



Australian Energy Market Commission

Rule Determination

National Electricity Amendment (Technical Standards for Wind and other Generator Connections) Rule 2007

Rule Proponents
NEMMCO
8 March 2007

Signed:

John Tamblyn
Chairman

For and on behalf of
Australian Energy Market Commission

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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.

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Summary

The Australian Energy Market Commission (Commission) makes this Rule determination under section 102 of the National Electricity Law (NEL). The attached Rule to be made will be made and commence operation under section 103 of the NEL on 15 March 2007.

This Rule implements a number of significant market developments in relation to generator connection, particularly related to wind generators. The original Rule proposal came to the Commission following detailed work flowing from the MCE's Wind Energy Policy Working Group (WEPWG) and the industry Wind Energy Technical Advisory Group (WETAG).

In the Rule to be made the Commission has balanced the need to remove unnecessary hurdles for new generator entry, in particular new generation technologies including wind, while ensuring that NEMMCO and the network service providers (NSPs) are able to maintain ongoing power system security and power quality. In particular, the Rule:

- maintains the existing negotiating framework for performance standards;
- is more technologically neutral and applicable to both scheduled and non-scheduled generation;
- allows for flexibility in the negotiation of the performance standards and how they can be met, depending on individual circumstances of the connection location and the technology used; and
- clarifies the provision of information requirements on connection applicants to ensure NEMMCO and the NSPs have sufficient modelling information to maintain system security while preserving the intellectual property of the generator proponents and manufacturers.

The Commission received the original proposal to amend the National Electricity Rules (Rules) from the National Electricity Market Management Company (NEMMCO) on 10 February 2006. The proposal related to "technical standards for wind generation and a review of existing provisions". Broadly, the technical standards are provisions that specify the nature and quality of electricity supplied by the National Electricity Market (NEM) power system. The key aspects of NEMMCO's proposal involve:

- providing technical standards for non-scheduled (principally wind) generating plant as the proportion of wind generation in the NEM continues to grow and it is becoming increasingly important to be able to manage the impact of that generation on the power system;
- addressing deficiencies in the current technical standards that apply to generators overall (Schedule 5.2 of the Rules);
- increasing the requirements on generators to provide detailed modelling information to NEMMCO and network service providers (NSPs) so that they

may more accurately manage the power system and providing a process for disclosing modelling information to relevant third parties; and

- amending the framework for negotiating generator access to networks including introducing reliability of supply as a basis for negotiating access standards, providing a clearer process for establishing performance standards and relaxing some restrictions on how performance standards can be modified.

On 13 March 2006 NEMMCO submitted an amendment to its proposed Rule changes that corrected certain cross-referencing errors. The Commission published its Section 95 consultation notice and the Rule change proposal on its website¹ for consultation on 4 May 2006. Sixteen submissions on the proposal were received by the 23 June 2006 closing date. The Commission also published notices under section 107 of the NEL that extended the period of time for the making of the Rule determination arising from the complexity of the proposal and the issues raised in submissions.

In parallel with this analysis, the Commission completed its review into the enforcement of, and compliance with, the technical standards² of the Rules. Aspects of that review are relevant to the subject matter of NEMMCO's Rule change proposal. The Commission notes that, consistent with the recommendations contained in its final review report to the Ministerial Council on Energy (MCE) :

- a joint NEMMCO/NGF process was undertaken to settle the content of performance standards for existing generators and a Rule intended to make the performance standards that resulted from that process enforceable was made on 7 December 2006; and
- the Commission plans to review how the technical and performance standards should evolve and interact over time as part of a broader review of the technical standards to be completed by 30 June 2008.

On 12 October 2006, the Commission published the draft Rule determination and Draft Rule for this proposal on its website. The Commission invited requests for a hearing by 19 October 2006, and submissions by 24 November 2006. The Commission received eighteen submissions on the draft Rule determination and Draft Rule but did not receive a request for a hearing. These submissions generally indicated broad industry support for the policy positions taken in the draft Rule determination.

The range of suggestions arising from the submissions on the draft Rule determination and Draft Rule required extensions of the initial time allocated to this analysis and the Commission published notices under section 107 extending the initial time when necessary.

In this Rule determination, the Commission has accepted a large number of the changes proposed by NEMMCO in its proposal, in particular almost all the technical

¹ The Commission's website is located at www.aemc.gov.au.

² Review of enforcement and compliance with technical standards: Final Report, September 2006 available at the Commission's website.

standards changes. However, after considering submissions and undertaking its own analysis, the Commission has:

- clarified NEMMCO's role within the access negotiation process set out in Chapter 5 of the Rules to ensure that the negotiation process itself delivers suitable performance standards rather than allow the content of the standards to be finalised in a subsequent process between NEMMCO and the connection applicant;
- decided against giving NEMMCO the power to consider reliability of supply when advising an NSP on a negotiated access standard;
- provided that generators, in providing modelling information to NEMMCO and the NSPs as part of the connection process, are not required to provide a non-confidential version of that information;
- provided that NEMMCO, in receiving modelling and other confidential information from generators, is required not to pass any information on to third parties;
- decided against accepting the proposal that market participants who are subject to performance standards must submit revised performance standards as the result of changes being made to the technical standards in the Rules – as noted above, the Commission plans to examine this issue as part of the broader technical standards review to be completed by 30 June 2008;
- decided against accepting NEMMCO's proposal to allow either it or the relevant NSP to direct a generator connecting to the network to spend additional funds in order to address network supply capability concerns arising from that connection;
- provided transitional arrangements that make it clear that the performance standards for new connections currently being negotiated may be based on the current technical standards; and
- made a number of minor corrections and enhancements in the Rule to be made.

The Commission also considers that there are benefits in the confidential information in Chapter 5 being disclosed to third parties in circumstances that are acceptable to all relevant parties. This would assist generator proponents to develop their projects and associated applications to connect while maintaining the confidentiality of the manufacturer's intellectual property. To this end, it is the view of the Commission that NEMMCO should take steps to form a working group or similar forum which would involve relevant industry representation, including manufacturers and wind farm proponents, to identify the process surrounding how and when currently confidential information could be made available to affected third parties. A Rule change proposal may be the appropriate vehicle to implement any arrangements which arise from this work.

The Rule to be made, made in accordance with this assessment, is attached. The Commission is satisfied that the Rule to be made is likely to contribute to the NEM

objective and that it therefore satisfies the Rule making test. This Rule determination sets out the reasons of the Commission in accordance with the requirements of the NEL.

Abbreviations

ACCC	Australian Competition and Consumer Commission
AEMC	Australian Energy Market Commission
AER	Australian Energy Regulator
Auswind	Australian Wind Energy Association
AVR	Automatic voltage regulator
DNSP	Distribution Network Service Provider
EHV	Extremely high voltage
ERAA	Energy Retailers Association of Australia
ESCOSA	Essential Services Commission of South Australia
ESIPC	Electricity Supply Industry Planning Council
ETNOF	Electricity Transmission Network Owners' Forum
MCE	Ministerial Council on Energy
MNSP	Market Network Service Provider
MW	MegaWatt
NECA	National Electricity Code Administrator
NEL	National Electricity Law
NEMMCO	National Electricity Market Management Company
NGF	National Generators Forum
NSP	Network Service Provider
PASA	Projected Assessment of System Adequacy
REGA	Renewable Energy Generators Australia
Roaring 40s	Roaring 40s Renewable Energy
TNSP	Transmission Network Service Provider
TSRG	Technical Standards Reference Group
WETAG	Wind Energy Technical Advisory Group
WEPWG	Wind Energy Policy Working Group

1 NEMMCO's Rule proposal

On 10 February 2006 the Commission received from the National Electricity Market Management Company (NEMMCO) a "technical standards for wind generation and review of existing provisions" proposal to amend the National Electricity Rules (Rules). NEMMCO submitted an amended proposed Rule on 13 March 2006 to address a number of cross-referencing errors. There are three main aspects to NEMMCO's proposal.

Technical standards

The first aspect concerns the technical standards applicable to generation. These are mainly set out in Schedule 5.2 of the Rules. The proposal is to amend the standards to more effectively provide for non-scheduled³ (principally wind) generating plant. NEMMCO submitted that, as the proportion of wind generators in the NEM continues to grow, it is becoming increasingly important to be able to manage the impact of that generation on the power system.

