Reliability Panel
AEMC

REVIEW

Reliability Panel AEMC

# DRAFT REPORT

## Review of the guidelines for identifying reviewable operating incidents

6 September 2012

Submissions due 4 October 2012. Reference: REL0048
Draft Report

**Inquiries**

Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

**E**: aemc@aemc.gov.au
**T**: (02) 8296 7800
**F**: (02) 8296 7899

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**About the AEMC**

The Council of Australian Governments, through its Ministerial Council on Energy (MCE), established the Australian Energy Market Commission (AEMC) in July 2005. The AEMC has two principal functions. We make and amend the national electricity and gas rules, and we conduct independent reviews of the energy markets for the Standing Council on Energy and Resources (the former MCE).

**About the AEMC Reliability Panel**

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

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## Reliability Panel members

Neville Henderson, Chairman and AEMC Commissioner

Trevor Armstrong, Chief Operating Officer, Ausgrid

Simon Bartlett, Chief Operating Officer, Powerlink

Mark Grenning, Chief Advisor Energy, Rio Tinto

Chris Murphy, Chief Executive Officer, Secure Energy

Andrew Nance, Principal, St Kitts Associates

Tim O'Grady, Head of Public Policy, Origin Energy

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

David Swift, Executive General Manager, Australian Energy Market Operator

## Foreword

I am pleased to present the Reliability Panel's (Panel's) draft report on the review for the guidelines for identifying reviewable operating incidents.

In preparing this draft report, the Panel has taken into consideration comments from stakeholders and whether there have been changes to the National Electricity Market or the National Electricity Rules that may have affected the application of the guidelines.

The Panel proposes to amend the guidelines to improve the efficiency of the current process for the Australian Energy Market Operator (AEMO) and market bodies involved in incident reviews. The revised guidelines incorporate amendments proposed by AEMO that have been modified by the Panel to clarify their intent, taking into consideration issues raised by stakeholders in submissions.

I would like to thank the stakeholders that have made submissions to this review process to date.

I look forward to engaging with you further during consultation on this draft report and at the public meeting to be held in Sydney at the AEMC offices on 24 October 2012.

Neville Henderson
Chairman, AEMC Reliability Panel
Commissioner, AEMC

# Contents

# 1 Introduction

In 2006, the Reliability Panel (Panel) published guidelines for identifying reviewable operating incidents. The guidelines are used by the Australian Energy Market Operator (AEMO) in deciding which operating incidents in the power system to review and report on. The Panel is carrying out this review of the guidelines to determine whether amendments or updates are required.

Publication of this draft report follows the Panel's release of an issues paper. Three stakeholder submissions were received on the issues paper and the draft report has considered issues raised in these submissions. The purpose of this report is to set out the Panel's proposed amendments to the guidelines and seek stakeholder submissions on the changes.

## 1.1 Reviewable operating incidents

Under the National Electricity Rules (NER), AEMO is required to conduct a review of every 'reviewable operating incident' in the power system and report on its findings.[1] Reviewable operating incidents are generally 'unusual' power system events that are not normally taken into account in the operation of the National Electricity Market (NEM). The incidents primarily occur in the transmission network[2] and include non-credible contingency events or multiple contingency events.[3]

These types of power system incidents may involve significant deviations from the normal operating conditions and could have an effect on the operation of the power system in terms of system security.

The NER set out criteria for AEMO to determine which operating incidents of the power system must be reviewed.[4] The Panel's guidelines help to clarify the criteria in the NER.

## 1.2 Objective of reviewing operating incidents

The objective of requiring AEMO to conduct incident reviews is not explicit in the NER. However, it is somewhat implicit that the focus is system security, given that the operating incident review provisions are contained in chapter four of the NER – the power system security chapter.

The Panel considers the overarching objective of reviewing operating incidents is to promote the secure operation of the power system.

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1 Clauses 4.8.15(b) and 4.8.15(c) of the NER.

2 AEMO Statistics of reviewable operating incidents: reporting period - January 2007 to end June 2011, 2 December 2011, p.4.

3 The definitions of non-credible and credible contingency events are discussed in Chapter 2.

4 Clause 4.8.15(a) of the NER.

To help achieve this objective, AEMO's review of each incident considers:

- the nature of the incident;
- the adequacy of the provision and response of facilities or services;
- whether the actions taken to restore or maintain power system security were appropriate; and
- recommended actions to reduce the likelihood or impact of incident recurrence.

The findings of the reviews are published in AEMO's operating incident reports on AEMO's website.

A summary of the process and outputs of operating incident reviews is contained in Appendix E.

## 1.3 Purpose of the guidelines

The NER requires AEMO to review incidents identified in accordance with the Panel's guidelines.[5]

Undertaking reviews of operating incidents can lead to power system improvements, however the reviews also impose costs on market participants. The costs arise from the requirement for participants to take part in reviews and also through AEMO's costs in conducting these reviews. For this reason, an appropriate balance is required between investigating incidents to ensure that the power system is operating in a secure way and minimising the overall costs to the market.

The purpose of the guidelines is to provide additional clarity and certainty on the review requirement, which goes towards ensuring that AEMO does not unnecessarily undertake investigations. The guidelines also act to promote the objectives of incident reviews by ensuring incidents of potential importance to power system security are within the scope of what is considered 'reviewable' by AEMO.

## 1.4 Review of the guidelines

The Panel established the guidelines in 2006.[6] There are no specific requirements under the NER for these guidelines to be reviewed and this is the first review since their establishment.

In January 2012, AEMO sent a letter to the Panel proposing that changes be made to the guidelines.[7] Given that AEMO's proposals were justified for further consideration,

5 Clause 4.8.15(a)(1).

6 The requirement for the Panel to establish the guidelines was introduced to the NER in 2006 as a part of the 'timely information to NEMMCO after operating incidents' Rule change. See AEMC, National Electricity Amendment (Timely information to NEMMCO after operating incidents), February 2006.

and that other minor updates to the guidelines appeared necessary, the Australian Energy Market Commission (AEMC or Commission) provided terms of reference for the Panel to undertake a review of the guidelines.[8]

The Panel is conducting this review in accordance with the AEMC terms of reference.

## 1.5 Proposed amendments to the guidelines

The Panel has proposed a number of amendments to the guidelines and a change-marked version of the guidelines is provided at Appendix B. The Panel's rationale for the proposed amendments is discussed in Chapter 3. The amendments are summarised as follows:

- a new criterion 1A has been added that applies to three other criteria in the guidelines – criteria 1, 4 and 6(a);
- an additional type of incident on the distribution network has been added to the list of incidents that are considered 'reviewable'. The addition involves an incident where there is a loss of generation or capacity of one or more scheduled or semi-scheduled generating units;
- the reference to 'regions with minimal load' has been deleted from criterion 2 in the guidelines to reflect that such regions no longer exist in the NEM;
- the exact values for the operation frequency tolerance band are no longer specified in the guidelines to ensure that changes in value are automatically captured in the guidelines – the guidelines now state 'as set out in the Reliability Panel's frequency operating standards'; and
- references to 'NEMMCO' have been updated to 'AEMO'.

## 1.6 Timetable for review and consultation process

Submissions on the draft report are due on 4 October 2012 and an indicative timetable for the remainder of the review is set out below.

### Indicative timetable

| Milestone | Date |
|---|---|
| Close of submissions on draft report | 4 October 2012 |
| Public meeting | 24 October 2012 |
| Publish final report | 22 November 2012 |

7 AEMO's 31 January 2012 letter to the Panel is available on the AEMC's website.

8 The terms of reference for this review are published on the AEMC's website.

The Panel has consulted with stakeholders during the review by providing the opportunity to make submissions on the issues paper and this draft report. The issues paper discussed a series of amendments to the guidelines, including amendments proposed by AEMO in a letter to the Panel on 31 January 2012.

The Panel received three submissions on its issues paper from Grid Australia, the Private Generators Group and Origin Energy, which are available on the AEMC's website[9]. A summary of the submissions is provided at Appendix D. AEMO reviewed the submissions and subsequently revised its proposal in response to issues raised by stakeholders.

A revised proposal was sent from AEMO to the Chairman of the Panel on 30 July 2012[10]. The Panel has considered AEMO's revised proposal and discusses its assessment in this draft report. Stakeholder submissions are sought on this report and details on how to make a submission are provided below.

## 1.7 Submissions on the draft report

The Panel invites comments from interested parties on this draft report by 4 October 2012. All submissions will be published on the AEMC's website.

Electronic submissions must be lodged online through the AEMC website www.aemc.gov.au using the "lodge a submission" function and reference code "**REL0048**". The submission must be on a letterhead (if submitted on behalf of an organisation), signed and dated.

