy Council, *Enhancing operational resilience*, rule change request, p. 2.

76 Ibid.

77 COAG Energy Council, *Enhancing operational resilience*, rule change request, p. 3.

78 Ibid.

79 Ibid.

5.6.2 **Ad-hoc protected operation**

The rule change proposes an 'ad-hoc' version of protected operation, which would allow AEMO to declare a period of ad-hoc protected operation where a risk has arisen from an indistinct event that had not been pre-identified or had management actions pre-defined.⁸⁰

Under the proposed rule, ad-hoc actions would apply to indistinct risks that are unanticipated, or when AEMO has identified a new and severe risk from an indistinct event but there has been insufficient time to complete the process for a conditional protected operation.⁸¹

The proposed rule intends ad-hoc protected operation to be an emergency measure. On each occasion AEMO declares a period of ad-hoc operation, AEMO would need to report publicly, and to the Panel, as soon as practicable following the occasion.⁸² The rule change proposes to specify minimum requirements for AEMO's report.⁸³ These minimum requirements are set out in section 6.2.1.

The proposed rule would also require AEMO to explicitly review the risks managed on each occasion it has used its ad-hoc power in the next GPSR. The rule change request states that this would allow AEMO to incorporate experience from the use of its ad-hoc power.⁸⁴

5.6.3 **Issues for consultation**

The proposed approach for protected operations is designed to address the limitations with the existing framework identified in the rule change request and the *BSE review*. The Commission seeks feedback on whether this proposed framework for protected operations is efficient, effective and proportional.

Efficiency, effectiveness and proportionality

AEMO and the Commission have identified that the current framework for indistinct events is inflexible, slow, and may be unable to keep pace with the rapid transition in the power system.⁸⁵ The proposed protected operations framework seeks to address these limitations by allowing faster and more efficient approval of AEMO's management actions.

Under the proposed rule, the Reliability Panel would not 'approve' protected operations, unlike protected events.⁸⁶ Instead, AEMO would have discretion to act to manage condition-dependent indistinct events that are identified in the GPSR, or new events that occur suddenly during abnormal conditions.

By streamlining the process for managing condition-dependent indistinct events, the protected operations framework could reduce administrative costs for AEMO, the Reliability Panel and stakeholders. Allowing AEMO to act more quickly and holistically to manage

80 COAG Energy Council, *Enhancing operational resilience*, rule change request, p. 3.

81 Ibid.

82 Ibid.

83 Ibid, pp. 3-4.

84 Ibid, p.4.

85 AEMC, *BSE review*, final report, p. 98.

86 Although it is noted that the Panel could be required to develop guidelines that would inform how AEMO met its NER obligations.

condition-dependent indistinct events could enhance security of the system and therefore improve outcomes for consumers. Improving certainty over the actions AEMO would take could also enhance the efficiency of participant operational decision-making.

The proposed framework could still seek to achieve cost-effective outcomes by balancing this increased flexibility by:

- requiring AEMO to take actions in line with a cost-minimisation principle (and potentially in line with a set of guidelines developed by the Panel)
- restricting AEMO's remit only managing indistinct events that are likely to lead to a cascading failure during abnormal conditions
- requiring enhanced transparency and consultation on these events in the GPSR.

A cascading failure is likely to have a significant impact on consumers and the economy more generally. The protected operations framework would make a tradeoff between the cost-effectiveness that increased oversight of AEMO's actions can deliver against increased operational flexibility, allowing AEMO to act to avoid cascading failures. The Commission seeks stakeholder feedback on this tradeoff.

Balancing efficiency and flexibility with ad-hoc operations

The indistinct events framework seeks to balance flexibility with cost-effectiveness by setting criteria for events that can be predicted (protected events and predefined protected operations), but allowing AEMO sufficient flexibility to act when it needs to address major unforeseen events through "ad-hoc" protected operations.

The ad-hoc power could provide AEMO with significant discretion and strong accountability and transparency arrangements are proposed to provide market participants with confidence in its application. Ad-hoc protected operation would only allow AEMO to manage indistinct events that occur during abnormal conditions but that were not previously identified through the GPSR or did not have management actions pre-defined.⁸⁷

The rule change request does not contain a draft rule and does not set out all requirements for the ad-hoc framework in detail. Therefore, if the issues identified in the rule change are to be addressed, there would need to be consideration of how to design the ad-hoc protected operations framework to appropriately balance the objectives of flexibility and effectiveness. In particular, such threshold questions would include whether:

- the NER could set out a process that AEMO must follow to declare an ad-hoc event
- AEMO could be granted discretion to decide how it identifies and declares an ad-hoc event and the criteria it uses to make this determination, but be required to publicly consult on this process
- the rules could require the Reliability Panel to approve the process and criteria that AEMO uses to declare ad-hoc operations
- the rules could allow AEMO complete discretion on how it declares ad-hoc events.

