Australian Energy Market Commission

Reliability Panel Technical Standards Review

Issues Paper

09 May 2008

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Citation

AEMC 2008, *Reliability Panel Technical Standards Review*, Issues Paper, 09 May 2008, Sydney

About the AEMC

The Council of Australian Governments, through its Ministerial Council on Energy, established the Australian Energy Market Commission (AEMC) in July 2005 to be the Rule maker for national energy markets. The AEMC is currently responsible for Rules and policy advice covering the National Electricity Market. It is a statutory authority. Our key responsibilities are to consider Rule change proposals, conduct energy market reviews and provide policy advice to the Ministerial Council as requested, or on AEMC initiative.

About the AEMC Reliability Panel

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

Disclaimer

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Foreword

This Issues Paper represents the first stage in the Reliability Panel's (the Panel's) review of the Technical Standards in the National Electricity Market.

The Panel is undertaking its Technical Standards Review in accordance with the Terms of Reference provided by the AEMC. The AEMC foreshadowed this review in one of the recommendations in its final report to its review "Review of Enforcement and Compliance with Technical Standards", published on 1 September 2006.

The Panel welcomes submissions from stakeholders by 13 June 2008 on the specific issues identified in the Terms of Reference and highlighted throughout the document. In particular, the Panel is seeking stakeholder views on:

- Are the current standards of the correct form?
- Are the current standards set at appropriate levels?
- Is the scope of the technical standards appropriate?
- Are the technical standards well structured in the Rules?
- Are there consistent levels of obligations between network service providers (NSPs) and network users?
- Which aspects of the technical standards need more urgent review?

The Panel looks forward to receiving your contributions to this important Review.

Ian C Woodward

Chairman, Reliability Panel Commissioner, Australian Energy Market Commission

Other AEMC Reliability Panel Members

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1 Background to this review

1.1 Context of the Technical Standards Review

1.1.1 AEMC review of Enforcement and Compliance with Technical Standards

In November 2005 the MCE directed the AEMC to perform a review of the enforcement and compliance with technical standards. The AEMC published the final report for its review "Review of Enforcement and Compliance with Technical Standards" on 1 September 2006.¹

One of the dimensions addressed by the AEMC review was ensuring that there are clear and appropriate technical standards. To this end, one of the AEMC's recommendations that arose from the review was that "the AEMC will direct the AEMC Reliability Panel to undertake a review of the adequacy and content of the technical standards".

1.1.2 Initial standards in the Code at market start

In December 2001 the National Electricity Code Administrator (NECA²) published the final report on its "Review of Technical Standards"³. The report addressed a number of issues including whether the existing standards are too stringent and, therefore, represent a barrier to entry to emerging technologies.

Generators argued that the technical standards in the Code were onerous and assumed modern steam turbine plant. The network service providers (NSPs) and NECA countered that generators were able to negotiate standards in their connection agreements and thus could get standards tailored to their plants.

All jurisdictions derogated the standards in the Code in favour of existing plant but these derogations were only granted on the basis that NECA would review the standards and, when the review was complete and implemented, the derogations would fall away. New entrants opposed the derogations since they were put at a disadvantage. The NECA review was conducted in two stages. The first stage established the principles that:

• participants should be able to connect to the system if they caused no degradation to the system (automatic access standard);

¹ Further information on the AEMC's review, including the terms of reference from the MCE, are available at the AEMC's website at <u>http://www.aemc.gov.au/electricity.php?r=20051216.173039</u>.

² Prior to 1 July 2005, when the National Electricity Rules and the AEMC were established, the NEM operated under the National Electricity Code (Code) which was administered by NECA.

³ The NECA report is available on the NECA website <u>www.neca.com.au</u>.