Upon receipt of the electronic submission, the AEMC website will issue a confirmation email. If this confirmation email is not received within three business days, it is the submitter's responsibility to ensure the submission has been delivered successfully.

Or, if choosing to make submissions by mail, the submission must be on a letterhead (if submitted on behalf of an organisation), signed and dated. The submission may be posted to:

The Reliability Panel
Australian Energy Market Commission
PO Box A2449
SYDNEY SOUTH NSW 1235

9 Available at: http://www.aemc.gov.au/Market-Reviews/Open/reliability-panels-review-of-the-guidelines-for-identifying-reviewable-operating-incidents.html.

10 AEMO's 30 July 2012 letter to the Panel is available on the AEMC's website at: http://www.aemc.gov.au/market-reviews/open/reliability-panels-review-of-the-guidelines-for-identifying-reviewable-operating-incidents.html.

## 1.8 Structure of the paper

The remainder of this paper is structured as follows:

- **Chapter 2 - factors taken into consideration:** sets out the factors the Panel considered in preparing this report and the proposed guideline amendments;
- **Chapter 3 - amendments to the guidelines:** sets out the Panel's consideration of specific issues in amending the guidelines;
- **Appendix A –** provides a version of the Panel's guidelines marked-up with the Panel's proposed amendments;
- **Appendix B –** provides a glossary for terms used in this report;
- **Appendix C –** discusses the criteria in the existing guidelines in more detail;
- **Appendix D –** provides a summary of stakeholder submissions on the issues paper;
- **Appendix E –** sets out further detail on AEMO's operating incident review process; and
- **Appendix F –** sets out the Panel's analysis of the impact its proposed guidelines would have if they applied retrospectively to 2010-11 operating incidents.

# 2 Factors taken into consideration

This chapter sets out the factors that the Panel considered in preparing this report and the proposed guideline amendments. Specific issues raised, and the Panel's response to these issues, are discussed in Chapter 3.

## 2.1 Improving the efficiency of reviews

AEMO is required to review any operating incident that is considered 'reviewable' under the Reliability Panel's guidelines and report publicly on the findings of its review. The report is typically published on AEMO's website 70 to 120 days after the incident occurred, depending on the magnitude and complexity of the incident.

The Panel has considered whether amendments to the guidelines could improve the efficiency of the overall review process by helping to reduce the costs of producing the reports while maintaining any important benefits.

To inform this assessment, the Panel sought information from stakeholders in its issues paper on the costs and benefits of the existing arrangements. The Panel also sought views on the potential impacts of amendments to the guidelines that reduce the total number incidents or alter the type of incidents that are reviewed in future.

A key objective of this review is to help avoid detailed reporting on incidents that are benign from a system security perspective. The Panel considers that focussing only on incidents with an actual or potential impact on the national power system will help to promote a more efficient use of resources for AEMO and other organisations involved in incident reviews.

**Potential benefits**

AEMO's operating incident reports are the only comprehensive source of information that is publicly available on the cause and impacts of unusual operating incidents in the power system. With respect to power system security, we consider the current key benefits of AEMO's operating incident reviews to be:

- AEMO obtains information from its reviews on incident causes and impacts that can be used for internal purposes – this includes consideration of whether to reclassify a non-credible contingency as credible;
- information is shared with the market to inform decision making relevant to the secure operation of plant and networks;
- actions are recommended for market participants to undertake to reduce the likelihood and/or impact of incident recurrence – the implementation of these actions is monitored and publicly reported on by AEMO;
- data is obtained and stored in a central repository to enable statistical analysis to identify any underlying trends in power system performance; and

- assurance is provided to market participants that incidents are monitored and investigated.

There can be additional reliability and broader market benefits from AEMO's incident reporting, however the Panel's key focus when considering amendments to the guidelines has been on power system security. This is consistent with the broader objective of incident reviews outlined in section 1.2 of this report.

**Potential costs**

The primary costs of incident reviews and reporting relate to the staff required to investigate and report on incidents.

Table 2.1 provides an indication of the process involved in undertaking an incident review; outlining the steps involved and time estimated for each step.

**Table 2.1 Process for incident reviews**

| Step | Typical time-frames (cumulative business days after event) |
|---|---|
| Determine whether the power system incident is reviewable and allocate appropriate resources | 5 |
| Request information from relevant parties | 8 |
| Receive information | 28[11] |
| Complete 1st draft and seek internal feedback | 38 |
| Complete 2nd draft and seek comments from relevant parties | 43 |
| Receive feedback from relevant parties | 53 |
| Complete negotiations regarding recommendations | 63 |
| Prepare final draft and seek internal feedback | 65 |
| Receive feedback on final draft | 68 |
| Incorporate feedback into final version | 69 |
| Publish report | 70 |

Source: AEMO Feedback on power system incident reporting, 21 December 2010, p. 5.

AEMO has advised the Panel that incident reviews currently involve an equivalent of around one and a half full time employees throughout the year. At peak times, around 18 to 20 system incident investigations can be active, which can involve up to approximately 14 employees. There are also costs for other market participants in

11 Under clause 4.8.15(g) of the NER, AEMO must allow 20 business days for registered participants to respond to such requests for information.

allocating time and resources to provide information to AEMO to assist their incident investigations and to provide feedback on AEMO's draft reports.

Under the Panel's proposed amendments, it's possible reporting would be reduced by around 25 per cent based on the Panel's assessment of 2010-11 operating incident reports. This assessment is set out in Appendix F. The Panel notes that the number of reports and the nature of incidents can vary significantly depending on the year[12]. A 25 per cent reduction is only indicative and the actual reductions could be higher or lower from year to year.

## 2.2 Objectives of the Panel's guidelines

In determining whether amendments to the guidelines are required, the Panel has focussed on the overarching objective of the guidelines and how any amendments could contribute to this objective. As noted in section 1.3, the objective of the guidelines is to clarify what kind of incidents AEMO should review in order to promote the secure operation of the power system while helping to avoid the costs of unnecessary reviews.

The guidelines are structured in a way that reflects the provisions in the rules for what is considered a 'reviewable operating incident'[13]. The guidelines provide additional clarification on how the provisions under the rules should be interpreted and provide other specific clarifications and details. Each aspect of the existing guidelines is discussed in Appendix C.

## 2.3 The National Electricity Objective

The Panel has considered whether any amendments to the template would contribute to the national electricity objective (NEO), which is:

"to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to -

- price, quality, safety, reliability and security of supply of electricity; and
- the reliability, safety and security of the national electricity system."

Specifically, the Panel has considered how the Panel's proposed amendments would impact the efficient operation of electricity services.

The proposed amendments remove the requirement for AEMO to report on minor incidents that do not impact the NEM power system security. This can reduce resource requirements for AEMO and market participants involved in incident reviews. The

12 AEMO's statistics of reviewable operating incidents between January 2007 and the end of June 2011 shows fluctuations in annual reporting levels between 13 and 57 incidents, with no general trend in reporting levels across the five years.

13 Clause 4.8.15(a) of the rules.

amendments retain the requirement for AEMO to report on incidents that are important from a system security perspective.

Overall, the Panel considers the proposed amendments will result in a more efficient operation of electricity services with no impact on the safety and security of the national electricity system.

# 3 Amendments to the guidelines

This chapter sets out the Panel's consideration of specific issues, including those raised in stakeholder submissions, in amending the guidelines. The proposed amendments to the guidelines are set out in Appendix A.

## 3.1 AEMO's proposed amendments

In a letter sent on 31 January 2012 to the Panel's Chairman, AEMO proposed amendments to the guidelines that introduced a new criterion for reviewable operating incidents - 'criterion 1A'[14]. This new criterion acts to limit the scope of what is considered a reviewable operating incident.

AEMO's proposed criterion 1A reads as follows:

> "An operating incident will be considered reviewable only if:
>
> - One or more of the transmission elements, which were forced out of service, has a nominal voltage of 220 kV or above; or
>
> - The event resulted in a threat to the power system security system of the higher voltage transmission network (that is with nominal voltage of 220 kV or above)"

The Panel has confirmed with AEMO that the intent is for criterion 1A to apply to three of the six criteria in the guidelines[15]. The Panel considers this amendment would result in the exclusion of the following incident types from future reviews:

- a non-credible contingency event or multiple contingency events on the transmission system where there is no threat to the security of a transmission network of 220 kilovolt (kV) or greater;

- an event where a power system below 220 kV is not in a secure operating state for more than 30 minutes but does not threaten the security of the higher voltage transmission network; and

- an incident where a power system below 220 kV is not in a satisfactory operating state for more than 5 minutes but does not threaten the security of the higher voltage transmission network.