Currently, wind generators are exempted from aspects of the standards because those standards are specific to scheduled, synchronous or transmission connected generating units whereas wind generators are classified as non-scheduled, generally use asynchronous technology and are sometimes connected to distribution networks. Other aspects of the current standards can impede wind developments. For example, a number of the requirements apply to each individual generating unit. This would impose a heavy cost burden on wind farms which typically comprise a large number of small turbines. To address this, NEMMCO proposes to move certain performance requirements to the point of connection with the network.

NEMMCO also submitted that, because wind generating units are currently treated as non-scheduled and are therefore not optimally dispatched, they may cause inefficient dispatch outcomes and potential network overloads. Under the Rule change proposal wind generators would be required to have active power control, in particular the ability to reduce their output in response to a dispatch instruction from NEMMCO.

NEMMCO also proposed changes designed to address deficiencies in the standards that apply to generators overall. These include providing greater flexibility in the technical standards to allow a wider range of parties to connect to the power system, enhancing the clarity of certain technical requirements and allowing generators to use their auxiliary equipment to meet the standards, if appropriate.

NEMMCO considers that its Rule change proposal in relation to the technical standards contributes to the NEM objective in that the proposed changes:

- are likely to reduce equipment costs for asynchronous generators, including wind, by allowing more flexibility and removing jurisdictional requirements;

³ Non-scheduled generation is generation that has not been required to participate in the NEM dispatch processes. Historically, it has referred to smaller generation (typically, generating systems less than 30MW in size). By contrast, scheduled generation is required to participate in dispatch and has typically been of larger size. The NEM now contains wind farms larger than 30 MW in size.

- provide greater certainty in the process for managing the impact of new generating units, thus reducing the risk of them being constrained off; and
- defer network costs by maintaining the network transfer capability following the connection of new generating units and generating systems.

Provision of information

The second set of changes were intended to increase the requirements on generators to provide detailed modelling information to NEMMCO and network service providers (NSPs) so that they may more accurately manage the power system. They also provide a process for disclosing that information to other prospective connection applicants so that they may assess the performance impact of their own plant on the power system and also to other parties to increase the base of expert opinion available.

NEMMCO considers that its Rule change proposal in relation to the provision of information contributes to the NEM objective in that the proposed changes:

- allow investors in wind farms to benefit from being able to have access to other wind farm models and hence optimise the cost of meeting technical requirements for connection; and
- increase the utilisation of the network using the more accuracy of the generator models to define the network transfer capability.

Access negotiation and compliance

Finally, NEMMCO proposed to amend the framework for generators negotiating access to networks including introducing reliability of supply as a basis for negotiating access standards, providing a clearer process for establishing individual performance standards and relaxing some restrictions on how performance standards can be modified.

NEMMCO considers that its Rule change proposal in relation to access negotiation and compliance contribute to the NEM objective in that the proposed changes:

- increase the benefits to end users by allowing NEMMCO to consider reliability of supply when advising on negotiated access standards;
- result in more consistent and less costly access negotiations which will ultimately lead to reduced costs being passed through to consumers; and
- improve the long term security of the power system by ensuring that the performance standards are up to date, feasible, consistently applied and appropriate for compliance monitoring.

Finally, the Commission notes a number of the parties who made submissions in response to NEMMCO's proposal were concerned that it included changes other than those to the technical standards required to provide for wind generation. The Commission notes that stakeholders may have formed this view based on the fact that the Rule change proposal followed a number of processes specifically designed

to address how to incorporate wind generation into the NEM⁴. Under the NEL, Rule change proponents are entitled to combine different issues concerning the existing Rules within a single proposal. A proposal must, for *each* such issue, contain appropriate information as to the issue, an explanation as to how the proposed Rule addresses that issue and how that proposed Rule would or would be likely to contribute to the NEM objective⁵. Subject to the discussion in this determination, the Commission is satisfied that NEMMCO's proposal meets those requirements.

⁴ These include the Ministerial Council on Energy (MCE) Wind Energy Policy Working Group (WEPWG), Wind Advisory Technical Advisory Group (WETAG) and NEMMCO Technical Standards Reference Group processes described in Chapter 2 below.

⁵ National Electricity Regulations, section 8(1).

2 Background to the proposal

2.1 The technical standards framework

Appropriate standards for plant connecting to the network are vital to protecting the integrity of the power system. The technical standards framework set out in the Rules was established as the result of a review conducted by the National Electricity Code Administrator (NECA) in 2001⁶. The framework was designed to ensure that the target performance levels of the power system could be achieved but also that this could be done as efficiently as possible. Accordingly, the framework provides flexibility with respect to:

- the technologies that can be used – to the extent that emerging technologies may be able to contribute towards meeting end-user customer demands, they should not be restricted from doing so by unnecessarily rigid standards or standards limited by existing technology or practice; and
- the point of connection within the power system – different performance standards may be appropriate in different locations within the power system, for example, to provide for remote and embedded generation.

This flexibility is subject to the requirement that the target power system performance levels can be achieved. It is important to emphasise in this regard that the framework was not designed to automatically permit the use of every potential technology or for the standards applying at specific locations to be lower than the minimum standard accepted across the NEM as the result of local conditions. Rather, the framework is designed to minimise barriers to entry consistent with achieving the system performance targets.

The framework 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 Commission's Reliability Panel approve particular standards for this purpose⁷.

Certain access standards are mandatory. However, in order to provide the flexibility referred to above, most allow a range within which plant operators may negotiate with NSPs for access to the network. Both NEMMCO and the NSP must be satisfied

⁶ NECA, Review of Technical Standards: Report, December 2001. See also the Australian Competition and Consumer Commission (ACCC), Applications for Authorisation: Amendments to the National Electricity Code, Technical Standards, February 2003.

⁷ Rules, clause 5.3.3(b2).

that the outcome of those negotiations is consistent with achieving the system standards. The negotiating range comprises:

- an *automatic access standard* where, if connected plant achieves that standard, then the system standards are expected to be met; and
- a *minimum access standard* which denotes the level below which there would be an unreasonable risk of the system standards not being met or harm occurring to other connected parties.

Negotiations below the minimum standard are not permitted due to the risks to power system security and quality of supply⁸. A one-off exception was provided for in the National Electricity Code (Code), the predecessor to the Rules, to reflect the fact that plant connected to the network at the launch of the market had a variety of capabilities based on requirements that existed at the time of their connection⁹. The resulting performance standards, whether below the minimum or not, were preserved or “grandfathered”. The grandfathered principle has been continued in the Rule to be made.

2.2 Access negotiation, compliance and enforcement

Under the access negotiation process set out in Chapter 5 of the Rules:

- negotiation takes place between the plant owner or operator and the NSP, being the parties with the most direct commercial interests in the outcomes;
- the NSP is responsible for ensuring that the connecting plant meets the access standards concerned with local quality of supply matters; and
- NEMMCO is required to advise the NSP, and the NSP must accept that advice, regarding the access standards to do with power system security.

The outcome of the negotiation process is a connection agreement which contains or refers to the set of performance standards that apply to that plant. The performance standards comprise the mandatory and automatic access standards or, where standards between the automatic and minimum have been agreed, those negotiated access standards.

Once the connection agreement has been finalised, the plant operator and the NSP must provide NEMMCO with details of all of the performance standards¹⁰. The plant operator is then required to comply with its performance standards obligations and to institute and maintain a compliance program¹¹. The Australian Energy Regulator

⁸ NEMMCO’s proposed Rule change included a power on NEMMCO to consider reliability of supply when advising an NSP on a negotiated access standard. This proposal was not adopted by the Commission.

⁹ Rules, clauses 4.13 and 14. Note that the obligation to submit performance standards for plant located in regions of the NEM other than Tasmania set out in clause 4.13 of the Code was limited to plant in operation on 16 November 2003 . As that requirement had expired by 1 July 2005, the date the Rules commenced, it was not carried across into the Rules. The obligation with respect to Tasmanian plant appears in the Rules due to the State’s more recent (29 May 2005) entry into the NEM.

¹⁰ Rules, clause 5.3.7(e).