- a participant who would degrade the system can still connect if the network can absorb the degradation and the participant compensated the system for that degradation;
- a participant who would degrade the system to an unacceptable extent cannot access the system (minimum access standard);
- participants had no obligation to support the system (with reactive support for example) but could contract to provide the service;
- there needed to be some transition from the current state where participants did provide some network support (particularly reactive) to the final state;
- it was essential that NEMMCO was aware of participant capability and that any variation from the "no harm" state should be documented. Existing participants could use the derogations as the starting point for their documented capabilities; and
- all standards should be defined in terms that were either technology neutral or plant specific to minimise compliance costs. The standards would be defined in the Code and set (and reset) by the Reliability Panel.

The second stage modified the principles. In essence:

- NEMMCO and NSPs, who have to run the system, sought to move more slowly in implementing the final state and would therefore like to retain some features like compulsory provision of reactive support; and
- while there was some refinement of the standards in specific areas, the changes made were conservative.

1.1.3 Amendments of Rules for Technical Standards for Wind Generation

In addition to the AEMC review of enforcement and compliance with technical standards, NEMMCO submitted a Rule change request to the AEMC on 10 February 2006 that proposed a number of changes to the Rules relating to the technical standards that apply to generating units connecting in the NEM, particularly for wind generators. The AEMC published its final determination on NEMMCO's proposal on 8 March 2007 and the associated Rule changes took effect from 15 March 2007.⁴

Prior to this package, wind generators were exempted from many of the technical standards in Schedule 5.2 because the schedule referred to synchronous, scheduled or transmission connected generating units whereas wind generators are classified as

⁴ Details of NEMMCO's proposal and the AEMC's determination are available at the AEMC's website at <u>http://www.aemc.gov.au/electricity.php?r=20060324.143345</u>.

non-scheduled⁵, generally use asynchronous technology and are sometimes connected to distribution networks.

The performance requirements were amended to:

- apply at the point of connection, rather than with individual generating units, allowing generators to use their auxiliary and reactive power equipment to meet the standards, if appropriate;
- ensure each standard had a clear automatic and minimum standard and that the basis for establishing the negotiated standard was clear;
- remove, as much as possible, any language that was specific to particular technologies; and
- make the performance standards registered with NEMMCO the primary document for referring to the performance of connected plant. Previously, the connection agreement would over-ride the registered standards.

1.1.4 **Panel's Transmission Reliability Standards Review**

The Panel is also undertaking a parallel review of the jurisdictional transmission reliability standards⁶, with a view to developing a consistent national framework for network security and reliability. This review forms part of the AEMC review into the national electricity transmission planner⁷, which is being performed in response to the MCE direction to the AEMC on 3 July 2007.

The Panel's review of the jurisdictional transmission reliability standards is focusing on:

- existing transmission reliability standards (which are established within the National Electricity Rules and jurisdictional instruments);
- alternative frameworks for nationally consistent standards, links between transmission standards and other parts of the transmission regulatory regime; and
- implementation issues surrounding the establishment of a new nationally consistent framework for network security and reliability.

⁵ On 1 May 2008 the AEMC published its Final Determination on a Rule change proposal "Central Dispatch and Integration of Wind and Other Intermittent Generation" from NEMMCO that seeks to require significant intermittent generators (such as wind farms) to participate in the central dispatch and PASA processes, and limit their output at times when that output would otherwise violate secure network limits.

⁶ Further information on the Panel's review, including the terms of reference from the AEMC, are available at the AEMC's website at <u>http://www.aemc.gov.au/electricity.php?r=20071221.150018</u>.

⁷ Further information on the AEMC's National Transmission Planner review, including the terms of reference from the MCE, are available at the AEMC's website at http://www.aemc.gov.au/electricity.php?r=20070710.172341.

The MCE requested that the AEMC provide it with the Panel's advice by 30 September 2008.

1.1.5 **AEMC Review of Demand Side Participation**

The AEMC is undertaking a review of demand side participation (DSP) in the NEM. The objective of the review is to identify whether there are barriers or disincentives within the Rules which inhibit efficient DSP in the NEM.

The connection of small generating units, and other facilities that can provide DSP, may be affected by the level and nature of the technical standards under this review.