AEMO's proposal is based on its consideration that incidents for transmission subsystems with voltage levels below 220 kV, while important at the local level, do not

14 AEMO's 31 January 2012 letter to the Panel is available on the AEMC's website at: http://www.aemc.gov.au/market-reviews/open/reliability-panels-review-of-the-guidelines-for-identifying-reviewable-operating-incidents.html.

15 Criteria 1, 4 and 6(a) of the Panel's guidelines.

normally threaten the security of the main transmission network.[16] In addition, AEMO notes that incidents involving transmission elements with voltages below 220 kV are addressed by the transmission network service provider (TNSP) under connection agreements.

The Panel prepared an issues paper to discuss the key elements of AEMO's proposal and seek stakeholder views. Three submissions were received from Grid Australia, the Private Generators Group and Origin Energy.

**Stakeholder views**

Grid Australia supports altering the guidelines in accordance with AEMO's proposal outlined above. Grid Australia submits that AEMO's proposal would result in a reduced effort for AEMO and TNSPs, whilst not reducing the quality of service to affected customers.

Origin does not support AEMO's proposed amendments to the guidelines. Origin submits that limiting the criteria for the identification of reviewable operating incidents would decrease the transparency to market participants into the operation and maintenance of system security.

Origin acknowledges the cost imposed on AEMO in preparing the reports and the reduction in merit associated with reporting on incidents on the high voltage sub-network. However, incident reports are important in identifying power system security incidents as well as disruption to generation and load to preserve system security.

Origin considers AEMO's proposed 220 kV threshold to be too high as it would exclude reporting on incidents involving a substantial volume of generation and load. Origin highlights this point with examples of infrastructure connected to networks below 220 kV, including 33 powers stations totalling 5640 megawatts (MW), regional load in four NEM regions and load in Sydney, Brisbane and Hobart.

If the Panel considers a threshold level is required, Origin has suggested a threshold of 100 kV and above could be more appropriate, based on the level of generation and load connected to the 110 kV and 132 kV networks. Origin considers this threshold limit provides participants access to information to understand how and why AEMO makes decisions to interrupt generation and load in order to operate and maintain a secure power system.

The Private Generators Group acknowledges that there is a cost associated with AEMO's investigating and reporting process. The group considers that the scope of reviewable operating incidents should be linked to the actual or potential power system impact and the likelihood that valuable lessons are learned to ensure the ongoing secure operation of the power system. The group notes that, whilst it is generally true that incidents involving higher voltage assets have a greater impact, it is

16 Letter from Mr Matt Zema to Mr Neville Henderson, 31 January 2012.

also true that some important incidents do not directly involve equipment at 220 kV above.

**AEMO's revised proposal**

AEMO reviewed the stakeholder submissions, which were published on the AEMC's website, and subsequently revised its proposal. The revised proposal was sent to the Chairman of the Panel on 30 July 2012.[17].

AEMO notes that operating incident reviews are selected on the basis of their potential or actual impact on system security. AEMO will continue to report on market events through its existing published price events and market operations review reports, which are separate to its operating incident reports.[18] The NER does not currently require reporting of incidents with a significant or potentially significant market impact. AEMO believes this may indicate an existing omission in the NER rather than one created by AEMO's proposal.

AEMO notes its proposal was revised due to the Panel's consultation process identifying concerns that AEMO's proposed changes may be seen by some market participants to be detrimental.

The revised proposal has retained the aforementioned criterion 1A. The key change from AEMO's original proposal was an addition to the guidelines to require AEMO to review incidents where there is a material level of generation interrupted on the distribution network. AEMO has included this requirement in criterion 6(c) of the guidelines, adding interruptions to scheduled and semi-scheduled generation to the existing list of reviewable incidents on the distribution network that affect the security of the transmission system.

The underlined text below indicates AEMO's proposed addition to criterion 6(c) of the guidelines:

> "Under clause 4.8.15(a)(3): A reviewable operating incident includes incidents that satisfy one or more of the following descriptions:
>
> - incidents on a distribution network that affect the security of the transmission system including <u>non-credible contingencies that cause loss of generation or capacity of one or more scheduled generating units or semi-scheduled generating units</u>; ..."

AEMO submits that this change ensures reviews include more significant incidents occurring on the distribution network. The current guidelines do not require AEMO to report on incidents that occur on a distribution network, regardless of the impact on

17 AEMO's 30 July 2012 letter to the Panel discussing its revised proposal is available on the AEMC website at: http://www.aemc.gov.au/Market-Reviews/Open/reliability-panels-review-of-the-guidelines-for-identifying-reviewable-operating-incidents.html.

18 These reports are not required under the NER.

generation, unless the frequency of the power system was outside the relevant standards.

AEMO has proposed the above amendment, but also offers alternatives to address incidents on a distribution network including using a tiered reporting structure as proposed in the Private Generators' submission or alternative wording to amend clause 4.8.15(a)(3):

> "Under clause 4.8.15(a)(3): A reviewable operating incident includes incidents that satisfy one or more of the following descriptions:
>
> - incidents on a distribution network that affect the security of the transmission system including non-credible contingencies affecting one or more generating units that does not meet AEMOs exemption guidelines in clause 2.2.1(c) of the NER; ..."

**Panel's considerations**

The Panel agrees with AEMO that the reviews should continue to focus on power system security rather than broader market impacts - such as load and generation loss if it is unrelated to system security. This is consistent with the Panel's position set out in the issues paper that the key objective of incident reviews is to promote power system security. This was also supported by the Private Generators as the key objective of the reviews.

Load and generation loss can, however, be relevant to power system security where they may cause frequency, voltage or other disturbances. It is within this context that any changes to the guidelines should not remove incidents from future reviews if those incidents involve a level of load or generation being interrupted that could have security implications.

The Panel agrees with Origin and the Private Generators that some important incidents do not necessarily directly involve equipment at 220 kV and above.

The Panel considered the option of reducing AEMO's proposed nominal voltage threshold for what is considered 'reviewable', from 220 kV to a lower voltage, to capture additional contingencies in the lower voltage transmission network. The Panel's assessment of this option is that it would be unlikely to deliver an appropriate outcome in terms of efficiency or security.

For example, the Panel considered the potential impact of a 100 kV threshold being used to determine which contingencies in the transmission network should be reviewed. A total of 36 incidents were reviewed in 2010-11 and if the 100 kV threshold had applied in 2010-11, a total of 35 incidents would have been reviewed – that is, the 100 kV threshold would only reduce reporting levels by one report in that particular year.

The one incident that would have been excluded under a 100 kV threshold involved a 66 kV substation, five 66 kV lines and a 66/11 kV transformer, 29 MW of load

interrupted and 116 MW of generation interrupted. This incident is the type of incident the Panel considers appropriate for AEMO to review as this level of load and generation loss could have some security implications. As such, the 100 kV threshold could lead to a perverse outcome in the case of 2010-11.

A criterion based solely on the nominal voltage of transmission network infrastructure may therefore be insufficient if the Panel is to ensure that all incidents with potential to impact system security are reviewed. The Panel has therefore included additional criteria that consider load and generation loss in its proposed amendments.

*Setting a 220 kV threshold*

The Panel supports AEMO's intent to remove incidents from the scope of future reviews where the incident does not have a potential or actual impact on power system security of the higher voltage transmission network. The Panel has considered AEMO's advice that the security of transmission lines below 220 kV is less critical than the higher voltage network with respect to the safe and secure operation of the national power system. This is in part due to faults on the lower voltage transmission network generally being more isolated, with a lower risk the fault will propagate through the system.

The Panel recognises, however, that the security impacts of certain faults involving generation plant on the lower voltage transmission and distribution networks should be considered in AEMO's reviews. As such, the Panel proposes to adopt AEMO's amendments to alter criterion 6(c) and add criterion 1A (with some minor changes).

The Panel considers further clarification may be appropriate to provide guidance as to what the Panel considers 'a threat to the power system security' of the higher voltage transmission network under criterion 1A. The Panel considers a threat to the higher voltage transmission network includes, but is not limited to, a material level of load or generation loss on the lower voltage transmission network. This example would be included in the guidelines to ensure this type of incident on transmission networks below 220 kV is reviewed by AEMO.

The Panel considers this option would maintain the existing benefits of the reviews, while helping to remove benign incidents from AEMO's reporting obligations that do not pose a threat to the security of the national power system.