⁸⁷ COAG Energy Council, *Enhancing operational resilience*, rule change request, p. 3.

Clear criteria and requirements can provide clarity and predictability for market participants on AEMO's likely actions and allow AEMO to effectively manage operations and investment decisions. However, it may also be important for AEMO to have the flexibility to depart from pre-defined criteria under emergency circumstances.

QUESTION 4: PROPOSED PROTECTED OPERATIONS FRAMEWORK FOR MANAGING CONDITION-DEPENDENT INDISTINCT EVENTS

- Do you support the proposed approach to protected operations?
- Is the proposed protected operations framework likely to be effective in managing indistinct risks at an appropriate cost?
- Should the Rules specify a process that AEMO must follow to determine whether an event should be managed using the ad-hoc approach? If so, what should that process be?

QUESTION 5: GENERAL QUESTIONS ON THE PROPOSED FRAMEWORK FOR MANAGING INDISTINCT EVENTS

- Can stakeholders identify any significant emerging risks to power system security that would not be captured under the proposed framework?
- Does the proposed framework provide AEMO with sufficient powers to manage protected events and protected operations once they are declared?
- Can stakeholders identify any duplication or overlap between the proposed framework and the existing credible contingency or protected events framework that may increase the complexity and/or cost of managing contingency events or indistinct events without delivering material security benefits?

5.7

Consultation, transparency and oversight

5.7.1

Transparency for protected operations and reclassification

Proposed enhanced consultation arrangements for protected operation

The transparency and market information requirements involving the issuance of market notices are proposed to remain the same as under the existing protected event framework.⁸⁸

The proposed framework for managing indistinct events also includes enhanced consultation arrangements for AEMO's use of protected operation. These enhanced consultation arrangements are designed to provide all stakeholders with confidence in AEMO's performance in its role and exercise of its powers. The *BSE review* noted that enhanced

⁸⁸ COAG Energy Council, *Enhancing operational resilience*, rule change request, p. 4.

consultation arrangements are particularly important given the flexibility the proposed framework provides AEMO.⁸⁹

The rule change request states:⁹⁰

Enhanced consultation requirements are proposed for AEMO's use of protected operation. These consultation arrangements require AEMO to consult on:

- the nature of the abnormal conditions and why these conditions increased risk from an indistinct event sufficiently to justify any use of an ad-hoc protected operation
- how AEMO has/will assess the risk arising from the indistinct events, including any assumptions used
- the range of options for managing the risks considered by AEMO and the indicative costs of each
- the indicative benefits associated with the options considered by AEMO for managing the risk
- how the chosen option satisfies the principle of cost minimisation, and
- details of how AEMO will implement protected operation.

AEMO would be required to publicly consult in accordance with the rules consultation procedures.

In line with its current requirements applying to re-classification, AEMO would report publicly, and to the Panel, on its use of the protected operation framework every six months.

The rule change states that the recommended protected operation framework is transparent, with appropriate levels of organisational accountability.⁹¹

The rule change proposes enhanced consultation arrangements for both protected operation and reclassification. The proposed changes for reclassification are described in the next section.

Proposed changes to consultation requirements for reclassification criteria

As explained in section 4.1, the current framework allows AEMO to reclassify non-credible contingency events. If a non-credible contingency event becomes 'reasonably possible' because of abnormal conditions, AEMO is required to reclassify it as a contingency event and notify the market.⁹²

89 AEMC, *BSE Review* final report, p. 114.

90 COAG Energy Council, *Enhancing Operational resilience*, rule change request, p.4.

91 Ibid, p. 8.

92 Clause 4.2.3A(g) of the NER.

Under the current framework, AEMO is required to develop and publish criteria for deciding whether any non-credible contingency has become 'reasonably possible' given abnormal conditions.⁹³

In the *BSE review* final report, the Commission stated that it considers that enhanced consultation arrangements should apply to both reclassification and protected operation and that the arrangements should:

- specify a process via which consultation should occur; and
- include a requirement for public consultation including with end users and consumer representatives.⁹⁴

The Commission therefore considered enhanced consultation arrangements should be conducted in accordance with the rules consultation procedures to maximise the rigour and robustness of the consultation process.⁹⁵ This is consistent with other consultation requirements for AEMO's development of guidelines impacting market operation, such as the Market Ancillary Service Specification.⁹⁶

The rule change request therefore proposes enhancing the consultation arrangements for AEMO's development of these criteria.⁹⁷

Currently, the NER do not set out a clear process on how AEMO should consult and publish information on its reclassification process.⁹⁸

The rule change proposal states that:

- public consultation is important given the potential impacts on market operation and price outcomes associated with any additional constraints applied to protect against risks from either distinct or indistinct events
- consultation in accordance with the rules consultation procedures (Part F of Chapter 8 of the NER) would bring reclassification and protected operation in line with other AEMO system security procedures with significant effects of market outcomes such as the Market Ancillary Services Specification.⁹⁹

5.7.2 Justifying the proposed transparency measures

The rule change request states that the proposed rule will promote the long-term interests of consumers because the recommended protected operation framework is transparent with appropriate levels of organisational accountability.