¹¹ Rules, clause 4.15.

(AER) is responsible for the monitoring and enforcement of any breaches of the performance standards.

The Rule change proposal incorporates changes to address a number of issues identified by NEMMCO associated with the current access negotiation framework.

2.3 MCE and NEMMCO processes

Since the technical standards framework was introduced, the number of connection applications for wind farm developments has grown significantly. In 2004 the Ministerial Council on Energy (MCE) established the Wind Energy Policy Working Group (WEPWG) to consider a range of issues related to the impact of the increasing number of wind generators in the NEM. The WEPWG formed the Wind Energy Technical Advisory Group (WETAG) to report on the relevant issues for the connection of non-scheduled generators. The WETAG discussion paper¹² identified the need for an urgent review of the technical requirements for wind generator connection. NEMMCO convened an industry based Technical Standards Reference Group (TSRG) to assist with a review of the technical standards and the development of a Rule change proposal. That Rule change proposal is the subject of the current Rule determination.

The WETAG paper also recommended that the Rules be amended to allow NEMMCO to publish additional information in relation to non-scheduled (principally wind) generation in order to assist market participants to assess the impact of that generation on NEM spot market outcomes. The Commission made a Rule in respect of NEMMCO's Rule change proposal on that issue in January 2006¹³.

2.4 Review of enforcement and compliance with technical standards

The Commission conducted a review concerning the enforcement of, and compliance with, the technical standards¹⁴. That report was in response to the terms of reference from the MCE that concerned the investigative, rectification and penalty provisions of the Rules as they relate to the technical standards framework. The Commission was also required to consider three recent power system events as part of its review.

As part of the report, the Commission recommended that:

- there were material deficiencies in the process established under the Code to grandfather the performance standards for existing plant; and
- it would be appropriate to conduct a thorough program of work to review the future development, scope and content of the technical standards.

In relation to the material deficiencies in the process established under the Code, a joint NEMMCO/NGF process was conducted to settle the content of the standards applicable to generators and a Rule change proposal intended to make the

¹² WETAG, Integrating wind farms into the NEM, discussion paper, March 2005.

¹³ National Electricity Amendment (Publication of Information for Non-Scheduled Generation) Rule 2006 No.2. A copy of the final determination and Rule can be found on the Commission's website.

¹⁴ Final report published 1 September 2006 and available on the Commission's website.

performance standards that result from that process enforceable was recently completed by the Commission and a Rule made¹⁵. As for undertaking a review, a review is expected to commence after the completion of this Rule change process. The Commission will address the issue as to whether NSPs should be subject to specific performance standards and the question of how agreed performance standards should relate to the technical standards over time. The Reliability Panel would be responsible for reviewing the scope and content of the technical standards themselves.

¹⁵ National Electricity Amendment (Resolution of existing generator performance standards) Rule 2006 No.21. Published on the Commission's website on 7 December 2006.

3. Rule determination

The Commission has determined in accordance with section 102 of the National Electricity Law (NEL) to make this Rule determination and the Commission will make the attached Rule to be made under section 103 on 15 March 2007. The Rule will also commence on 15 March 2007. The Rule to be made largely reflects the proposed Rule put forward by NEMMCO.

The Commission determined to commence initial consultation on this proposal under section 94 of the NEL and published a notice under section 95 of the NEL on 4 May 2006 which commenced first round consultation. The Rule change proposal was open for public consultation for seven weeks. Submissions closed on 23 June 2006.

The Commission also issued two notices under section 107 of the NEL which extended the time period for the making of the draft Rule determination by a total of eight weeks. The basis for these extensions was that the Commission considered that the issues raised by NEMMCO's proposal were of sufficient complexity that it was in the public interest to extend the time period in order to appropriately address those issues in this determination.

On 12 October 2006, the Commission published its draft Rule determination and Draft Rule on this proposal. The Commission invited requests for a hearing by 19 October 2006, and submissions by 24 November 2006. The Commission received no request for a hearing, and fourteen submissions. These submissions generally indicated broad industry support for the policy positions taken in the draft Rule determination.

The range of suggestions arising from the submissions on the draft Rule determination and Draft Rule required an extension of initial time allocated to this analysis. Accordingly, the Commission issued a section 107 notice on 14 December 2006 to extend the publication date of the Rule determination to 25 January 2007, and a further section 107 notices on 21 December 2006, 11 January 2007 and 15 February 2007 to extend the publication date of the Rule determination to 1 February 2007, 22 February 2007 and 8 March 2007 respectively.

This Rule determination sets out the Commission's reasons for making the Rule to be made. The Commission has taken into account:

- the Commission's powers under the NEL to make the Rule;
- the proponent's Rule change proposal including the proposed Rule;
- submissions received;
- relevant MCE statements of policy principles; and
- the Commission's analysis as to the ways in which the Rule to be made will or is likely to contribute to the achievement of the NEM objective so that it satisfies the statutory Rule making test.

3.1 The Commission's power to make the Rule

This Rule change proposal raises matters about which the Commission may make a Rule (NEL s.94 (1)(b)). In particular, the proposed Rule falls under the matters set out in NEL s.34(1), as it relates to:

- the operation of the national electricity market;
- the operation of the national electricity system for the purposes of security and reliability of that system; and
- the activities of persons participating in the national electricity market or involved in the operation of the national electricity system.

In addition, the proposed Rule changes fall under the following items in Schedule 1 of the NEL:

- clause 1 relates to the registration of participants;
- clause 11 concerns the operation of generating systems;
- clause 13 relates to network access; and
- clause 35 concerns confidential information.

3.2 Submissions received

The Commission received 16 (first round) submissions on NEMMCO's proposal from the following parties:

- the Australian Energy Regulator (AER);
- the Australian Wind Energy Association (Auswind);
- Citipower and Powercor Australia (CP/PC);
- the Energy Retailers Association of Australia (ERAA);
- the Electricity Supply Industry Planning Council (ESIPC);
- the Electricity Transmission Network Owners' Forum (ETNOF);
- Hydro Tasmania;
- NEMMCO;
- the National Generators Forum (NGF);
- Pacific Hydro;
- Renewable Energy Generators Australia (REGA);
- Roaring 40s Renewable Energy (Roaring 40s);

- TransGrid;
- TrustPower;
- VENCORP; and
- Vestas.

The Commission received 18 (second round) submissions on its Draft Determination from the following parties:

- the Australian Energy Regulator (AER);
- AGL Hydro;
- the Australian Wind Energy Association and Renewable Energy Generators of Australia (Auswind/REGA) - 3 submissions;
- Citipower and Powercor Australia (Citipower/Powercor);
- EnergyAustralia - 2 submissions;
- the Electricity Supply Industry Planning Council (ESIPC);
- the Electricity Transmission Network Owners' Forum (ETNOF);
- NEMMCO - 2 submissions;
- the National Generators Forum (NGF);
- Pacific Hydro - a submission to address matters raised by NEMMCO in its second round submission;
- Roaring 40s Renewable Energy (Roaring 40s);
- Snowy Hydro (Snowy);
- Sweeting Consulting Services (Sweeting); and
- Vestas.

In regard to the proposed changes to the technical standards, the submissions were broadly favourable in terms of extending the application of the standards to wind generation and to separating a number of the standards into automatic and minimum standards. There were mixed views as to the range of new technical requirements proposed to be introduced. The comments and suggestions arising from these submissions have been addressed in section 4.1.

With respect to the proposed requirements to provide modelling and other technical information, first round submissions largely objected to the changes on the basis that inadequate protection was provided for commercial in confidence material and that the information required was unduly specific, onerous and poorly drafted. Second round submissions, on one hand tried to improve the framework for provision of

information to third party generators and on the other hand continued to object to the release of commercial in confidence material. This matter is addressed in section 4.2.

In regard to the proposed changes to the access negotiation process, first round submissions disagreed with the changes concerning the negotiation of performance standards for new plant. They also submitted that performance standards for existing plant should remain at their grandfathered levels and, more generally, that revisions of the technical standards should not force plant upgrades. Submissions favoured the proposed changes in relation to amending performance standards where plant is modified. On the other hand, one second round submission strongly objected to adopting grandfathered clauses for performance standards. The comments and suggestions arising from these submissions have been addressed in section 4.3.