The guidelines would not quantify the level of load or generation loss that is considered 'material'. This would enable AEMO to consider incidents on a case-by-case basis and would not require the Panel to select an arbitrary level of load or generation loss that is considered 'material' for every incident. Incident reports focus on power system security and AEMO is responsible for the secure operation of the NEM – the Panel considers AEMO has the appropriate incentives and expertise to determine what to consider a 'material' level of load or generation interruption to ensure it reviews incidents that could potentially impact power system security.

The Panel has taken into consideration AEMO's advice that they have been required under the current guidelines to review a high number of faults, such as busbar trips, on

low voltage networks that pose no threat to the NEM power system security. Where an incident only threatens the lower voltage transmission network or the distribution network and has no other impact on power system security described in the guidelines, the Panel considers that the incident is unlikely to warrant a comprehensive operating incident review and report undertaken by AEMO. The Panel notes that, while these incidents may not be captured in future detailed incident reports, they may still be reported on by AEMO through its range of other market notices and publications.

The Panel's analysis of 2010-11 incidents indicates that the Panel's amended guidelines could reduce reporting by around 25 per cent. Section 2.1 and Appendix F discuss this point in more detail.

The Panel considers these amendments will enable AEMO and other market participants to avoid unnecessary costs associated with reviews, without materially reducing the value of the review function under the NER.

The Panel's amended guidelines ensure that important incidents occurring on lower voltage transmission networks that involve load or generation interruptions are appropriately reviewed by AEMO. The Panel considers these amendments strike an efficient balance between the existing arrangements and AEMO's original proposal.

*Incidents on the distribution network*

The Panel supports adopting AEMO's proposed amendments to 6(c) of the guidelines, adding interruptions to scheduled and semi-scheduled generation to the existing list of reviewable incidents on the distribution network that affect the security of the transmission system. As the Panel's amended criterion 1A only applies to transmission network incidents, this amendment to guideline 6(c) will ensure that all incidents involving generation interruptions on the distribution network are reviewed where they have the potential to threaten the security of the transmission system.

Load interruptions on the distribution system impacting power system security are already addressed by guideline 6(d) where automatic under frequency load shedding is considered reviewable and, as such, the Panel does not propose to include load interruption in the revised guideline 6(c).

*Other incidents*

The Panel notes that, under the proposed amendments, AEMO will still be required to review the following incidents regardless of the voltage associated:

- black system incidents;
- incidents where the frequency is outside the operational frequency tolerance band;
- incidents where there is load shedding due to a clause 4.8.9 instruction;

- incidents where AEMO's on-line oscillatory and transient stability monitoring systems detect a potential instability for 30 minutes, continuously;
- incidents involving faults of extended duration within the distribution network where these have had a material impact on the transmission system;
- an incident that impacts the security of the transmission system involving the loss of multiple embedded generating units in the distribution network, the total capacity of which exceeds the capacity of the largest generating unit within any region including an affected generating unit;
- incidents on the distribution network affecting the security of the transmission system that result in the operation of under frequency or over-frequency protection and control schemes including automatic under frequency load shedding and automatic tripping of a generating unit due to over-frequency; and
- where the Panel request AEMO to review and report on an incident.

## 3.2 Reporting by other participants

The Panel has considered whether information on certain operating incidents could be publicly reported by a market body other than AEMO. This helped the Panel to assess the impact on the availability of information of excluding all low voltage incidents from future AEMO reporting.

Part of this assessment involved asking stakeholders in the issues paper whether information on low voltage incidents is currently publicly available anywhere other than in AEMO's reports.

**Stakeholder views**

Grid Australia submits that, under the current arrangements, TNSPs investigate all power system incidents on their networks (regardless of voltage). TNSPs report directly to affected customers and some also have jurisdictional obligations to report on events above a given severity threshold. Such obligations would remain unchanged as a result of AEMO's proposal.

Origin submits that AEMO's proposal to have TNSPs report on lower voltage incidents does not actually reduce the cost of reporting; rather it just reallocates the cost from AEMO to TNSPs. Origin queries how TNSPs could report holistically on events that include low voltage assets across regions given TNSPs' jurisdictional focus and notes that AEMO, on the other hand, can provide cross-regional insight.

The Private Generators note it is difficult to comment on any duplication as TNSP reports are not visible to most participants. The Private Generators submit that, if the proposal is that TNSPs perform the task of preparing reports on lower voltage assets, then it will be important that such reports are made available to all industry stakeholders, and that their scope and detail is at least consistent with the level of reporting currently carried out by AEMO.

**Panel's considerations**

Based on advice in submissions and the Panel's own investigations, it appears that AEMO's incident reports are the only publicly available source of information on the cause, impact and corrective actions associated with operating incidents. Narrowing the scope of incidents reviewed by AEMO would therefore reduce the information publicly available on these incidents.

The Panel has confirmed with AEMO that it is not proposing that the existing TNSPs reporting arrangements should be altered. The Panel also does not consider this a suitable option – irrespective of the fact that this would require changes to the NER, the Panel does not see merit in this option. Requiring TNSPs or other market participants to report on low voltage incidents would reallocate the cost from AEMO to another participant.

AEMO is responsible for maintaining system security and has the powers under the NER to obtain the relevant information for its incident investigations. The Panel considers AEMO has the appropriate incentives, experience and powers to investigate incidents in a holistic manner and share information across the NEM to promote improvements in operations and equipment.

As such, the Panel has proposed to only remove from AEMO's reporting obligations what it considers to be 'benign' incidents in terms of power system security. These amendments have been discussed in section 3.1.

## 3.3 Altering the type of reporting for low voltage incidents

Neither the NER nor the Panel's guidelines stipulate the format of AEMO's incident reports, the type of information or the level of detail that must be included. The only requirement under the NER is that the report include details of how the re-classification criteria were assessed and applied in the context of non-credible contingency events[19]. The Panel therefore considered whether it may be beneficial to provide additional guidance on the nature of reporting within the guidelines to improve the quality of reporting or limit its costs.

This consideration is particularly relevant to AEMO's proposal to reduce the costs of reporting by narrowing the scope of reviewable incidents. The Panel considered how the guidelines could be amended to reduce the costs of reporting where possible. The Panel also considered whether there was a demonstrated need to improve the quality of the reporting.

19 The NER requires AEMO to prepare a report on each incident review and make the report available to the registered participants and the public. The exception to this public reporting requirement is where the incident involved AEMO disconnecting facilities of a Registered Participant in an emergency. In this case, AEMO is only required to report to the affected Registered Participant, the Australian Energy Regulator (AER) and the AEMC.

In order to assess the potential impacts of any changes to guidelines (including changing the way low voltage incidents are reported on), the Panel sought stakeholder input through its issues paper on how incident reports are currently used by market participants and the costs and benefits of the existing arrangements.

**Stakeholder views**

Origin submits that power system operating incident reports provide transparency to market participants on operating incidents that may impact generating plant or load across the network. The value of the report is in the provision of information as to why an event occurred and what actions can be taken to mitigate recurrence. The reports promote transparent decision making by AEMO, which is crucial to maintain participant confidence in the operation of the NEM.

Understanding and promoting transparent decision making by AEMO is crucial to maintaining participant confidence in the operation of the NEM.

The Private Generator Group agrees with the Panel that the objective of operating incident reviews is to promote the secure operation of the power system. Operating incidents provide opportunities to: better understand the dynamics and capability of the power system; assess compliance with security obligations; determine if existing power system security arrangements are still appropriate; assess the adequacy of ancillary service arrangements; and understand causes of events and review procedures to respond or prevent recurrence.

The Private Generators submitted that, while all power system incidents potentially provide some valuable insights into power system operation, there is a cost associated with the investigation and reporting process. A scaled approach would therefore seem appropriate. This could involve different levels of reporting detail, which is scaled relative to the quantum of load or generation interrupted. For example, for incidents involving load or generation loss below 5 MW, a very basic report similar to the current AEMO irregularity report would be sufficient. Where between 5 and 30 MW of load or generation is interrupted, a slightly more detailed report with some recommendations would be made.

**Panel's considerations**

As noted earlier, the guidelines do not currently include details on the structure of AEMO's reports. The Panel has not amended the guidelines to reflect this possible scaled approach to AEMO's reporting. While recognising that the guidelines exist to provide additional clarity as to the review requirements in the NER, the Panel does not consider that additional prescription is necessary in the guidelines. The Panel considers that AEMO has managed its review and reporting obligations well to date. This is in part evidenced by the consultation process AEMO initiated in December 2010 on its incident reporting to obtain stakeholder suggestions on any improvements that could be made.

In addition, stakeholders have not raised any concerns with the Panel through this review process in relation to how AEMO has interpreted the NER and guidelines.