Under the proposed framework AEMO would be required to:

93 Clause 4.2.3B of the NER.

94 AEMC, *BSE Review*, final report, p. 115.

95 The rules consultation procedures are defined in part F of NER Chapter 8.

96 Clause 3.11.2(d) of the NER.

97 COAG Energy Council, *Enhancing operational resilience*, rule change request, p. 4.

98 *Ibid.*

99 *Ibid.*, pp. 4-5.

- consult according to the rules consultation procedures—providing transparency and supporting market confidence in the process
- publish protected operation criteria—providing reasonable levels of predictability on AEMO’s actions to manage identified risks and will enhance the ability of market participants to make decisions to manage their own market and investment risk
- report each 6 months, and following each use of ad-hoc protected operation, providing accountability as to AEMO’s actions.

Additional accountability will be provided for through the Reliability Panel’s making of guidelines (if required) applying to AEMO’s use of protected operation.

QUESTION 6: CONSULTATION ARRANGEMENTS FOR PROTECTED OPERATION AND RECLASSIFICATION

- Are the proposed consultation arrangements sufficient to provide stakeholders with confidence in AEMO’s use of protected operations and reclassification powers?
- Are the consultation obligations imposed on AEMO proportionate to the benefits?

5.7.3

Provision for Reliability Panel guidelines and oversight

The rule change request proposes that, if the Reliability Panel considers it necessary or desirable, it may elect to determine guidelines for pre-defined and ad-hoc protected operation.¹⁰⁰ Under the proposed rule, the Reliability Panel may also act in a general oversight role by considering framework performance as part of its Annual Market Performance Review (AMPR). This is discussed further in section 6.2.2.

5.8

Options for implementation

The rule change request does not recommend a specific approach to implementing protected operation in the NER. It instead proposes two broad options for implementation:

- Option A: implement arrangements parallel to the existing contingency classification system. This is equivalent to the existing implementation of protected events and is broadly consistent with international practice. This may involve the following amendments:
 - defining indistinct events separately from the existing definition of contingency events—this retains ‘contingency event’ in its traditional meaning; and
 - adding references to indistinct events into relevant rule clauses on a case by case basis, including clause 4.2.4(a), which describes the security operating state.
- Option B: implement as a part of an extended contingency classification system.¹⁰¹ This would be integrated into the rules by changing the definition of a contingent event, bu

¹⁰⁰ Ibid, p.5.

¹⁰¹ Ibid

redefining and expanding the existing concept to cover any unplanned event that causes a sudden change in the balance of available supply and demand. This approach could be enabled in the following way:

- A contingency event would no longer be limited to something that causes the failure or removal from service of a generating unit or major transmission element. It may be redefined as an event that would be expected to result in a sudden and unplanned change in the availability or operability of generation, networks or scheduled load.¹⁰²
- A credible contingency may still be defined as a contingency that is considered reasonably possible in the surrounding power system circumstances. The management of credible contingency events can take one of two forms depending on whether the plant at risk from the contingency can be specifically identified (i.e. distinct) or not (i.e. indistinct). Importantly, indistinct events would *only be considered credible in abnormal conditions*.
- This approach would automatically incorporate indistinct credible contingency events in arrangements for the secure operation of the power system and technical envelope, during periods AEMO consider involving abnormal conditions. This could allow AEMO to maintain the system in a secure state to what it considers to be indistinct events during abnormal conditions.

There are pros and cons with either approach, which were discussed in the *BSE review* final report.¹⁰³

5.8.1

Other Issues

Accountability and governance differences between Option A and Option B

Option A would define 'indistinct event' and create a separate framework for managing indistinct events that is parallel to the existing framework for contingency events. Broadly, Option A would implement the framework for managing indistinct events as described in the rule change request.

Option B would redefine 'contingency event' and manage contingency events using the existing reclassification and protected events processes. This would lead to some fundamental differences in accountability and governance compared to Option A.

Option B would allow AEMO to:

- use the reclassification process to manage condition-dependent indistinct events
- use the protected events framework to manage standing indistinct events.

Option B would not develop the proposed protected operations framework. This would change some aspects of the governance and transparency framework compared to Option A.

The reclassification framework does not require AEMO to first identify indistinct events through the GPSR before they can manage them. This would provide AEMO more flexibility in

¹⁰² This allows the contingency framework to account for sudden reductions in operation, as might occur on the triggering of run-back schemes or known emergency frequency control scheme actions.