Sections 4.4, 4.5, 4.6 and 4.7 address other matters relevant to the Rule change proposal that have been raised by submissions or through the Commission's own analysis.

3.3 Relevant MCE statements of policy principles

The NEL requires the Commission to have regard to any MCE statements of policy principles in applying the Rule Making test. The Commission notes that currently, there are no specific MCE statements of policy principles that directly relate to matters raised in this Rule change proposal.

4 Commission's consideration of matters raised in analysis and consultation

This Chapter sets out the Commission's consideration of matters raised in its analysis of, and as the result of consultation on, NEMMCO's Rule change proposal. The key components of this Chapter are as follows:

- technical standards – section 4.1;
- provision of information – section 4.2;
- access negotiation and compliance – section 4.3;

In addition, the Chapter also includes:

- discussion in relation to a late submission from NEMMCO – section 4.4;
- consequential amendments to derogations – section 4.5;
- savings and transitional provisions – section 4.6; and
- a summary of the differences between NEMMCO's proposed Rule and the Commission's Rule to be made – section 4.7.

All references in this Rule Determination are to the clause numbering used in the Rule to be made, which may differ from the NEMMCO's proposed Rule and the Draft Rule, unless otherwise stated.

4.1 Technical standards

NEMMCO proposed a number of changes that relate to the technical standards contained in Chapter 5 of the Rules and the Schedules to that Chapter. The Commission largely accepted the changes with the main exception being the proposed new requirement in relation to managing the impact of connecting generators on network capability. The Commission's reasons for doing so are outlined below. The specific changes addressed in this section of the report are as follows:

- quality of supply – section 4.1.1;
- frequency – section 4.1.2;
- reactive power – section 4.1.3;
- voltage – section 4.1.4;
- disturbances following contingency events – section 4.1.5;
- partial load rejection – section 4.1.6;
- protection of generation – section 4.1.7;
- impact on network capability – section 4.1.8;

- control systems and stability – section 4.1.9;
- fault current – section 4.1.10;
- technical matters to be co-ordinated – section 4.1.11;
- active power – section 4.1.12;
- remote monitoring – section 4.1.13;
- generating units and systems – section 4.1.14;
- other technical requirements – section 4.1.15; and
- glossary definitions – section 4.1.16;.

General support for NEMMCO’s proposal – technical standards

Views from Submissions:

Submissions from ETNOF, the ERAA Hydro Tasmania, the NGF, Pacific Hydro, Trust Power, VENCORP, AGL Hydro, Citipower/Powercorp, and Roaring 40s expressed general support for the changes to the technical standards contained in NEMMCO’s proposal. Some of their general concerns included:

- some significant aspects of NEMMCO’s proposal extend beyond the objective of including wind generation and other new technologies within the framework for establishing performance standards;
- the NGF indicated that some of the technical requirements are still quite onerous; and
- support for a further review of the technical standards in the Rules.

A detailed discussion on specific issues is presented in this section.

The Commission’s consideration and reasoning:

In general the Commission accepted NEMMCO’s proposed changes to the technical standards in the schedules to Chapter 5 of the Rules which aim to improve the formation of access standards between an NSP and a generator. The Commission’s reasons for accepting the NEMMCO proposal include:

- The proposed Rule addresses deficiencies in the current technical requirements for generating plant, both existing and new.
- The proposed Rules strike a balance between improving entry to the NEM of new generating technologies and the ongoing need to maintain and improve power system security and the quality of supply.
- The proposed Rules build on an earlier upgrade to technical standards that was introduced into the National Electricity Code in 2003, and in that regard forms the basis of a regular revision of the technical standards. The Commission

accepts that a broad review of the technical standards should be undertaken and has foreshadowed a further technical review to be completed by mid 2008.

- The regular revision of the generator technical standards is consistent with the entrepreneurial nature of the national electricity market, where investors are specifically encouraged by market based information to introduce supply and demand innovations to improve the efficient utilisation of Australia's energy resources.

Accordingly, the Rule to be made incorporates NEMMCO's proposal on technical standards, subject to the detailed variations on clauses specified below and further amendments contained in the section on savings and transitional provisions.

4.1.1 Quality of supply

NEMMCO's proposal

In regard to the quality of supply, the NEMMCO proposal relates to the following clauses:

- S5.1.7 (voltage unbalance);
- S5.2.5.2 (quality of electricity generated);
- S5.2.5.3 (generating unit response to disturbances in the power system)

Quality of supply covers a number of technical issues that impact on customers such as voltage flicker and fluctuation, voltage unbalance and harmonics. Quality of supply is a connection point issue and thus, under the Rules, is treated as an NSP responsibility while power system security is the responsibility of NEMMCO.

The quality of supply changes proposed by NEMMCO are as follows:

- introduce new clauses S5.1.7(c) and (d) in relation to voltage unbalance to provide minimum and automatic access standards with respect to NSPs requiring certain levels of negative phase sequence voltage for generating units to align with the new cross-references in clause S5.2.5.2(a), (b) and (c);
- modifying clause S5.2.5.2 in relation to quality of supply generated to provide for the standard to apply at the generating system level rather than at the unit level and to allow for situations where there are multiple connection points; and
- deleting clause S5.2.5.3 in relation to generating unit response to power system disturbances and replacing it with three clauses which address the relevant disturbances (frequency, voltage and post-contingency event) individually.

NEMMCO argued that the changes were appropriate because the current Rules did not provide for automatic and minimum access standards on voltage unbalance, did not allow for generating systems with multiple connection points and did not distinguish between auxiliary supply connection points and generating connection points.

Views in submissions

Voltage unbalance

The Commission received first round submissions from Auswind, REGA, Vestas, the NGF and VENCORP and second round submissions from Auswind/REGA, the NGF and Vestas. The issues raised in submissions include:

- Auswind, REGA and Vestas (first round) suggested that the level of unbalance should be expressed as an allowable amount of negative sequence voltage;
- Auswind, REGA, Vestas and the NGF (first round) considered that the clause proposed clause 5.1.7(d) is opened-ended and may lead to unknown future upgrades;
- the NGF (first round) argued that the voltage unbalance requirements in clause S5.1.7(c) are in the system standards and not on generators;
- the NGF (first round and second round) considered that the wording of clause S5.1.7(c) was incorrect in that a generator does not draw current when it is not generating;
- VENCORP (first round) believed that it is possible that the individual generating units could meet the requirements under the automatic access standard but not allowing the NSP to meet their obligations under S5.1a.7; and
- Auswind/REGA NGF and Vestas (second round) considered that NSP should be responsible for balancing the network, and not generators.

Generator auxiliary load

The Commission received a first round submission from VENCORP and a second round submission from Auswind/REGA in relation to the modified requirement for generator auxiliary load in clauses S5.2.5.2. The issues raised in submissions include:

- VENCORP (first round) proposed that generator auxiliary load quality of supply requirements be separated from generator quality of supply requirements; and
- Auswind/REGA (second round) suggested that equivalent international standards should be adopted in relation to voltage fluctuations.

Quality of electricity generated

The Commission received a second round submission from Auswind/REGA in relation to the requirement in clause S5.2.5.2(d) that the negotiated access standard should not prevent the NSP meeting the system standards.

Auswind, REGA and Vestas (first round) considered that NSP should be responsible for meeting the system standards.

Quality of supply and continuous uninterrupted operation

The Commission received a first round submission from VENCorp and second round submissions from AER, NEMMCO and Auswind/REGA in relation to incorporating a new clause S5.2.5.3D (adopted as clause S5.2.5.6) requiring quality of supply obligations to be added in relation to continuous uninterrupted operation. The issues raised in submissions include:

- VENCorp (first round) proposed this new requirement;
- the AER and NEMMCO (second round) noted that quality of supply issues may arise gradually and not necessarily from a disturbance, that reactor power compensation equipment should also remain connected, and whether the requirement should be a minimum or automatic standard; and
- Auswind/REGA (second round) suggested that equivalent international standards should be acceptable.