Subject to stakeholder submissions on this draft report, the Panel favours maintaining the current approach in the guidelines and allowing AEMO to determine how best to fulfil their incident reporting obligations in a way that compliments their broader role in operating the power system in a safe and secure manner.

The Panel recommends AEMO consult with market participants prior to making material changes to the structure of its incident reports. The Panel recognises that AEMO undertook similar consultation on changes to reporting in 2010-11.

Feedback obtained in 2011 during AEMO's consultation reflected that stakeholders were broadly satisfied with AEMO's reporting to date. Some suggestions were offered, including reporting on the status of recommendations, and AEMO has since implemented these changes.

In the context of the Panel's proposed amendments discussed in section 3.1, AEMO could consider the merits of scaling the reporting relative to the level of load or generation interrupted in the lower voltage networks, as was suggested in the Private Generators' submission.

For example, AEMO may determine to maintain its current reporting approach (ie. detailed incident reports) for incidents involving load or generation interruption above 30 MW[20]. A more simplified report could be provided for incidents involving load or generation interruption below 30 MW. These incidents may not pose as great a threat to power system security but could still offer some lessons on the secure operation of the system or provide data to support power system trend analysis.

Alternatively, AEMO could consider adopting a tabular approach where all incidents on the transmission network involving load or generation loss below a certain threshold (eg. 30 MW) are summarised in a table. Facts on the incident's date, location, fault type, transmission elements involved, cause, impacts and any other key details could be included in the table.

There are a number of ways to scale reporting and the above examples are provided simply to illustrate two of many potential options.

## 3.4 Minor amendments

A number of other minor amendments have also been proposed by AEMO and identified by the Panel in its preliminary assessment. These proposed minor amendments are discussed below.

- update 'NEMMCO' references to 'AEMO';
- remove the reference to 'regions with minimal load' altogether given that the NEM no longer has regions that can be considered as having 'minimal load'; and

20 This is the level of capacity where a generator is required to register with AEMO and could be used as a benchmark for what is considered 'material' from an operational perspective.

- the reference to the operational frequency tolerance band is clarified to specify that the values under the relevant ' frequency operating standards' apply. The reference to the exact figures of the operational frequency tolerance band can therefore be deleted as the reference to the 'operational frequency tolerance band' itself is sufficient clarification and the exact values are set out in the frequency standards. In addition, should there be future changes to the operational frequency tolerance band, this would automatically be captured in the guidelines.

# Abbreviations

| | |
|---|---|
| AEMC | Australian Energy Market Commission |
| AEMO | Australian Energy Market Operator |
| AER | Australian Energy Regulator |
| Commission | See AEMC |
| kV | kilovolt |
| MW | megawatts |
| NEM | National Electricity Market |
| NEMOC | National Electricity Market Operations Committee |
| NEO | national electricity objective |
| NER | National Electricity Rules |
| OPWG | Operations Planning Working Group |
| Panel | Reliability Panel |
| PSSWG | Power System Security Working Group |
| TNSP | Transmission Network Service Provider |

# A The Panel's proposed guideline amendments

**AEMC Reliability Panel**

**Guidelines for identifying reviewable operating incidents [proposed changes]**

When determining whether a power system operating incident is of significance under clause 4.8.15(a), and hence reviewable, ~~NEMMCO~~AEMO should apply the following guidelines:

1A Under clause 4.8.15(a)(1)(i), (iv) and (a)(3), an operating incident will be considered a reviewable operating incident only if:

- One or more of the transmission elements, which were forced out of service, has a nominal voltage of 220 kV or above; or
- The incident resulted in a threat to the power system security of the higher voltage transmission network (that is with nominal voltage of 220 kV or above). This may include load interruption or generation interruption on the lower voltage transmission network that is material enough to be considered a potential threat to the security of the higher voltage network.

1. Under clause 4.8.15(a)(1)(i): Apply the definition of a non-credible contingency in clause 4.2.3 and define a multiple contingency event as reviewable when the events, including any inappropriate automatic or manual operation of a transmission element, occur within 30 minutes of each other and the residual impact of an earlier contingency interacts with a later contingency.
2. Under clause 4.8.15(a)(1)(ii): Apply the definition of "black system" in Chapter 10 of the Rules. For this purpose a major supply disruption affecting a significant number of customers is considered as one resulting in loss of at least 60% of the predicted regional load with the exception of:
   - ~~regions with minimal load (for example the Snowy region); and~~
   - the Queensland region, where the loss of 60% of the load (excluding the pot line loads) in any of the Northern Queensland, Central Queensland or Southern Queensland areas is also considered to be a major supply disruption.
3. Under clause 4.8.15(a)(1)(iii): Define as reviewable all incidents where the frequency is outside the operational frequency tolerance band ~~(currently set by the Panel at 49 to 51 Hz on the mainland and 47.5 to 53 Hz in Tasmania).~~ (as set out in the Reliability Panel's frequency operating standards).
4. Under clause 4.8.15(a)(1)(iv): Subject to 1A above, ~~D~~define all incidents where the power system is insecure for more than 30 minutes as reviewable operating incidents.
5. Under clause 4.8.15(a)(1)(v): Define all incidents where there is load shedding due to a clause 4.8.9 instruction as reviewable operating incidents.
6. Under clause 4.8.15(a)(3): A reviewable operating incident includes incidents that satisfy one or more of the following descriptions:
   (a) Subject to 1A above, the power system is not in a satisfactory operating state for more than 5 minutes (excluding issues resulted to potential oscillatory or transient stability);
   (b) ~~NEMMCO~~AEMO's on-line oscillatory and transient stability monitoring systems detecting a potential instability for 30 minutes, continuously;
   (c) incidents on a distribution network that affect the security of the transmission system including:
      - non-credible contingencies or multiple contingencies that cause loss of generation or capacity of one or more scheduled generating units or semi-scheduled generating units;
      - faults of extended duration within the distribution network where these have had a material impact on the transmission system; and

- loss of multiple embedded generating units the total capacity of which exceeds the capacity of the largest generating unit within any region including an affected generating unit;

(d) incidents that result in the operation of under frequency or over-frequency protection and control schemes including:

- automatic under frequency load shedding; and
- automatic tripping of a generating unit due to over-frequency; or

(e) where the AEMC Reliability Panel requests ~~NEMMCO~~AEMO to review and report on an incident under clauses 4.8.15(b) and (c)[1], after considering whether:

- the incident represented a threat to system security; and
- the benefits to the NEM are likely to exceed the cost to ~~NEMMCO~~AEMO and the affected participants.

[1] The Panel considers that the following parties should be able to apply to the Panel for it to request ~~NEMMCO~~AEMO to investigate an incident:

- a registered participant, or group of registered participants;
- a participating jurisdiction, or group of participating jurisdictions; or
- ~~NEMMCO~~AEMO (for clarification).

# B Glossary

This glossary outlines explanations of select terms to provide background and context to this draft report. Where terms are defined under the rules, please refer to Chapter 10 of the rules for the precise wording of the rule definitions.

| Term | Definition / Explanation |
|---|---|
| black system | black system is defined under the rules as the absence of voltage on all or a significant part of the transmission system or within a region during a major supply disruption affecting a significant number of customers |
| clause 4.8.9 instruction | under the rules AEMO has powers to issue directions and instructions to registered participants. A 'clause 4.8.9 instruction' refers to an instruction by AEMO, or a person authorised by AEMO, to a registered participant under clause 4.8.9(a1)(2) of the rules to take any action in accordance with the provisions under the rules or the National Electricity Law |
| contingency event | a contingency event is defined under the rules as 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 (see clause 4.2.3(a) of the rules) |
| credible contingency event | a credible contingency event is defined under the rules as a contingency event that AEMO considers to be reasonably possible in the surrounding circumstances (see clause 4.2.3(b) of the rules) |
| damping | power system damping is defined under the rules as the rate at which disturbances to the satisfactory operating state reduce in magnitude |
| extreme frequency excursion tolerance limit | see frequency operating bands |
| frequency operating bands | there are four frequency operating bands as defined under the frequency operating standards. The concepts, and the actual values, of the bands are outlined in the standards. The concepts are briefly summarised below (refer to the standards for the full explanations and context): |
| | - normal operating frequency band: subject to impacts of events on the power system, generally the frequency should not exceed the normal operating frequency band for more than five minutes on any occasion |
| | - normal operating frequency excursion band: this is the band that the frequency of the power system |