1.1.6 Rule change proposal in relation to Compliance and Enforcement with Technical Standards

On 14 February 2008 the National Generators Forum (NGF) lodged a Rule change proposal regarding the compliance with performance standards by Generators. The NGF's proposal addresses several of the recommendations in the AEMC's review "Review of Enforcement and Compliance with Technical Standards".⁸

1.2 Panel's Terms of Reference for the Technical Standards Review

On 14 February 2008, the AEMC approved the Terms of Reference for the Reliability Panel's technical standards review, which are contained in Appendix A.

The Panel's review is in accordance with clause 8.8.1(a)(7) of the Rules which requires the Panel to monitor, review and publish a report on the implementation of automatic access standards and minimum access standards as performance standards in terms of whether:

- their application is causing, or is likely to cause, a material adverse effect on *power system security*; and
- the *automatic access standards* and *minimum access standards* should be amended or removed.

The AEMC also requests the Panel to review the technical standards, including the individual technical standards, as well as the effectiveness of the interaction between the system, access and plant-specific standards as a whole.

One of the main objectives of this review is also to improve the clarity of the technical standards, in addition to their appropriateness.

⁸ Further information on the NGF's proposal and the associated AEMC assessment is available on the AEMC's website at <u>http://www.aemc.gov.au/electricity.php?r=20080228.150735</u>.

1.3 Deliverables from the review

The Terms of Reference from the AEMC requires that the Panel review the technical standards to identify:

- the principles that should be applied in revising the technical standards;
- the processes for implementing the recommended changes to the technical standards including prospective Rule changes; and
- the priority list for reviewing the individual standards.

Following this review subsequent processes will be established to:

- review the technical standards, including the individual technical standards as well as the effectiveness of the interaction between the system, access and plant-specific standards as a whole; and
- improve the clarity of the technical standards to ensure that the standards are expressed in ways that allow both access to the standards by any relevant technology and appropriate compliance assessment by the Australian Energy Regulator (AER).

1.4 Consultation process

This review of the technical standards is likely to have important implications for NEM stakeholders. Consistent with its philosophy of engaging with those parties, the Panel plans to involve stakeholders by seeking submissions and holding forums on this Issues Paper and on each of its draft decisions.

The AEMC Terms of Reference requires the Panel to deliver its final report by 31 December 2008.

The following key dates outline the intended consultation process leading up to the delivery of the Panel's final report to the AEMC on its technical standards review.

| Date | Milestone |
|------------------|--------------------------------------|
| 9 May 2008 | Publish Issues Paper |
| 13 June 2008 | Close of submissions on Issues Paper |
| 29 August 2008 | Publish Draft Report |
| 3 October 2008 | Close of submissions on Draft Report |
| 31 December 2008 | Submit Final Report to AEMC |
| January 2009 | Publish Final Report |

The Panel is likely to hold a forum for interested stakeholders during the overall review process and will identify an appropriate date later in the process.

Following the completion of this review, the timetable for subsequent reviews of specific aspects of the technical standards will be announced.

1.5 Submissions on the Issues Paper

The Panel invites written submissions from interested parties in response to the Issues Paper by 5 pm (Australian Eastern Standard Time) on 13 June 2008. Submissions may be sent electronically or by mail in accordance with the following requirements.

1.5.1 Lodging a submission electronically

The submission must be sent by email to panel@aemc.gov.au. The email must contain the phrase "Technical Standards Review – Issues Paper" in the subject line or heading. The submission must be on letterhead (if submitted on behalf of an organisation), signed and dated. The submission must be in PDF format, and must also be forwarded to the Panel via ordinary mail.

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

1.5.2 Lodging a submission by mail

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

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

The envelope must be clearly marked "Technical Standards Review - Issues Paper".

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

2 Technical Standards in the NEM

2.1 Why do we need technical standards?

The NEM technical standards define the level of performance required of the equipment that makes up, and is connected to, the NEM power system. The overall power system is operated to these standards and allows the power system operator, NEMMCO, to effectively mange power system security.