The Commission's consideration and reasoning

Voltage unbalance

Clause S5.1.7(a) requires NSPs to be responsible for meeting quality of supply limits set out in Table S5.1a.1 of the Rules. NSPs must require entities connected to their network to balance their phase currents so that the overall Table S5.1a.1 limits can be met. Clause S5.2.5.2 introduces automatic, negotiated and minimum standards on generators in regard to the contribution of voltage unbalance they make to the network.

With respect to the relationship of clause S5.1.7(c) to a generator raised by the NGF, the Commission considers that it is in the interests of the operation of the power system that the generator should not contribute to a breach of the voltage unbalance standards imposed on the NSP by clause S5.1.a.7. As the NSP has overall responsibility for maintaining average levels of voltage unbalance across the network, the Commission considers it is appropriate to join the generator to the NSP's responsibility via this clause. Furthermore, with respect to clause S5.1.7(c)(1), the owner of the generating system is the Generator in this instance, not the NSP.

In relation to the NGF's comments on clause S5.1.7(c)(2) and a generating system on no load, the Commission understands that the phrase 'voltage generated' applies to the condition during the period the generating system is synchronised to the network, irrespective of the output level, and the phrase 'current drawn' applies to the condition during the period the generating system is not synchronised but is drawing current from the network, possibly for auxiliary supplies, from a single connection point. The Commission notes that the NEMMCO proposal uses these phrases in a consistent manner. The Commission notes that if the generating system obtained auxiliary supply from a separate connection point unrelated to the generating system connection point then Schedule 5.3 would apply.

The Commission considers that it is in the interests of the operation of the power system that the generator should not contribute to a breach by the NSP of their requirements under the clause S5.1.a.7. The Commission agrees with VENCorp (first round) that the amount of voltage unbalance permitted to generators under the proposed automatic access standard appears too large for some technologies if NSPs

are to meet their obligations under clause S5.1a.7. The Commission notes that NEMMCO's proposed paragraph S5.2.5.2(c) attempts to address the VENCORP problem by requiring that the amount allocated to a generator must not prevent the NSP from meeting its clause S5.1a.7 obligations. However, the Commission considers that the most transparent solution would in fact be to not accept the proposed automatic access standard and adopt the wording of the proposed minimum standard instead. This would make it clear that the NSP must allocate a generator limit that will allow the NSP to meet its clause S5.1a.7 obligations. The generator would be required to comply with those requirements under the proposed standards in clause S5.2.5.2. Accordingly, the Draft Rule was prepared on this basis.

In the second round submissions, Auswind/REGA suggested that the Commission reconsider the position taken in the Draft Rule to ensure that an NSP was not in the position of requiring a generator to be responsible for correcting system voltage unbalance that existed prior to their connection. The Commission understands that synchronous generating plant behave differently to asynchronous generating plant in regard to negative sequence voltages, as follows:

- A synchronous generator presents a small negative sequence impedance to the network (**shunt** connected) such that the generator represents a **sink** to negative sequence currents. Negative sequence currents are absorbed by creating heat in the rotor, and to prevent rotor damage from excessive negative sequence currents the generator installs negative sequence protection, which is calibrated to trip the generating unit once the negative sequence current exceeds a design limit. As a consequence, synchronous generating plant provide a beneficial contribution to the network as they act to reduce negative sequence voltages at the generator's connection point.
- An asynchronous generator presents a small negative sequence impedance to the network (**series** connected) on the basis that the generator represents a **source** of negative sequence currents. Negative sequence currents are created by the imperfect nature of the 'inverters' that transform the direct current into alternating current (whether these 'inverters' are at the commutator of the alternator or stand alone electronic equipment). A set of three pure sinusoidal waves that are exactly 120 angular degrees apart create no negative sequence currents. If an inverter is not able to produce a pure sinusoidal wave form and/or that waveform is not separated by precisely 120 angular degrees, the inverter produces negative sequence currents (that is, it behaves in the same manner as an out of balance load). The negative sequence currents need to flow through the network to sinks, and in doing so produce negative sequence voltages.

The Commission's analysis reveals that the synchronous generating plant and the asynchronous generating plant need to be treated differently by an NSP when applying the negative voltage standards contained in Table S5.1a.1. A result of the asynchronous generating plant creating negative sequence currents, it becomes the responsibility of the applicant to present the NSP with equipment that creates the smallest amount of negative sequence current that is practically possible (in the same way as a customer is required to balance its phase loads, Distribution Network Service Providers are required to balance their single phase loads, and NSPs are

required to minimise the creation of negative sequence currents from the phase order of their circuits).

Accordingly, an NSP will include in the Connection Agreement under clause S5.1.7(a) a requirement to limit negative sequence currents (and hence voltages) on asynchronous generating plant. The extent of the requirement imposed by the NSP cannot be subject to negotiation, because to relax the requirement on asynchronous generating plant means that the additional negative sequence currents must be absorbed by synchronous generating plant, putting at risk power system security should these synchronous generating units be shut down. However, in imposing a negative sequence voltage limit on asynchronous generating plant, the NSP must take into account the capability of the generation technology, and not impose a commercially prohibitive requirement (for example, zero negative sequence voltage).

In this regard, the Commission recognises that the Draft Rule could be applied unfairly to asynchronous generating plant so as to require this equipment to make an onerous contribution with respect to its technology capability, but at the same time recognises that the NSP should have the right to restrict the contribution of voltage unbalance from these type of generators to allow the NSP to meet its network voltage unbalance requirements. To recognise this issue, the Commission has introduced a new requirement on the NSP in clause S5.1.7 to consider the reasonable capabilities of the generator technology when determining the voltage unbalance allocation to that generator.

The Commission considers that this additional provision addresses concerns that have been consistently raised and has made this variation to the Rule to be made.

The Commission considers that the proposed provision in clause S5.1.7 that seeks to provide the voltage unbalance standard for the negotiated access standard under clause S5.2.5.2(d), does not work in the same manner as other negotiated access standards, in that it carries a future requirement rather than a requirement at the time of application. The changes to clause S5.1.7(c) that were made by the Commission in the Draft Rule removed the strict application of an automatic access standard and a minimum access standard, by merging these standards into one flexible requirement. As identified in the Commission's above analysis, the parties are not given the opportunity to negotiate the voltage unbalance limits. Rather, the NSP must determine the limit to be imposed on a particular technology, and if this limit is not reasonable, the applicant has recourse to the Rules dispute resolution process, or it can decide not to connect at that location. On this analysis, the Commission has concluded that clause S5.2.5.2(d) should point to clause S5.1.7(c) and Draft Rule clause S5.1.7(d) should be deleted.

Generator auxiliary load

With respect to the suggestion made by VENCORP to treat generator auxiliary load quality of supply separately, the Commission considers that NEMMCO's proposal addresses this appropriately. This is because the quality of supply allocations made by the NSP would be undertaken in accordance with the plant standards referred to in clauses S5.1.5, S5.1.6 and S5.1.7. Those plant standards are customer based standards. Clause S5.2.5.2 can therefore be used to place specific requirements on the generator with respect to generator auxiliary load quality of supply issues at the same time that generator quality of supply issues are addressed under clause

S5.2.5.2. Where the auxiliary load uses a separate connection point, then the relevant customer load standards contained in Schedule 5.3 would apply.

In relation to Auswind's suggestion that voltage fluctuation requirements for the quality of electricity generated (S5.2.5.2) should be based on the use of International Standards, the Commission notes that this matter has been discussed in section 4.1.8 of this Rule determination. The Commission does not consider it appropriate to adopt this suggestion.

Quality of supply and continuous uninterrupted operation

The Commission agrees with the addition of an extra clause S5.2.5.3D as proposed by VENCORP. This is consistent with the removal of clause S5.2.5.3 and its replacement with three clauses which identify the requirements on generators to ride through power system disturbances more clearly. The Commission understands that there may be some slight increase in costs to generators (more robust auxiliary systems) to meet these requirements. However, it considers that those costs are likely to be offset by the reduction in the risk that generators would be unable to provide continuous uninterrupted operation arising from quality of supply situations. Failure to provide continuous uninterrupted operation may lead to a cascade failure on the power system that involves a material risk of customer loss of supply. As a consequence, the replacement clauses are:

- S5.2.5.3 "Generating unit response to frequency disturbance".
- S5.2.5.4 "Generating system response to voltage disturbances".
- S5.2.5.5 "Generating system response to disturbances following contingency events".
- S5.2.5.6 "Quality of electricity generated and continuous uninterrupted operation".