| Term | Definition / Explanation |
|---|---|
| | should not exceed (except as a result of a contingency event or a load event) |
| | - operational frequency tolerance band: this is the band that should not be exceeded following a network event. The timeframe to recover the system varies for the type of event. |
| | - extreme frequency excursion tolerance limit: in one example this is the band that should not be exceeded for more than two minutes as a result of any multiple contingency events |
| frequency operating standards | the frequency operating standards set out the standards of the frequency of the power system in operation. The standards are determined by the Reliability Panel in accordance with provisions under the rules. Separate standards apply for the 'mainland NEM' and for Tasmania |
| load shedding | load shedding is defined under the rules as reducing or disconnecting load from the power system |
| major supply disruption | major supply disruption is defined under the rules as the unplanned absence of voltage on a part of the transmission system affecting one or more power stations |
| non-credible contingency event | a non-credible contingency event is defined under the rules as a contingency event other than a credible contingency event (see clause 4.2.3(e) of the rules) |
| normal operating frequency band | see frequency operating bands |
| normal operating frequency excursion band | see frequency operating bands |
| operational frequency tolerance band | see frequency operating bands |
| power system security and reliability standards | these are the standards (other than the system restart standard) governing power system security and reliability of the power system. These standards are approved by the Reliability Panel on the advice of AEMO |
| satisfactory operating state | satisfactory operating state is defined under the rules with reference to the criteria set out under clause 4.2.2. Summarily the NEM is considered to be in a satisfactory operating state when the frequency and voltage are within operating standards, transmission lines and other plant are within operating limits and the power system is safely configured |

| Term | Definition / Explanation |
|---|---|
| secure operating state | the power system is considered to be in a secure operating state if the power system is in a satisfactory operating state and, in AEMO's reasonable opinion, the power system will return to a satisfactory operating state following the occurrence of any credible contingency event (see clause 4.2.4) |
| transient stability | transient stability relates to the ability of the power system to maintain synchronisation between relevant parts of the system following a disturbance and the ability of the power system to then regain a state of equilibrium |
| under-frequency load shedding | when the frequency of the power system falls, it is possible that load could be shed in order to restore the frequency to required levels |

# C Detail on existing guideline criteria

This Appendix sets out further detail on each criteria in the existing Panel guidelines to provide further clarification on the kind of incidents that are considered 'reviewable' by AEMO. Italicised terms are defined under the rules and selected terms are outlined in the glossary in this paper (for the glossary - see Appendix B). The Panel's amendments would alter some aspects of these criteria, as discussed in Chapter 3 of this report.

## C.1 Guidelines for provisions under the rules

Under clause 4.8.15(b) of the rules, AEMO must conduct a review of a reviewable operating incident described in clause 4.8.15(a)(1) or (3). Clauses 4.8.15(a)(1) and (3) state that a reviewable operating incident means:

"(1) an incident comprising:

(i) a *non-credible contingency event* or multiple *contingency events* on the *transmission system*; or

(ii) a *black system* condition; or

(iii) an event where the *frequency* of the *power system* is outside limits specified in the *power system security* and *reliability standards*; or

(iv) an event where the *power system* is not in a *secure operating state* for more than 30 minutes; or

(v) an event where *AEMO* issues a *clause 4.8.9 instruction* for *load shedding*,[21]

being an incident identified, in accordance with guidelines determined by the *Reliability Panel* under rule 8.8, to be of significance to the operation of the *power system* or a significant deviation from normal operating conditions; or

...

(3) any other operating incident identified, in accordance with guidelines determined by the *Reliability Panel* under rule 8.8, to be of significance to the operation of the *power system* or a significant deviation from normal operating conditions;

but does not include an incident in respect of which *AEMO* is required to conduct a review under clause 3.14.3(c)."[22]

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21 Clause 4.8.9 of the rules sets out the powers of AEMO to issue directions and instructions to registered participants.

22 Clause 3.14.3(c) of the rules is about AEMO conducting a review in the event that there is a suspension of the spot market.

Each component of these clauses and how the guidelines consider the provisions are discussed in detail as follows.

### C.1.1 Non-credible contingency or multiple contingency events

Clause 4.8.15(a)(1)(i) of the rules states that reviewable operating incidents include 'a *non-credible contingency event* or multiple *contingency events* on the *transmission system*'.

As a non-credible contingency event is defined under the rules, the guidelines state that the rules definition applies and no other specific guidance is given for interpreting 'non-credible contingency events'.

However, as the term 'multiple contingency events' is not specifically defined under the rules, the guidelines provide guidance by defining that a multiple contingency event is reviewable when:

- the events, including any inappropriate automatic or manual operation of a transmission element, occur within 30 minutes of each other; and
- the residual impact of an earlier contingency interacts with a later contingency.

This item in the guidelines currently captures a range of transmission system equipment failures, with the most commonly reviewed incident being the trip of a busbar.[23]

### C.1.2 Black system conditions

Clause 4.8.15(a)(1)(ii) of the rules states that reviewable operating incidents include 'a *black system* condition'.

As 'black system' is defined under the rules, the guidelines state that the rules definition should apply. A black system is defined as '[t]he absence of *voltage* on all or a significant part of the *transmission system* or within a *region* during a *major supply disruption* affecting a significant number of *customers*'.

However, the rules do not define what would be considered 'a significant part of the transmission system'. For this reason, the guidelines clarify what constitutes a 'significant' part of the transmission system taking into account the interpretation used by AEMO (NEMMCO at the time) in its operating procedures at the time the guidelines were first established.[24]

Currently the guidelines provide that 'a significant part of a transmission system' is considered to be at least 60 per cent of the predicted regional load with the exception of:

23 AEMO's statistics of reviewable operating incidents between January 2007 and the end of June 2011 shows 39 per cent of incidents reviewed in this period were busbar trips.

- regions with a minimal load (for example the Snowy region);[25] and
- the Queensland region, where the loss of 60 per cent of the load (excluding the pot line loads) in any of the Northern Queensland, Central Queensland or Southern Queensland areas is also considered to be a major supply disruption.

### C.1.3 Operational frequency tolerance band

Clause 4.8.15(a)(1)(iii) of the rules states that reviewable operating incidents include an event where the frequency of the power system is outside limits specified in the *power system security* and *reliability standards*.

The Panel interprets this provision to refer to the frequency limits as specified in the frequency operating standards that are set by the Panel. The frequency operating standards specify a number of frequency bands including a '*normal operating frequency band*', a '*normal operating frequency excursion band*', an '*operational frequency tolerance band*' and an '*extreme frequency excursion tolerance limit*'.[26]

In preparing the current guidelines the Panel noted that AEMO prepares a monthly report on the performance of the power system against the frequency standards. This report identifies events where the power system frequency deviates from the frequency standards and the circumstances of each event. The Panel considered that this reporting provided a suitable summary of the performance of the power system for small deviations in power system frequency. Hence, events where there are small deviations would not need additional reporting. The Panel considered that only larger deviations should be treated as reviewable operating incidents. For this reason, only incidents where the frequency is outside the operational frequency tolerance band are defined as reviewable operating incidents under the guidelines.

### C.1.4 Secure operating state

Clause 4.8.15(a)(iv) of the rules states that reviewable operating incidents include an event where the power system is not in a *secure operating state* for more than 30 minutes.[27]

As the rules provide a clear definition for 'secure operating state' the Panel did not consider further clarification was necessary in the guidelines for this provision.

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24 For example see AEMO's Power System Security Guidelines (SO_OP3715) available at http://www.aemo.com.au/electricityops/3715.html.

25 The Snowy region was abolished in June 2008, after the guidelines were first established.

26 An explanation of each of these defined terms is provided in the glossary.

27 Secure operating state is defined under the rules with reference to specific provisions as set out under clause 4.2.4 of the rules. This includes references to the power system security principles as described in clause 4.2.6 of the rules. Additional information is provided in the glossary.

### C.1.5 Load shedding

Clause 4.8.15(a)(v) of the rules states that reviewable operating incidents include an event where *AEMO* issues a *clause 4.8.9 instruction* for *load shedding*.

The guidelines define all incidents where there is load shedding due to a clause 4.8.9 instruction as a reviewable operating incident because load shedding could have a material impact on participants and the power system. The Panel did not consider that additional clarification on this requirement was necessary. However the Panel did consider that automatic under frequency load shedding should also be investigated.[28] The requirement relating to under frequency load shedding is included in the guidelines as one of the 'other operating incidents' (see section 2.7 below).

### C.1.6 Other operating incidents

Clause 4.8.15(a)(3) of the rules provides that the Panel may identify other operating incidents that should be reviewable operating incidents.

In preparing the current guidelines, the Panel noted that under the rules AEMO is required to operate the power system in a 'secure operating state'. As such, an investigation should be undertaken for any incidents where the power system is not in a satisfactory operating state for more than five minutes. A specific limit of five minutes prevents unnecessary investigations being undertaken for transient issues in the power system.