¹⁰³ AEMC, *BSE review*, final report, p. 120

managing condition-dependent indistinct events, as could reclassify a condition-dependent indistinct event that is identified by any means. However, this approach would not provide the same oversight as under the proposed protected operations approach.

QUESTION 7: OPTIONS FOR IMPLEMENTATION

To implement the proposed rule, should the AEMC follow a parallel process (Option A) or change the definition of contingency event (Option B)?

Are the governance and accountability requirements under Option B appropriate?

6 GOVERNANCE, RESPONSIBILITIES AND ENFORCEMENT

The *BSE review* noted that the actions taken under the proposed framework for managing indistinct events will influence not only system security outcomes but also market outcomes and the risks faced by market participants.¹⁰⁴ The Commission identified that a clear governance framework is therefore critical to delivering efficient outcomes for consumers.

This chapter considers governance, responsibility and enforcement of the proposed framework.

6.1 Principles for allocating responsibility

This rule change process will consider whether these new frameworks adhere to the good governance principles outlined in the assessment framework in section 3.3.

This chapter discusses how the proposed framework would:

- allocate risk and the accountability for decisions related to the management of risk to those parties best placed to manage them; and
- allocate roles and responsibilities based on the primary function and experience of organisations.

6.2 Responsibilities

The framework for managing indistinct events proposed in the rule change request would introduce responsibilities for AEMO and the Reliability Panel. This section outlines the responsibilities of the parties.

6.2.1 AEMO responsibilities

Defining criteria and managing risks for protected operation

The previous chapter set out the proposed framework for managing indistinct events, which would alter responsibilities for AEMO, including providing AEMO with the authority to define criteria, and the actions that will be taken to manage specific risks during a period of pre-defined protected operation.¹⁰⁵

The proposed protected operation framework provides AEMO with the authority to take ad-hoc actions subject to additional reporting and transparency requirements.¹⁰⁶ The transparency requirements imposed by the rule are included to provide market participants with confidence in AEMO's exercise of its powers.¹⁰⁷

104 AEMC, *BSE review*, final report, p. 106.

105 COAG Energy Council, *Enhancing operational resilience rule*, pp.2-3.

106 *ibid*, pp.3-4.

107 *ibid*, pp.9-10.

Issues for consultation

The proposed rule would provide AEMO with additional flexibility to manage indistinct events. Governance principles suggest that an expansion of powers should be met with an appropriate expansion of oversight.

QUESTION 8: AEMO RESPONSIBILITIES

- Do stakeholders support AEMO's proposed responsibilities?
- Do parties consider that AEMO would have sufficient powers and accountability to efficiently and effectively manage indistinct events under the proposed rule?

6.2.2

Reliability Panel responsibilities

Overview of Panel responsibilities

Under the proposed rule, the Reliability Panel would:¹⁰⁸

- determine which standing indistinct events are protected events, on the advice of AEMO
- determine guidelines for pre-defined and ad-hoc protected operation, if the Reliability Panel considers it necessary or desirable to do so
- act in a general oversight role by considering AEMO's performance as part of its Annual Market Performance Review (AMPR).

Standard process for determining protected events

The proposed rule would retain the existing framework for determining protected events,¹⁰⁹ specifically the Reliability Panel process for determining protected events outlined in NER clauses 8.8.3 and 8.8.4.

The standard approach for determining protected events under the proposed rule is as follows:

1. AEMO identifies a non-credible contingency event or condition-dependent indistinct event that it considers justifies taking action to prevent it.¹¹⁰
2. AEMO develops and submits a request to the Reliability Panel to classify the event as a protected event.¹¹¹ This request would need to include the required information set out in NER clause 5.20A.4(b), such as the nature and likelihood of the event, options for managing the event, and estimated costs.¹¹²
3. The Reliability Panel then undertakes an economic assessment of AEMO's application by:

¹⁰⁸ *ibid*, p.2 and p.5.

¹⁰⁹ *ibid*, p.2.

¹¹⁰ The non-credible contingency needs to be considered to be sufficiently severe as to make actions to prevent a cascading failure economically efficient.

¹¹¹ NER cl. 5.20A.4(a)

¹¹² NER cl. 5.20A.4(b)

- a. weighing the costs of managing the event (including the costs to the market of any load shedding) against the avoided consequences of the non-credible contingency event should it occur¹¹³
 - b. following the Rules Consultation Procedures set out in NER Rule 8.9, which includes developing a draft report, seeking and then considering public consultations, and reconciling these in a final report.
4. Where the costs of managing the event are outweighed by the benefits of avoiding a cascading failure, the Reliability Panel would declare the event as a protected event.

Expedited process for determining protected events

As discussed in section 5.3, the *BSE review* noted that the current process for declaring a protected event is challenging for AEMO. In particular, AEMO identified that the time needed to identify, develop, review, and eventually declare a protected event is too long to keep pace with the rapid transition in the power system.