Second round responses to clauses S5.2.5.3, S5.2.5.4, and S5.2.5.5 are detailed in the relevant sections below.

In respect to NEMMCO and the AER's comments on clause S5.2.5.6 and the reference to 'continuous uninterrupted operation', the need for reactive plant to remain connected during a disturbance and the citation of the connection point, the Commission accepts that these suggestions improve the operation of the clause. Accordingly, the Commission has made these variations to the Rule to be made.

4.1.2 Frequency

NEMMCO's proposal

In regard to frequency, the NEMMCO proposal relates to the following clauses:

- S5.2.5.3A (generating unit response to disturbances);
- S5.2.5.11 (frequency control).

The proposed Rules relating to frequency set an automatic and minimum access standard and add requirements in relation to non-scheduled generation. NEMMCO

argued that the proposed changes were necessary because they needed to cover non-scheduled generation, remove technology specific terminology or add clauses specific to particular technologies, introduce an automatic and minimum access standard to expand the range for connection negotiation and make the clauses more explicit in terms of how the various frequencies are to be applied.

Clause S5.2.5.3 has been replaced by a revised clause S5.2.5.3 which address frequency disturbances separate to voltage disturbances and contingency events. NEMMCO stated that the purpose of this new clause S5.2.5.3 (and the other related clauses S5.2.5.4 and S5.2.5.5), is to set standards to prevent cascading events occurring on the power system.

Views in submissions

Automatic access standard

The issues raised in first round submissions include:

- Auswind, the NGF, REGA, Roaring 40s and Vestas (first round) considered that it is not possible for wind and combustion turbines to meet the automatic standard contained in NEMMCO's proposal;
- Auswind, Hydro Tasmania, the NGF, REGA, Roaring 40s and Vestas (first round) noted that a new requirement on generators to have frequency control ancillary services capability has been imposed when previously this was a commercial decision for the generator; and
- Vestas (second round) suggested that clause S5.2.5.3(b)(5) is modified to include greater flexibility as the stated requirements are on the border of the capability of existing technology.

Negotiated access standard

The Commission received second round submissions from the AER, NEMMCO and ESIPC in relation to the negotiated access standard for generator response to frequency disturbances. The issues raised include:

- the AER and NEMMCO (second round) considered that the frequency rate of change requirements in the clause S5.2.5.3(e)(1) of the Draft Rule should emphasise the expected rates of change of frequency in the particular region;
- the AER and NEMMCO (second round) considered that clause S5.2.5.3(f) of the Draft Rule is redundant because the negotiated access standard cannot be lower than the minimum access standard; and
- ESIPC (second round) considered that the concept of negotiating to a level "as close as practicable to the automatic level" appears appropriate in principle but may be open to interpretation and difficult to administer. ESIPC considers that lower barriers to entry would be achieved if the automatic access standards are clear and achievable.

Minimum access standard

In first and second round submissions, Auswind, the NGF, REGA and Vestas (first round) compared the time required to remain connected when the frequency is

below 47.5 Hz is excessive to international standards, and Vestas consider that 9 seconds is appropriate, rather than the 10 seconds proposed by NEMMCO. Table 4.1.2 discusses other first round issues raised in submissions.

Frequency rates of change

The issues raised in first and second round submissions on this matter include:

- the AER, Auswind, ESIPC, the NGF, REGA and Vestas (first round) noted that the performance of the generators is not specified outside the ranges of $\pm 1 \text{ H} \pm 4 \text{ H}$
- Roaring 40s (first round) considered that the Rules should not specify the frequency ranges or rates of change, rather the Rules should simply reference the frequency operating standards determined by the Reliability Panel;
- (second round) was not aware of any technical basis to justify the addition of a rate of change of frequency requirement in the Rules, but did support referring the levels of the rate of change parameters to the Reliability Panel;
- Vestas (second round) considered that different standards should apply for island conditions, that it should be clarified who determines the frequency standards for each region and that the 'transient frequency limit' and 'transient frequency time' values of 47.5 Hz and 9 seconds, respectively, should not be exceeded by the Reliability Panel; and
- other first round issues are outlined in Table 4.1.2.

Frequency control

The issues raised on this matter in second round submissions include:

- Auswind/REGA and Vestas (second round) considered that requirements on the active power controller should distinguish between the short term and longer term response to a change in frequency;
- Auswind/REGA (second round) considered that the frequency control requirements for the automatic access standards in clause S5.2.11(b)(3) could not be met by most renewable energy generators;
- NEMMCO (second round) agreed that the words "subject to the system frequency recovering gradually" in clause S5.2.5.11(b)(2)(ii)(C) are unclear and should be deleted; and
- Vestas (second round) considered that the requirement in clause S5.2.5.11 of the Draft Rule that frequency control system should be "adequately damped" would be difficult to comply with because of the difficulty in achieving suitable test conditions.

The Commission's consideration and reasoning

In generally accepting NEMMCO's proposal as stated in section 4.0 of this Rule Determination, the Commission has varied the clause numbering, such that the

NEMMCO proposed clause S5.2.5.3A will become clause S5.2.5.3 in the Rule to be made, as further explained in section 4.7 of this Rule Determination.

Automatic standard

First round

Consistent with the technical standards framework as explained in Chapter 2 of this Rule determination, the Commission considers that the automatic access standard is an expression of the desired performance from a generator connecting to the power system that will ensure that the generator is not denied access to the network and allow NEMMCO to manage power system security. It is realistic to note that not all technologies can be assumed to be able to meet the automatic standards. This is why room to negotiate was introduced. Generators (such as wind and combustion turbines) with a lower level of performance may avail themselves of a negotiated access standard, provided the performance does not create problems with power system security.

Second round

In respect to Vestas's suggestions that clause S5.2.5.3(b) should have greater flexibility, the Commission notes that the suggestion has not provided an alternate clause to replace the proposed clause nor has there been a clear justification as to why this change should be made. Accordingly, the Commission does not consider it appropriate to adopt this suggestion at this stage of making the Rule.

The Commission understands that NEMMCO's concern with respect to proposed clause S5.2.5.11(b)(2)(iii) is to ensure that there is an ability to procure sufficient ancillary services to maintain the security of the power system when needed. This requirement only applies to the automatic access standard which is an expression of the desirable performance of a generator. If a generator does not wish to provide this capability it is open to them to negotiate a performance standard rather than agree to the automatic access standard.

Negotiated standard

The Commission notes that NEMMCO's proposed clause S5.2.5.3A(f) provides limits on the total amount of generation that can be accepted below the automatic standard. Paragraph (f)(2) allows performance at a negotiated standard only where the system frequency would be unlikely to fall below a certain range as the result of over-frequency tripping. The Commission notes however that a generator would only trip off for over-frequency if it couldn't meet the minimum access standard. Thus, the clause appears to permit a negotiated standard at a level below the minimum standard. To remain consistent with the principles noted above and embodied in proposed clause 5.3.4A(a)(1), the Commission has amended the proposed Rule to make it clear that the negotiated standard cannot be negotiated to a level below the minimum standard.

More broadly, the Commission notes that NEMMCO has included several clauses ("push-up" clauses, such as in S5.2.5.4(c)) in the Rule change proposal that provide restrictions on the ability of parties seeking access to negotiate access at performance levels below the automatic standard. The push-up technique requires the negotiated access standard to be 'as close as practicable to' the automatic access standard. Since

the push-up technique raises the effective minimum access standard to the level of the automatic access standard, it introduces the issue of the usefulness of a minimum access standard. The Commission notes that this technique has been applied where under some circumstances (but not all) the full negotiating range would present unacceptable risk to power system security. The Commission notes that such a technique does not compromise the access standard framework, but alerts parties to the need to recognise that the acceptable negotiation must take place across a more restrictive range.

In respect to clause S5.2.5.3(d)(1), the Commission notes the concern that negotiating to a level as close as practicable to the automatic access standard will introduce a problem with interpretation and be difficult to administer. The suggested alternative, which proposes a lowering of the automatic standard, does not carry sufficient information to enable the Commission to assess its merits at this stage of the Rule making process. Accordingly, the Commission does not consider it appropriate to adopt this suggestion at this stage.