The Panel also took into account that AEMO operates a number of systems or analysis tools to monitor the stability of the power system. Systems are used to test the transient stability and to monitor the damping of the power system.[29] The Panel considered that where these analysis tools identify any abnormalities that persist for more than 30 minutes, these incidents should also be investigated.

As noted above, any incident that results in load shedding can have a material affect on participants and the power system. As such, the guidelines require the investigation of any incident that involved any under frequency load shedding.

The guidelines also clarify that incidents on the distribution network that affect the security of the transmission network should be considered a reviewable operating incident.

The Panel also noted that it is not possible to identify in advance all potential system incidents that may require investigation. For this reason, the guidelines provide for the Panel to request AEMO to review and report on incidents on an ad hoc basis. However, the Panel notes that a request under this provision has not been made to date.

28 The concept of 'under frequency load shedding' is explained in the glossary.

29 The concepts of 'transient stability' and 'damping' are explained in the glossary.

# D Summary of submissions

Issues raised in submission on the issues paper are summarised below. Submissions are published on the review's webpage on the AEMC website.

| Issue | Stakeholder | Detail | Panel response |
|---|---|---|---|
| Purpose and benefits of providing information to the market on incidents on networks below 220 kV | Origin Energy<br><br>Private Generators | Origin submitted that incident reports provide transparency to market participants on operating incidents that may impact generating plant or load across the network. The value of the report is in the provision of information as to why an event occurred and what actions can be taken to mitigate recurrence. The reports promote transparent decision making by AEMO, which is crucial to maintain participant confidence in the operation of the NEM.<br><br>The Private Generator Group agrees with the Panel that the objective of operating incident reviews is to promote the secure operation of the power system. Operating incidents provide opportunities to: better understand the dynamics and capability of the power system; assess compliance with security obligations; determine if existing power system security arrangements are still appropriate; assess the adequacy of ancillary service arrangements; and understand causes of events and review procedures to respond or prevent recurrence. | This issue is considered and discussed in sections 3.1 and 3.3. |
| Availability of information on low voltage incidents from sources other than AEMO | Grid Australia<br><br>Origin Energy<br><br>Private Generators | Grid Australia submits that its members investigate all power system incidents on their networks, regardless of the voltage. Actions to prevent or mitigate future incidents are also identified and acted on. TNSPs provide an explanation of the incidents to any affected customers. Some member TNSPs also have jurisdictional obligations to report on events above a given severity threshold. | This issue is considered and discussed in section 3.2. |

| Issue | Stakeholder | Detail | Panel response |
|---|---|---|---|
| | | Origin notes that AEMO's current reporting provides a more holistic view of power system security compared to the type of information that the TNSP responsible for the affected connection point could provide to the market. TNSP incident reports are not publicly available and only the affected connecting party could receive a report.<br><br>The Private Generators noted that, while it may be the case that TNSPs currently prepare reports under terms of their connection agreements, these reports are not provided to all industry stakeholders. | |
| Continued reporting of low voltage incidents involving load or generation interruption | Origin Energy<br><br>Private Generators | Origin submits that limiting the criteria for the identification of reviewable operating incidents would decrease the transparency to market participants into the operation and maintenance of system security. Origin considers AEMO's proposed 220kV threshold to be too high as it would exclude reporting on incidents involving a substantial volume of generation and load connected to the network below 220kV. If the Panel considers a threshold level is required, Origin has suggested a threshold of 100kV and above could be more appropriate.<br><br>The Private Generators submitted that, while all power system incidents potentially provide some valuable insights into power system operation, there is a cost associated with the investigation and reporting process. A scaled approach would therefore seem appropriate. Examples are provided in the submission, where reporting would involve different levels of detail scaled proportionally to the level of load or generation interrupted. | This issue is considered and discussed in section 3.1. |

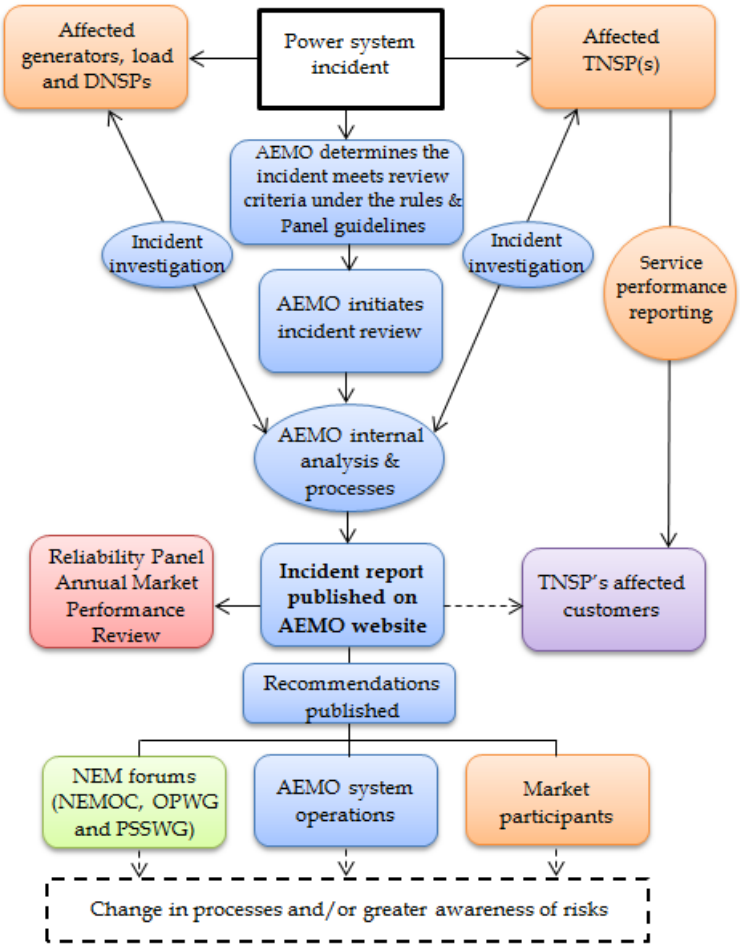
| Issue | Stakeholder | Detail | Panel response |
|---|---|---|---|
| Costs and benefits of existing arrangements | Grid Australia<br><br>Origin Energy<br><br>Private Generators | Grid Australia submits that AEMO's proposal to change the existing arrangements will result in a reduced effort for AEMO and TNSPs, whilst not reducing the quality of service to affected customers.<br><br>Origin submits that, while the proposed reporting limits would reduce AEMO's reporting costs, the decreased transparency into NEM operations is likely to erode confidence. On the balance, this is unlikely to promote the NEO. Origin acknowledges AEMO's costs of preparing reports and the reduction in merit associated with reporting on incidents on the high voltage sub-network. However, Origin considers incident reports are important in identifying power system security incidents as well as disruption to generation and load to preserve system security.<br><br>The Private Generators recognise there are industry costs associated with the preparation and publication of power system incident reports. However, they believe the potential value of these reports is high and limiting the scope of reporting carries a risk that important lessons will be missed and the power system might drift into insecure territory. The scaled approach is thought to provide a good balance between ensuring the value of incident investigation is obtained with a view to efficiency of effort and cost. | This issue is considered and discussed in sections 3.1 and 3.3. |
| TNSP reporting on incidents | Grid Australia<br><br>Origin Energy<br><br>Private Generators | Grid Australia submits that, under the current arrangements, TNSPs investigate all power system incidents on their networks (regardless of voltage). TNSPs report directly to affected customers and some also have jurisdictional obligations to report on events above a given severity threshold. Such obligations would remain unchanged as a result of AEMO's proposal. | This issue is considered and discussed in section 3.2. |

| Issue | Stakeholder | Detail | Panel response |
|---|---|---|---|
| | | Origin submits that AEMO's proposal to have TNSPs report on lower voltage incidents does not actually reduce the cost of reporting; rather it just reallocates the cost from AEMO to TNSPs. Origin queries how TNSPs could report holistically on events that include low voltage assets across regions given TNSPs' jurisdictional focus and notes that AEMO, on the other hand, can provide cross-regional insight.<br><br>The Private Generators note it is difficult to comment on any duplication as TNSP reports are not visible to most participants. The Private Generators submit that, if the proposal is that TNSPs perform the task of preparing reports on lower voltage assets, then it will be important that such reports are made available to all industry stakeholders, and that their scope and detail is at least consistent with the level of reporting currently carried out by AEMO. | |
| Minor amendments | Grid Australia<br><br>Private Generators | Grid Australia supports the minor amendments described in Section 4.2 of the issues paper. Notably, the Tasmania frequency standards have changed since the guidelines were published, making the numerical values in clause 3 of the guidelines incorrect.<br><br>The Private Generators have no objection to the minor amendments proposed by the Panel. | This issue is considered and discussed in section 3.4. |

# E Operating incident review process

Reviewable operating incidents are identified using a set of criteria under the rules, which are further clarified in the Panel's guidelines. The criteria focus on the likelihood and the impact of the incident. Where AEMO determines that an incident meets the criteria, it initiates an operational incident review. The Panel understands the general review process operates as illustrated in Figure 2.2.1.[30]

**Figure 2.2.1 Incident review process**




Following a power system incident, AEMO assesses the incident against requirements in the rules and the Panel's guidelines on reviewable operating incidents to determine whether an incident review should be undertaken.