For example, the technical standards include specifying the ability of a generating unit to ride through a disturbance in the power system. If all generators adhere to these standards, a power system incident is less likely to lead to a cascading failure and endanger power system security. In addition, the transfer limits within the NEM transmission system can be more accurately defined when the technical performance of the power system is well defined, and known to NEMMCO.

Other aspects of the technical standards specify the quality of the electricity services that the network and those connected to the network can expect. This allows parties to invest in and operate equipment with a reasonable assurance of the quality and expected performance of other parties connected to the network.

2.2 What technical standards apply in the NEM?

While the term "technical standards" is not explicitly defined term, the Rules:

- define power system security and reliability standards; and
- contain schedules of network access technical standards in Chapter 5.

The power system security and reliability standards govern the level of performance of the NEM in relation to system security and reliability, including frequency standards and reserve standards. The Panel has an ongoing work program to review and approve the power system security and reliability standards and, therefore, the AEMC excluded these standards from the terms of reference in Appendix A.

The network access standards in the Chapter 5 schedules define the technical obligations on network users and network owners when negotiating the connection of a generating unit, a market network service provider or an end use customer. The framework for the access standards comprises the following hierarchy:

- system standards set out in Schedule 5.1a of the Rules that establish the security, reliability and quality parameters of the power system;
- access standards set out in Schedules 5.1 to 5.3a that define the levels to which plant (whether network, generator, customer or Market Network Service Provider (MNSP)) must be able to perform in order to connect to the power system; and

• plant standards being technology-specific standards which, if met, would assure compliance with the access standards. Plant owners may request that the Panel approve particular standards for this purpose.

To date the Panel has not been requested to approve any plant standards.

2.2.1 System standards

The system standards are contained in schedule 5.1a of the Rules and set out the targets for the performance of the power system. The purpose of schedule 5.1a is to establish system standards that:

- (a) are necessary or desirable for the safe and reliable operation of the facilities of Registered Participants;
- (b) are necessary or desirable for the safe and reliable operation of equipment;
- (c) could be reasonably considered good electricity industry practice; and
- (d) seek to avoid the imposition of undue costs on the industry or Registered Participants.

System standards specify the quality and nature of the electricity supplied by the network. All network users know that these are the standards to which supply can be expected to conform and the system performance which the plant and equipment connected to the system must be designed to withstand. Similarly, the market operator and network service providers know that these are the standards that the system is to be designed and operated to achieve.

System standards need to be set at an appropriate level that seeks to minimise the overall cost to all parties connected to the power system. The market operator would incur considerable costs to achieve high system standards, but this would minimise the cost of plant connecting to the power system. Conversely low standards, although cheaper for the market operator to achieve, may increase the direct and indirect costs to parties using the power system or seeking connection.

It is also clear that system standards can not easily be varied as the plant installed by all network services providers and the facilities of all parties connected to the grid have been developed based on current expectations.

2.2.2 Access standards

While some of the access standards contained in schedules 5.2, 5.3 and 5.3a are mandatory, most allow the flexibility of a range within which plant proponents may negotiate with NSPs for access to the networks. Both the NSP and, in the case of standards that relate to system security, NEMMCO must be satisfied that the outcome of those negotiations is consistent with achieving the system standards. The negotiating range comprises:

- an automatic access standard where, if connecting plant achieves that standard, the system standards are expected to be met and the plant would not be denied access to the network (because of that technical requirement); and
- a minimum access standard where, if the connecting plant cannot achieve that standard, there would be an unreasonable risk of the system standards not being met or harm occurring to other connected parties and, therefore, the plant would be denied access.

An exception is provided for in the Rules such that at any time a plant that has negotiated its performance standards should not have to vary those standards simply because the standards themselves change. A plant is only required to upgrade to a higher standard if it upgrades the relevant aspect of their plant.