In respect to clause S5.2.5.3(c)(1), the Commission notes the suggested additional words to be applied to this paragraph in regard to negotiating continuous uninterrupted operation for a disturbance in which the frequency varies. The Commission notes that this variation is a requirement, in addition to the requirements to be 'as close as practicable to' and 'to protect the plant from damage' that need to be considered by NEMMCO and the NSP. Whilst there is merit in making transparent a principle that NEMMCO would apply in its capacity under paragraph (g) of the same clause, the Commission is of the view that this additional requirement should be tested through consultation before it is accepted and not at this stage.

In respect to draft clauses S5.2.5.3(e)(2) and (f), the Commission notes the suggestion that paragraph (f) is not necessary. The Commission notes that paragraph (f) refers to a possible inconsistency between paragraph (e)(2) and the combined paragraphs (c) and (d). The Commission agrees that in practice there will be no inconsistency between these clauses and accordingly has removed paragraph (f) from the Rule to be made.

Minimum standard

The argument raised by stakeholders is that the minimum access standard should be lowered to allow more room for negotiation. As discussed in Chapter 2 of this Rule determination, the minimum standards are intended to be set at the point below which there is an unacceptable risk to power system security from connection. In the present case, if a significant number of generators trip during a major disturbance on the power system (because they cannot continue to operate during the frequency range or rate of change resulting from the disturbance), then the effect of the original disturbance on the power system can be substantially worsened, potentially leading to cascade failure and major load shedding.

Stakeholders submitted that, in the alternative, individual connecting plant should be allowed to negotiate below the minimum access standard on a case by case basis. This would lower the barrier to entry and allow more efficient customer outcomes if the risk to system security could be managed acceptably. Connections could be established one by one until system analysis indicated that the security risks

associated with the connection of the next generator exceeded the relevant thresholds. The issue was raised in recognition of the fact that, while the minimum standard is set for the NEM as a whole, local performance requirements may vary. As discussed in Chapter 2, this variability is taken into account by defining an appropriate minimum access standard that provides a range for negotiation. Negotiation below the minimum standard is not permitted and this is reinforced by proposed clause 5.3.4A(b)(1). The issue therefore remains whether the minimum access standard is appropriate. Subject to the matter below, from a system security point of view, the Commission finds no reason at this time not to accept the NEMMCO proposal.

In respect to clause S5.2.5.3(a) and the 'transient frequency time' which applies to the minimum access standard, NEMMCO proposed a setting of 10 seconds. As noted above, this could present difficulties to some technologies for the relevant frequency range. The range itself is a matter determined by the Reliability Panel. Some of these technologies could meet a slightly reduced time (as suggested by Vestas). After discussions with NEMMCO, the Commission is satisfied that 9 seconds would be acceptable and has adopted this change in the Rule to be made.

In respect to clause S5.2.5.3(c)(5), the Commission agrees with NEMMCO and the AER that if a generating system has frequency protection that is set at a level agreed by NEMMCO then this setting can override the upper bound of the normal operating frequency range. Accordingly, the Commission has made this variation.

Frequency rates of change

The current standards do not indicate levels for the rate of change of frequency. By implication generators must therefore provide continuous uninterrupted operation for all rates of change of frequency. It is known that some technologies cannot do so. Rate of change standards are important because having a power system successfully recover after a severe disturbance (with high rate of change of frequency) requires the generators to remain connected to the system. Therefore setting a range for the rate of change of frequencies that can reasonably be met by most or all generation technologies is a step in the right direction. The proposed automatic access standard (-4Hz to + 4 Hz) sets a rate of change of frequency standard that would ensure generators remain connected to the power system in all regions for most disturbances. The minimum access standard value (-1Hz to + 1 Hz) will ensure that generators remain connected to the power system for most events on the mainland of Australia when the system was not islanded.

A number of stakeholders submitted that some wind generators (and potentially other technologies) cannot remain in continuous uninterrupted operation for the high rates of change of frequency proposed in the automatic access standard. Where generators that cannot meet high rate of change of frequency are only a small part of the generating system, their loss should not be a threat to power system security. However, in large disturbances the combined loss of a significant additional amount of small generation could be very serious. As the penetration of wind generation is increasing this requirement is quite important to future power system performance. This is particularly likely to be the case in Tasmania and South Australia if either were to island from the rest of the system. The Commission notes however that the concerns are raised in the context of the automatic standard and that the minimum provides an appropriate range for negotiation.

The submissions also noted that both the automatic and minimum access standards are drafted in the form that “each generating unit must be capable of continuous uninterrupted operation for the frequency ranges determined by the Panel provided that the system rate of change of frequency is less than 4 Hz per second (or 1 Hz per second for the minimum performance standard). The implication is that, outside those rates of change of frequency, a generator is *not* required to be capable of continuous uninterrupted operation. This leaves the standard for generator performance undefined outside the rate of change of frequency range but within the frequency bands within which the Panel requires them to be capable of operating. In such circumstances, generators may decide to trip off the system to protect themselves.

This represents a reduction in the fault ride through standard required of generators. NEMMCO has explained that this amendment was proposed on the basis that the current fault ride through standard of “continuous uninterrupted operation for all frequency ranges” may have been very difficult to meet in practice. Subject to the comments below, the Commission’s view is that the rate of change ranges proposed are appropriate to cater for the relevant range of potential events.

The Commission notes the AER concern that rates of change of frequency which leave performance unspecified outside a range, may make compliance monitoring and enforcement more difficult. The Commission considers that it is important to recognise the limitations of different technologies in providing for the effective management of power system security and that this should take precedence over compliance and enforcement issues.

The Commission notes both the AER and NEMMCO’s submissions that enforcing the instantaneous rates of change proposed may potentially cause difficulties in monitoring compliance and enforcing breaches of the technical standards. The Commission agrees with NEMMCO’s submission for a change of greater than 4 Hz per second for over 0.25 seconds for the automatic standard and a change of greater than 1 Hz per second for over 1 second for the minimum standard. The Commission has included these changes in the Rule to be made.

Finally, the Commission notes that the specification of the 4 Hz per second in clause S5.2.5.3A(b) and the 1 Hz per second in clause S5.2.5.3A(d) are meant to refer to a band of acceptable rate of change of frequencies between increasing and decreasing rates up to the values specified above. The Rule to be made has been made to make it clear that the rates of change of frequency are bands between +4 Hz per second down to -4 Hz per second and +1 Hz per second to -1 Hz per second in clauses S5.2.5.3A(b) and S5.2.5.3A(d), respectively.

Review by Reliability Panel

Under clause 8.8.1 of the Rules, the Reliability Panel is responsible for determining the power system security and reliability standards. Those standards are defined to include “standards for the frequency of the power system in operation”. This definition is arguably wide enough to include frequency rates of change. However, historically in carrying out its responsibility to set the power system security and reliability standards, the Panel has not yet set these rates of change. The Commission has accepted NEMMCO’s submission to establish rates of change of frequency in the Rules. The Commission proceeded on this basis in the draft Rule determination.

However, it requested submissions on alternatives, for example, requiring that the proposed frequency rates of change be referred to the Panel for review within 6 months of the commencement of the Rule.

Several second round submissions addressed this request. In respect to the frequency rates of change specified in the automatic and minimum standards in clause S5.2.5.3, the AER supported a review of the proposed rates of change of frequency by the Reliability Panel. The ESIPC consider that the Commission's decision did not contain any justification as to the adequacy of the actual rate of change proposed.

The Commission notes that the values for the rates of change in clauses S5.2.5.3(b) and (c) were proposed by NEMMCO following a consultation with the Technical Standards Reference Group (TSRG) and has adopted the proposed values in the Rule to be made. However, the Commission also notes the concerns of the AER and ESIPC and has included a provision to allow these rates of change values to be amended following a determination of the Reliability Panel.

In respect to clause S5.2.5.3(a) and the suggestion of Vestas to apply different requirements to island conditions, the Commission has not adopted this suggestion because the ability for a generating unit or generating system to be capable of continuous uninterrupted operation is most important during extreme events such as islanding. For this reason, the Commission considers further testing is required before any specific requirements are to apply to island conditions.