To address this issue, the rule change request proposes an expedited Reliability Panel process that would allow the Reliability Panel to approve distinct and indistinct protected events that are relatively straight forward and not considered controversial.¹¹⁴

The rule change request proposes an expedited Reliability Panel process to be specified for the approval of distinct and indistinct protected events that are relatively straight forward and not considered controversial. For such applications the Panel would issue a consultation paper and consult for a minimum of 10 business days. If no objections are raised, the Panel would then publish a single final report setting out its decision.

The rule change request does not propose changes to governance arrangements for protected events other than the introduction of an expedited process just described. The Panel, on the advice of AEMO, would remain the party to determine which non-credible contingency events and indistinct events are to be protected events and approve the management actions proposed by AEMO on the basis of an assessment of costs and benefits.

Guidelines

Under the proposed rule, the Reliability Panel may elect to determine guidelines for pre-defined and ad-hoc protected operation, if the Reliability Panel considers it is necessary or desirable to do so.¹¹⁵ This could be used to help provide guidance to AEMO on how to assess such events that are inherently uncertain.

¹¹³ In determining the request, the Reliability Panel assesses the costs of the recommended option(s), including the cost of ex-ante measures and the costs of any new or modified emergency frequency control scheme (and any load or generation shedding associated with the option), against the avoided cost of the consequences of the non-credible contingency event, should it occur. See: AEMC, *Emergency frequency control schemes*, final determination, p. 64.

¹¹⁴ COAG Energy Council, *Enhancing operational resilience*, rule change request, p. 2.

¹¹⁵ COAG Energy Council, *Enhancing operational resilience*, rule change request, p. 5.

AMPR review

The AMPR includes observations and commentary on the security, reliability and safety performance of the power system. Clause 8.8.3(b) of the NER requires the Reliability Panel to conduct this review at least once every financial year.

The proposed rule would allow the Reliability Panel to “act in a general oversight role” by considering the performance of the protected operations framework as part of the AMPR.¹¹⁶

Issues for consultation

Reliability panel responsibilities

The Commission is interested in stakeholder views on what the Panel’s role should be. While Reliability Panel already considers issues related to uncertainty as part of its current functions, it is not explicitly required to consider indistinct events. For example, how would the Reliability Panel access the necessary expertise to fulfil its proposed functions, such as reviewing applications to declare indistinct events as protected events, or having oversight of AEMO’s use of protected operations.

QUESTION 9: RELIABILITY PANEL RESPONSIBILITIES

- Do you support the Reliability Panel’s proposed responsibilities?

Defining ‘non-controversial and straightforward’ events for expedited approval

The rule change request proposes to allow the expedited approval process to be used for distinct and indistinct protected events that are “relatively straight forward and not considered controversial”.¹¹⁷

The rule change does not explain what would make an event “relatively straight forward and not considered controversial”.¹¹⁸ However, it does outline the process the Reliability Panel would take to consider these applications.¹¹⁹ For such applications, the Panel would issue a consultation paper and consult for a minimum of 10 business days. If no objections are raised, then the Panel would publish a single final report setting out its decision.

This may imply that the Reliability Panel would consider an application using the standard protected events process if stakeholders raise objections to it. Stakeholder objections could therefore be the evidence that the Reliability Panel uses to determine whether an event is non-controversial or straightforward.

¹¹⁶ “The Reliability Panel may also act in a general oversight role by considering framework performance as part of its Annual Market Performance Review (AMPR).” COAG Energy Council, *Enhancing operational resilience*, rule change request, p. 5.

¹¹⁷ COAG Energy Council, *Enhancing operational resilience rule change*, p. 2.

¹¹⁸ In addition, there is no established process in the NEM framework for determining whether an event is non-controversial or straightforward. The National Electricity Law outlines that a non-controversial Rule is one that is “unlikely to have a significant effect on the national electricity market”. *National Electricity Law (South Australia) Act 1996*, “non-controversial Rule”, Part 7, Division 1, subdivision 1, section 87.

¹¹⁹ Ibid.

However, the Reliability Panel could also use other mechanisms to determine whether an event is non-controversial or straightforward. For example, the Reliability Panel could assess an event against criteria to make this determination.

These criteria could, for example, be:

- set out in the NER
- developed by AEMO and approved by the Reliability Panel
- developed by the Reliability Panel and issued as a guidance note.

Criteria could help further streamline the expedited process. They could help AEMO, the Panel and stakeholders more easily identify whether an application should be considered through the expedited process. They could also help the Reliability Panel determine whether stakeholder objections under this process are valid. However, if these criteria are too narrow, they may reduce the flexibility and effectiveness of this expedited process.

Conversely, if the Reliability Panel was granted full discretion to determine whether an event is straightforward or non-controversial this could provide for more flexibility to consider a broader range of events through the expedited process, but may make it more difficult for the Reliability Panel to assess applications and may not provide appropriate guidance to AEMO or stakeholder confidence in the process.