Power system equipment is designed to conform to the technical standards that apply at that time equipment is specified and commissioned. Once the equipment is commissioned it is generally difficult for it to be modified to meet a more arduous standard.

2.3 Which technical standards are the subject this review?

The AEMC indicated in its final report, and in the terms of reference contained in Appendix A, that the technical standards to be reviewed by the Panel should include:

- the performance standards for Generators, Market Customers and MNSPs specified under clauses 4.13, 4.14 and 5.3.4A(g) that are required to be registered with NEMMCO;
- the automatic access standards, minimum access standards and performance criteria required for connection of NSPs, Generators, Market Customers and MNSPs set out in schedules 5.1, 5.2, 5.3 and 5.3a respectively, which in the case of Generators, Market Customers and MNSPs, form the basis for specific performance standards required to be registered with NEMMCO;
- the obligations of NSPs, Generators and Market Customers under clauses 5.2.3, 5.2.4 and 5.2.5; and
- the system standards in schedule 5.1a to the extent of their relation to technical matters.

The frequency and reliability standards for the mainland and Tasmania are excluded from the scope of this present review by the Panel.¹

¹ On 18 March 2008 the AEMC approved separate terms of reference for the Reliability Panel to review the Mainland Frequency Standards during the times of supply scarcity associated with load restoration and a complete review of the Tasmanian Frequency Standards.

3 Questions for the technical standards review

The effectiveness of the management of power system security, the negotiation of access arrangements and the enforcement and compliance regime depends on the quality of the technical standards. Therefore, the objectives of this review are to:

- determine principles for assessing the effectiveness of the existing technical standards;
- identify areas where improvements can be made to the technical standards; and
- propose processes for implementing the appropriate amendments to the standards.

The Panel has formulated the questions in this section in order to facilitate this review. Stakeholders are encouraged to consider these questions when preparing their submissions to this review. In addition, the Panel also seeks comments from stakeholders on any other related aspects of the existing technical standards subject to this review.

3.1 Are the current standards of the correct form?

It is important that the technical standards in the Chapter 5 schedules are suitable for each of their applications under the Rules. In particular, they should be in a form that:

- aligns the technical performance of the power system and its components with the philosophy used to manage power system security and reliability, as defined in Chapter 4 of the Rules and in NEMMCO's operating procedures;
- allows network users, NSPs and NEMMCO to assess and negotiate the technical aspects of applications to connect to the power system; and
- adequately specifies the technical performance of the power system and its components, allowing suitable compliance programs and enforcement regimes to be determined¹.

The Panel seeks comments from stakeholders on the suitability of the current form of the technical standards and how it may be improved. In addition, the Panel seeks comment on how effectively the current technical standards manage the interactions between the system and plant-specific access standards.

¹ The AEMC is currently assessing a Rule change proposal from the NGF in relation to the compliance with, and enforcement of, performance standards.

3.2 Are the current standards set at appropriate levels?

The level of each of the technical standards is an economic and technical trade-off between the benefits delivered by the standard and the costs of it being achieved. This trade-off seeks to effectively manage the interactions between the system, access and plant-specific standards as a whole.

For example, high technical standards can impose additional capital and operating costs for new power system plant but would generally improve the operation of the power system in terms of allowing increased transfer capability for the power system and reducing the risk of a cascading failure.

Therefore, the Panel seeks stakeholder's views on the levels of the current technical standards, in particular, the level of the minimum and automatic access standards, and hence the flexibility for negotiated standards.

3.3 Is the scope of the technical standards appropriate?

The Chapter 5 schedules define the different aspects of the technical requirements of the NEM power system and its components. Each of these specific technical requirements should serve an appropriate purpose in terms of managing the security of the power system and the quality of the electricity delivered to customers.

The Panel seeks comments from stakeholders on the scope of the current technical standards. In addition the Panel seeks stakeholders' views as to which aspects of the technical standards could be removed or added to the current standards.