The Panel understands that once a review has been initiated, AEMO liaises directly with each of the affected market participants to investigate an incident's cause, impacts and the appropriate follow up actions. Once AEMO has collected and assessed relevant

30 The Panel confirmed its understanding of the process through discussions with AEMO and TransGrid. This is not an exhaustive representation of all interactions and steps for reviewable operating incidents, but reflects the key elements of the process. For example, TNSPs in some jurisdictions also report to jurisdictional authorities on certain operating incidents. This has not been included in Figure 2.2.1.

information on the incident, it creates an incident report that is published on the AEMO website.

TNSPs also report to their customers that have been affected by the incident under a process separate to AEMO's review.

The Panel considers that while anyone in the general public is able to access the operating incident reports, AEMO, network service providers and generators are likely to have the most interest. These parties are able to consider the findings and recommendations in the report to develop risk mitigation strategies or system improvements.

Incident reports are also discussed at a number of forums including the National Electricity Market Operations Committee (NEMOC),[31] the Operations Planning Working Group (OPWG)[32] and Power System Security Working Group (PSSWG)[33].

Depending on the nature of the incident, the review process can result in a series of recommendations for market participants. These may include (but are not limited to) recommendations for TNSPs or generators to continue investigations to determine whether there are systemic risks, recommendations for market participants to investigate options for risk mitigation and recommendations that AEMO conduct broader investigations to determine if there are similar risks in other areas of the NEM. A total of 124 recommendations have been made since July 2009, of which 84 are reported to have been completed to date.[34]

31 This committee consists of TNSP, jurisdictional planning bodies and AEMO representatives. The committee discusses electricity network operation issues and facilitates the operational interface between AEMO and TNSPs.

32 The working group reports to the NEMOC and is comprised of members from each of the TNSPs and AEMO staff. It is a technical working group that considers operations planning issues under the control or influence of AEMO and/or the TNSPs with a view to improving the management of power system security and NEM efficiency.

33 This working group consists of operations representatives from TNSPs and AEMO. It aims to achieve consensus solutions to electricity system security issues at an operational level.

34 On 4 May 2012, AEMO published a report listing all recommendations for reviewable operating incidents (between July 2009 and December 2011) with advice on the progress of each recommendation's implementation. The list of recommendations will be updated on a quarterly basis and is available at: http://www.aemo.com.au/en/Electricity/Market-and-Power-Systems/NEM-Reports/Recommendations-arising-from-Power-System-Operating-Incident-Reports.

# F Low voltage transmission incidents - 2010/11

As discussed in section 2.1, the table below summarises the details of 16 operating incidents that occurred in the 2010-11 financial year that were confined to transmission infrastructure below a nominal voltage of 220 kV.

The table has been prepared to illustrate how low voltage operating incidents would potentially be considered under the Panel's proposed guideline amendments. The last column indicates whether the Panel considers the incident a possible threat to the security of the higher voltage transmission network, based on the level of load or generation interrupted.

Of the 16 low voltage incidents, seven incidents would potentially be considered 'reviewable' under the revised guidelines and nine incidents would be excluded. This represents a reduction in reporting for 2010-11 of 25 per cent. The Panel notes that the nature and number of reviewable operating incidents vary considerably between years. As such, the amended guidelines could lead to larger or smaller reductions in reporting in future years than for 2010-11.

Information in the table was drawn from AEMO's relevant operating incident reports available on AEMO's website[35].

35 A copy of each incident report is located at: http://www.aemo.com.au/reports/incident_reports.html.

**Examples of operating incidents that would likely meet the Panel's proposed guidelines – 2010-11**

| Date | Incident | Fault type | Event type | Number of events | Transmission element(s) affected | Load interrupted | Generation interrupted | Likely to be reviewed under amended guidelines? |
|---|---|---|---|---|---|---|---|---|
| 26 September 2010 | Trip of New Osborne busbars | Transmission (transmission lines) | Non-credible | Multiple | 66 kV substation (two busbars tripped)<br><br>Five 66kV lines<br><br>66/11kV transformer | 29 MW | 116 MW | Yes |
| 24 October 2010 | Trip of Kurri to Rothbury line and Hydro Aluminium potlines | Transmission (transmission line) | Non-credible | Multiple | Four 132 kV lines | 300 MW | - | Yes |
| 6 December 2010 | Trip of double circuit Mackay-Collinsville Tee Proserpine and lines | Transmission (transmission lines) | Non-credible | Multiple | Two 132 kV lines<br><br>Two 132/66kV transformers | 54 MW | - | Yes |
| 6 December 2010 | Trip of Waterloo | Transmission (busbar) | Non-credible | Single | 132 kV line | - | - | No |

| Date | Incident | Fault type | Event type | Number of events | Transmission element(s) affected | Load interrupted | Generation interrupted | Likely to be reviewed under amended guidelines? |
|---|---|---|---|---|---|---|---|---|
| | busbar | | | | 132 kV busbar | | | |
| 7 December 2010 | Trip of Waterloo busbar | Transmission (busbar) | Non-credible | Single | Two 132 kV lines | - | - | No |
| 10 January 2011 | Trip of Glenn Innes busbar | Transmission (busbar) | Non-credible | Single | 132 kV busbar<br>Two 132 lines<br>Two 132/66kV transformers<br>66kV feeder | 2 MW | - | No |
| 14 January 2011 | Trip of Waterloo busbar | Transmission (busbar) | Non-credible | Single | Two 132 kV lines<br>132 kV busbar | - | - | No |
| 3 February 2011 | Trip of Waterloo busbar | Transmission (busbar) | Non-credible | Single | Two 132 kV lines<br>132 kV busbar | - | - | No |
| 5 February 2011 | Trip of Cowra busbar | Transmission (busbar) | Non-credible | Single | 132 kV line<br>One 132 kV busbar | 50 MW | - | Yes |

| Date | Incident | Fault type | Event type | Number of events | Transmission element(s) affected | Load interrupted | Generation interrupted | Likely to be reviewed under amended guidelines? |
|---|---|---|---|---|---|---|---|---|
| 8 February 2011 | Trip of Central Queensland Feeders | Transmission (transmission lines) | Non-credible | Multiple | Four 132 kV feeders | - | - | No |
| 15 February 2011 | Trip of Keith – Snuggery line and transformer | Transmission (Transmission lines/transformer) | Non-credible | Multiple | 132 kV line<br><br>132 kV transformer | - | - | No |
| 13 March 2011 | Trip of Mullumbimby busbar and multiple lines | Transmission (busbar) | Non-credible | Single | 132 kV busbar<br><br>Two 132 kV lines<br><br>132/66 kV transformer | - | - | No |
| 25 April 2011 | Trip of Redbank busbar | Transmission (busbar) | Non-credible | Single | 132 kV busbar<br><br>Two 132 kV lines | - | 71 MW | Yes |
| 2 May 2011 | Trip of Columboola busbar | Transmission (busbar) | Non-credible | Single | 132 kV busbar<br><br>Two 132 kV lines | 28 MW | - | Yes, but could involve less detailed reporting under scaled approach |
| 9 May 2011 | Trip of Tully busbar and | Transmission (busbar) | Non-credible | Multiple | 132 kV busbar | - | - | No |

| Date | Incident | Fault type | Event type | Number of events | Transmission element(s) affected | Load interrupted | Generation interrupted | Likely to be reviewed under amended guidelines? |
|---|---|---|---|---|---|---|---|---|
| | Tully-Ingham South Tee Cardwell line | | | | Five 132 kV lines<br><br>132/22 kV transformer | | | |
| 8 June 2011 | Trip of Kareeya busbar | Transmission (busbar) | Non-credible | Single | 132 kV busbar<br><br>Five 132 kV lines | - | 44 MW | Yes |