The Commission seeks stakeholder feedback on how an application should be determined to be non-controversial and straightforward under the proposed rule.

Efficiency and effectiveness of the expedited approval process

The Commission also seeks feedback on whether the expedited approvals process is efficient, effective and proportional. In its submission to the *BSE review* issues and approach paper, AEMO identified that the time needed to identify, develop, review, and eventually declare a protected event is too long to keep pace with the rapid transition in the power system.¹²⁰ The Commission seeks feedback on whether stakeholders consider that this proposed process is likely to help address this issue, and whether there are other approaches that could further improve efficiency and effectiveness.

QUESTION 10: PROPOSED EXPEDITED APPROVAL PROCESS

- What is the most appropriate way for the Reliability Panel to determine whether an application to declare a proposed protected event as straightforward and non-controversial?
- Should criteria for defining whether a proposal is non-controversial be developed?
- Is the proposed approach likely to be an effective way of streamlining the protected events approval process?

¹²⁰ AEMC, *BSE review*, final report, p. 98. cf. AEMO, submission to the *BSE review* issues and approach paper, p. 7.

6.2.3 Proposed role of GPSR and NSPs

Overview of the GPSR

Emerging risks to power system security should be promptly identified so that they can be effectively and efficiently managed. Existing arrangements for identifying emerging risks to power system security include a Power System Frequency Risk review (PSFR) for identifying risks to frequency from non-credible contingency events.

Given the changing power system risk and resilience profile, the BSE review recommended changing the NER to broaden the scope of the existing PSFR beyond frequency to become a more frequent and holistic General Power System Risk review (GPSR) process.¹²¹ These changes would be in order to allow it to effectively identify emerging risks to power system from all sources. These changes are currently being progressed through a separate rule change request that has been received from the COAG Energy Council.

The GPSR (if implemented) would act as a front end risk identification process to inform risk management actions, including for protected events and protected operation. The GPSR would consider:

- issues across both the transmission and distribution networks, including the impact of increased DER penetration, and
- a wider range of risks, including risks associated with voltage, system strength and inertia.

Role of the GPSR in protected operation

As described in section 5.6.1, the *Enhancing operational resilience in relation to indistinct events* rule change request proposes to introduce two types of protected operation: pre-defined and ad-hoc. The GPSR would play a role in both of these types of protected operation.

Role of the GPSR in pre-defined protected operation

AEMO would use the GPSR to pre-identify condition-dependent indistinct events that it would manage through the 'pre-defined' protected operation process. The NER would require AEMO to specify and publish in the GPSR:

- the criteria for the specific abnormal conditions that would allow AEMO to enter into a period of protected operation
- AEMO's approach to assessing the level of risk arising from the indistinct event
- the actions AEMO would take to:
 - prevent a cascading failure; or
 - maintain the system in a secure state (following consideration of the costs and benefits), given the occurrence of the abnormal conditions.

¹²¹ AEMC, *BSE Review*, final report, p. 9

The role of the GPSR in ad-hoc protected operation

The proposed rule would also require AEMO to report on ad-hoc protected operations through the GPSR. Under the proposed rule, AEMO could declare a period of ad-hoc protected operation for risks that have not been pre-identified in the GPSR or had management actions pre-identified for them.

The rule change proposes to specify minimum requirements for AEMO's report, including details of:

- the nature of the abnormal conditions and why these conditions increased risk from an indistinct event sufficiently to justify the use of an ad-hoc protected operation
- the measures that AEMO took to mitigate this risk
- the direct costs of declaring a period of ad-hoc protected operation
- any actions AEMO intends to take to account for this kind of event in the future.

For each occasion AEMO declares a period of ad-hoc operation, the NER would require AEMO to review the risks it managed in the next GPSR. This is intended to allow AEMO to incorporate experience from the use of its ad-hoc power.

QUESTION 11: THE ROLE OF NSPS AND THE GPSR IN MANAGING INDISTINCT EVENTS

- What responsibility should AEMO have for identifying potential condition-dependent indistinct events in the GPSR (if implemented), and what responsibility should each NSP have? For example, how should responsibility be apportioned for network configuration issues, such as protection settings, reclose arrangements and sophisticated tripping?
- If an NSP considers outcomes from the GPSR and takes action to improve system security as a result, can and should these actions count towards the NSP's network capability component under the service target performance incentive scheme (STPIS)?

7 COSTS AND BENEFITS

7.1 Challenges in calculating costs and benefits for indistinct events

It is important to undertake transparent assessments of the costs and benefits of power system resilience to maximise the long term interests of consumers.