3.4 Are the technical standards well structured in the Rules?

The technical obligations placed on the different NEM participants need to be clearly defined to effectively manage the operation of the NEM power system. Therefore, the technical standards contained in the Chapter 5 schedules need to be well structured and unambiguously defined.

Therefore, the Panel seeks comments from stakeholders on the structure of the current Chapter 5 schedules and how the technical obligations could be more clearly be captured.

3.5 Are the obligations between NSPs and network users consistent?

The security of the NEM power system is managed through the obligations placed on the various NEM participants contained in the technical standards in the Chapter 5 schedules. This can be effectively managed where there is an appropriate balance between the different classes of NEM participants, in particular, the balance between the obligations placed on the NSPs, as the operators of the transmission network, and the network users. The Panel seeks the perspectives on stakeholders on this balance in the current technical standards and where this balance could be improved.

3.6 Which aspects of the technical standards need more urgent review?

The Panel seeks the views of stakeholders on what priority should be given to the different aspects of the technical standards being reviewed. The Panel will consider these views when determining the ongoing work packages resulting from this review.

A Appendix: AEMC Terms of Reference (14 February 2008)

Introduction

On 1 September 2006 the AEMC published its "Review of Enforcement of and Compliance with Technical Standards". In its final report the AEMC recommended that the Reliability Panel (Panel) to undertake a review of the adequacy and content of the technical standards. In the final report for this review the AEMC indicated that the technical standards should:

- be based on actual sustainable plant capability; and
- are clear and appropriate.

The AEMC has also noted the Panel's indicative work program which included the likelihood of this review in 2008.

Scope of the Technical Standards Review

Clause 8.8.1(a)(7) of the National Electricity Rules requires the Reliability Panel to:

monitor, review and *publish* a report on the implementation of *automatic access standards* and *minimum access standards* as *performance standards* in terms of whether:

- (i) their application is causing, or is likely to cause, a material adverse effect on *power system security*; and
- (ii) the *automatic access standards* and *minimum access standards* should be amended or removed.

Therefore, the AEMC requests the Panel, in accordance with section 38 of the NEL, to undertake a review of the technical standards, including the individual technical standards as well as the effectiveness of the interaction between the system, access and plant-specific standards as a whole.

The term "technical standards" is not a defined term in the Rules. However, the AEMC indicated in its final report that the technical standards to be reviewed by the Panel should include:

- the performance standards for Generators, Market Customers and MNSPs specified under clauses 4.13, 4.14 and 5.3.4A(g) that are required to be registered with NEMMCO;
- the automatic access standards, minimum access standards and performance criteria required for connection of NSPs, Generators, Market Customers and MNSPs set out in schedules 5.1, 5.2, 5.3 and 5.3a respectively, which in the case of Generators, Market Customers

and MNSPs, form the basis for specific performance standards required to be registered with NEMMCO;

- the obligations of NSPs, Generators and Market Customers under clauses 5.2.3, 5.2.4 and 5.2.5; and
- the system standards in schedule 5.1a to the extent of their relation to technical matters.

The frequency and reliability standards for the mainland and Tasmania are excluded from the scope of this present review by the Panel.

Deliverables

The AEMC requests that, following the completion of its review of the adequacy and content of the technical standards, the Panel should provide the AEMC with a Final Report that includes the findings and recommendations of its review, and which identifies:

- the principles that should be applied in revising the technical standards; and
- processes for implementing the recommended changes to the technical standards including prospective Rule changes.

Process

This review of the Technical Standards is likely to have important implications for NEM stakeholders. Consistent with its philosophy of engaging with those parties, the AEMC requests the Panel to plan to involve stakeholders by seeking submissions and holding forums on the main review issues paper and on each of its draft decisions.

The Panel may choose to utilise consultant support engaged and provided by the AEMC to assist the Panel in the preparation of scoping and issues papers, draft and final review documents, and undertaking research and analysis.

The Panel is requested to deliver its Final Report by 31 December 2008.

The Panel should also keep the AEMC informed of progress during the review.