The *BSE review* identified that, while valuing resilience is relatively straightforward in concept, there are challenges with valuing resilience in practice.¹²²

These challenges include that:

- it is difficult to value the avoided costs of reducing the probability and magnitude of a severe HILP event because these events are often inherently uncertain, with unknown underlying probability distributions
- the benefits of increased resilience will tend to accrue and be realised over time, in contrast to the costs of resilience measures which are immediate, and so much easier to quantify
- it is difficult to accurately quantify the nature of the benefits of increased power system resilience.

While these challenges are significant, carefully designed regulatory frameworks can assess the costs and benefits of power system resilience measures. In the *BSE review*, the Commission considered that there are several characteristics of these frameworks that can help to address these challenges for power system security.

Firstly, frameworks should be as transparent as possible.¹²³ This will allow market bodies, governments, regulators, market participants, consumer groups and all other interested stakeholders to understand, provide input and, if necessary, critique the costs and benefits that underpin a decision to increase or decrease system resilience.

Furthermore, these frameworks should acknowledge the uncertainty inherent in this assessment and utilise a mix of probabilistic and deterministic methods to inform decision-making. Deterministic methods and settings can provide 'rules of thumb' to guide decision-making and account for the information limitations and methodological complexities associated with relying on probabilistic methods to assess uncertain events. However, carefully developed and bounded probabilistic methods, based on whatever existing information can be utilised, can also be used to inform the determination of deterministic settings.

In terms of developing solutions to enhance power system resilience, there is also merit in developing and coordinating multiple frameworks, to obtain resilience measures from various sources. This is on the basis that utilising a mix of measures to enhance resilience is likely to increase effectiveness and reduce overall costs for system security.

¹²² AEMC, *BSE review*, final report, p. 51.

¹²³ *Ibid*, p. 52.

7.2 How the proposed rule seeks to minimise costs

The proposed rule seeks to manage indistinct events at least cost in line with the NEO. It contains separate measures to make sure this occurs for protected events and protected operations (both pre-defined and ad-hoc). This section discusses these proposed mechanisms.

7.2.1 Protected events

Under the proposed rule, AEMO and the Reliability Panel would consider and analyse the costs and benefits of declaring and managing an event as a protected event, and only do so if they consider that the benefits outweigh the costs. By doing this, the proposed framework seeks to manage standing instinct events (and non-credible contingencies) at least cost.

As described in section 6.2.2, AEMO and the Reliability Panel go through a multi-step process to declare a protected event. Where the costs of managing the event are outweighed by the benefits of avoiding a cascading failure, the Reliability Panel would declare the non-credible contingency event a protected event.

7.2.2 Protected operation

The proposed framework for protected operation is designed to help minimise costs from managing indistinct events by setting requirements for:

- AEMO and the Reliability Panel to assess the costs and benefits of managing indistinct events through pre-identified operation
- AEMO to explicitly report on any events it manages through ad-hoc protected operation.

The Energy Council's rule change request clarifies how AEMO's pre-defined protected operations should apply.¹²⁴

The proposed rule would allow AEMO to take actions to manage risks arising from pre-identified indistinct events. These actions are those which represent the lowest overall cost approach to managing the identified risk.

In determining what actions should be taken, the proposed rule is for AEMO to follow a cost-minimisation principle, which will be defined in the NER.

The cost-minimisation principle should not conflict or impede AEMO's obligation to meet its power system security responsibilities. This rule change request should read to be clear that this is the case.

In particular, in terms of the actions taken during a period of protected operation, AEMO must, at a minimum, take actions to minimise the risk of a cascading failure. However, AEMO may also elect to take actions above this, to maintain the power system in a secure state, without load shedding.

This indicates the proposed rule would set out the following:

¹²⁴ COAG Energy Council, *Rule change request — enhancing operational resilience*, p. 3

- AEMO would be required to take actions to minimise the risk of a cascading failure.
- The NER would not specify how AEMO should meet the cost minimisation objective. This would allow AEMO to decide what assumptions and methodologies it uses to determine protected operation periods subject to the cost-minimisation principle.
- The cost-minimisation objective would:
 - qualify the level of accuracy AEMO would need to provide when making its assessment of pre-defined protected operations
 - allow AEMO to make “general assessment of possible ranges of costs and benefits sufficient to demonstrate the likelihood that their proposed actions will be consistent with the principle of efficient framework design.”¹²⁵
- The cost minimisation principle should not conflict or impede AEMO’s obligation to meet its power system security responsibilities.

For further context, the BSE review suggested that the cost minimisation principle would be to:¹²⁶

- reasonably assess costs and benefits of the actions necessary to manage indistinct risks
- implement and publish pre-defined criteria that apply to the actions AEMO would take under protected operation.

The Commission also discussed how the cost-minimisation principle might apply in the *BSE review* final report.¹²⁷ In the report, the Commission recognised the difficulty of undertaking these kind of assessments for events that are inherently uncertain.

Reliability Panel assessment guidelines

As discussed in section 6.2.2, the proposed rule would provide the Reliability Panel with the scope to issue guidelines for how AEMO should assess indistinct events and the case for defining a protected operation period, if deemed necessary. This is based on the Commission’s recommendation in the *BSE review*, where it recognised that AEMO may need further guidance on how it should conduct its assessment given the complexity of indistinct events. These guidelines are intended to provide additional accountability for how AEMO uses protected operation.

Consultation requirements and cost-benefit analysis

As discussed in section 3.3, the proposed rule would require AEMO to consult on its use of protected operation (and reclassification) and would also specify minimum requirements on the matters AEMO must consult on. These matters would also include issues related to the assessment of pre-defined indistinct events and protected operation, including:

- how AEMO would assess the risk arising from indistinct events identified in the GPSR
- the general extent of the costs and benefits of the operational actions proposed to manage risks from an identified indistinct event

¹²⁵ AEMC, *BSE review*, final report, p. 113.

¹²⁶ *Ibid*, p. 109.

¹²⁷ *Ibid*, p. 11 and 113-114

- how AEMO's selected management options would satisfy the principle of cost minimisation.

AEMO would be required to consult publicly in accordance with the rules consultation procedures and publicly report on the ex-ante application of the pre-defined protected framework every 6 months.

Cost-benefit assessment for ad-hoc indistinct events

As discussed in section 6.2.2, the proposed rule would provide for AEMO to declare a period of ad-hoc protected operation to avoid a cascading failure associated with an indistinct risk/condition which has not been pre-identified. Ad-hoc actions would apply to indistinct risks that are unanticipated or when AEMO has identified a new and severe indistinct risk to the power system but there has been insufficient time to complete the process for a conditional protected operation.

By their very nature, unanticipated events cannot be analysed in advance. However, the proposed framework would require AEMO to explicitly review any unanticipated indistinct events it manages through ad-hoc operation in the next GPSR. This is intended to allow AEMO to incorporate experience from the use of its ad-hoc power.¹²⁸

The rule change request would require AEMO to consult on:¹²⁹

- the nature of the abnormal conditions and why these conditions increased risk from an indistinct event sufficiently to justify any use of an ad-hoc protected operation
- how AEMO has/will assess the risk arising from the indistinct events, including any assumptions used
- the range of options for managing the risks considered by AEMO and the indicative costs of each
- the indicative benefits associated with the options considered by AEMO for managing the risk
- how the chosen option satisfies the principle of cost minimisation, and
- details of how AEMO will implement protected operation.

The *BSE review* suggested that authority to take ad-hoc actions, combined with additional report and transparency obligations, balances the need for AEMO to take operational actions necessary to maintain security, with transparency and confidence for the market more generally.¹³⁰

7.2.3

Issues for consultation

The Commission seeks stakeholder feedback on whether the proposed rule appropriately balances the interrelated objectives of efficiency and effectiveness in the protected operation and protected events framework.

128 Rule Change Request, p.4

129 Rule change request, p.4.

130 AEMC, *BSE review*, final review, p. 13.

QUESTION 12: PROPOSED APPROACH TO COST MINIMISATION

- Do you support the proposed cost-minimisation principle?
- Does the proposed framework contain adequate mechanisms to ensure standing, condition dependent and ad-hoc indistinct events are effectively managed at least cost?
- Is the proposed approach to cost minimisation, including reliability panel oversight, the most effective framework for assessing proposed protected operation periods?
- Are there other more efficient and effective frameworks to minimise costs or assess protected operation periods?
- Is the proposed approach to cost minimisation sufficiently transparent to allow stakeholders to assess whether AEMO is efficiently managing indistinct events?

8 LODGING A SUBMISSION

Written submissions on the rule change request must be lodged with Commission by 11 February 2021 online via the Commission's website, www.aemc.gov.au, using the "lodge a submission" function and selecting the project reference code ERC0304.

The submission must be on letterhead (if submitted on behalf of an organisation), signed and dated.

Where practicable, submissions should be prepared in accordance with the Commission's guidelines for making written submissions on rule change requests.¹³¹ The Commission publishes all submissions on its website, subject to a claim of confidentiality.

All enquiries on this project should be addressed to Tyson Vaughan on (02) 8296 0652 or Tyson.Vaughan@aemc.gov.au

¹³¹ This guideline is available on the Commission's website www.aemc.gov.au.

ABBREVIATIONS

AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
BSE	Black system event
Commission	See AEMC
COAG	Council of Australian Governments
COGATI	Coordination of generation and transmission investment (review)
DER	Distributed energy resources
ESB	Energy Security Board
IBR	Inverter-based resources
NEL	National Electricity Law
NEM	National Energy Market or National Electricity Market
NEO	National electricity objective
NER	National Electricity Rules
UFLS	underfrequency load shedding schemes