In respect to clause S5.2.5.3(a) and 'the frequency operating standards that apply to a region', the Commission notes that the Reliability Panel approves the frequency operating standards, which includes frequency standards for each region, as part of its role in approving the power system security and reliability standards as specified in those terms in Chapter 10 of the Rules.

In respect to clause S5.2.5.3(a) and 'such other values determined by the Reliability Panel' for transient frequency limit and transient frequency time, the Commission notes that Vestas prefers the value of 47.5Hz to be a provision of the Rules without opportunity for review by the Reliability Panel. The Commission does not agree with this suggestion since all matters of power system frequency fall within the 'power system security and reliability standards' that are approved by the Reliability Panel.

Frequency Control

The Commission notes the comments by Auswind/REGA and Vestas in relation to the automatic access standard. However, particular generation technology that cannot meet the automatic access standard can still obtain access through a negotiated access standard.

The Commission agrees that for an automatic access standard, the phrase 'subject to the frequency recovering gradually' in S5.2.5.11 does not contribute to the desired outcome and consequently has been removed.

In respect to clause S5.2.5.11(g) and the suggestion by Vestas regarding demonstrating compliance that a control system is 'adequately damped', the Commission notes that the NEMMCO proposal includes a definition of this term. The definition is in the form of a test objective and test criteria. The Commission would expect that a demonstration of adequate damping would need to be

consistent with this new definition. Accordingly, the Commission does not consider it appropriate to adopt this suggestion at this stage of the consultation process.

Other issues (first round)

Table 4.1.2.

Stakeholder	Clause	Issue	AEMC considerations
Roaring40s	S5.2.5.3A(f)(3)	"Adverse impact" needs to be clearly defined.	NSP will need to indicate the impact during negotiations. No change.
Auswind, NGF, Roaring 40s, Vestas	S5.2.5.3A(f)(2)	In a small enough island, it would be inevitable for any generator to cause the frequency to fall below the lower bound of the operational frequency tolerance band as a result of tripping on over-frequency.	The islanding issue is correctly stated. This clause is looking at protecting the power system from too much generation tripping at less than the full range in the frequency standards. However, this should only apply to islands of reasonable size. The Commission will direct the Reliability Panel to address this matter in its upcoming frequency standards review.
Auswind, NGF, REGA and Vestas	S5.2.5.11(b)(2)	Clause conflicts with S5.2.5.8	No anomaly. S5.2.5.8 to be read subject to the requirements of S5.2.5.11(b)(2)
Auswind, NGF, REGA and Vestas	S5.2.5.11(c)	The paragraphs (c) and (d) referred to do not exist.	The submission was based on a copy of the Rules with an old clause numbering. This has now been corrected.
NGF	S5.2.5.11(b)(2)(ii)(C)	Definition of "frequency recovering gradually" would be helpful	The words form part of the automatic standard and are acceptable.
Auswind, NGF, REGA	S5.2.5.11(b)(3)	Requires generators to increase output when frequency falls. What	Clause S5.2.5.11(b)(3) addresses situations where performing at

Stakeholder	Clause	Issue	AEMC considerations
and Vestas		about when generating at full output?	or close to full output
Auswind, NGF, REGA, Vestas and TrustPower	S5.2.5.11(c)	Should be interpreted “in response to the system frequency” and not as a coincidental increase or fall in the wind.	Changed clause to add “For each generating system under relatively stable input energy, active power transfer to the power system must not...”

4.1.3 Reactive power

NEMMCO proposal

In regard to reactive power, the NEMMCO proposal relates to the following clause:

- S5.2.5.1 (reactive power capability).

Clause S5.2.5.1 of the current Rules specifies certain matters in regard to the reactive power capability of generating plant. NEMMCO argued that changes to the existing provisions were necessary to remove technology specific wording, extend the provisions to apply to any technology, and specify greater details about what can be negotiated.

Views in submissions

The issues raised in first and second round submissions include:

- Auswind, NGF, REGA, Roaring 40s and Vestas (first round) were concerned that the automatic access standard required the reactive power capability over the full range of connection point voltages, rather than just at the normal voltage
- Auswind, ESIPC, NGF, REGA, and Vestas (first round) suggested that the point at which the reactive power requirement must be met (connection point or machine terminals) should also be subject to negotiation;
- The AER (first round) suggested that clause S5.2.5.1(d) be redrafted to allow generators to select the lowest cost option to rectify a reactive power support deficiency;
- Auswind/REGA (second round) proposed that clause S5.1a.4 should refer to “nominal voltage”, instead of “normal voltage”, otherwise the standard is unlikely to be met when the normal voltage is 10% above the nominal voltage;
- Auswind/REGA (second round) proposed that wind farms would need to be de-rated as clause S5.2.5.1(a)(1) refers to “active power”;

- Auswind/REGA (second round) proposed that clause S5.2.5.1(a)(2) should refer to the nominal“;
- Vestas (second round) considered that the requirements of the automatic access standard are beyond the capability of existing industry generators;
- Vestas (second round) was concerned that the negotiated access standard requirement in clause S5.2.5.1(c)(1) to meet “all relevant system standards” appears to shift some responsibility for the operation of the system to the generator; and
- Vestas (second round) was also concerned that the generator will have ongoing costs and compensation obligations after the negotiation is finalised.

The Commission’s consideration and reasoning

Reactive power is different to active power and is predominately consumed in the creation of magnetic fields in motors and transformers. However, the currents associated with active and reactive power act to increase the voltage drop along power lines. The voltage drop increases exponentially due to the effect of the line impedance on the combined currents. Accordingly, the control of voltage along the power lines becomes an essential component of power system security. Control can be in the form of local injection of reactive power such that the reactive power is not required to be delivered by the power lines. At the same time, remote injection of reactive power is helpful to lift the over power system voltage profile. Accordingly, the power system requires sources of reactive power to assist in voltage control.

With respect to the automatic standard, the Commission considers that the standard is an expression of the desired performance from a generator connecting to the power system which will allow NEMMCO to manage the voltage component of power system security. A lower level of performance is available through the negotiated access arrangements.

The Commission notes that connection applicants would in fact be able to negotiate the point at which the requirement is met. With regard to clause S5.2.5.1(d) the Commission agrees that a generator should be able to select the lowest cost option or options to address a reactive power deficiency and has amended the clause to provide the generator with choice in this regard.

In respect to clause S5.2.5.1(a) and the concern of Auswind/REGA with operating at +10% above normal voltage, the Commission notes that this matter is fully addressed in section 4.1.4 “Voltage” of the Rule determination.

In respect to clause S5.2.5.1(a(1)) and the difference in meaning between the terms ‘real’ and ‘active’, the Commission understands that the definition of ‘active power’ in Chapter 10 of the Rules has the same meaning as ‘real power’ to which Auswind/REGA refer.

In respect to clause S5.2.5.1(a)(2) and the concern by Vestas that it cannot be agreed to at any voltage level, the Commission notes that this matter is fully addressed in section 4.1.4 “Voltage” of the Rule determination.

In respect to clause S5.2.5.1(a)(2) and the requirement to continuously supply and absorb reactive power, the Commission notes that this is an automatic access standard and a person can negotiate a lower standard.

In respect to clause S5.2.5.1(c)(1) and the requirement to meet all relevant system standards, the Commission notes that the NEMMCO proposal has not altered this provision of the Rule, which is currently a requirement on generators. The Commission does not consider it appropriate to amend this clause at this stage of the process.

The Commission notes the concern of Vestas that the compensation requirement may be potentially disadvantageous to the generator. The Commission considers that this concern can only arise if the generating technology cannot meet the automatic access standard, and where the actual conditions at the connection point selected by the generator make the connection of that generator difficult for the NSP to meet its system standards. As the overriding principle is for the NSP to meet “all relevant system standards”, the generator under a negotiated access standard may decide that it is not attractive to locate its generating plant at the desired connection point. Alternatively, the generator may decide that other factors (to which only it is aware) may warrant the connection application to proceed, in which case the option under paragraph (d) would become attractive. Accordingly, the Commission considers that the paragraph works as was intended and does not accept the suggestion.

4.1.4 Voltage

NEMMCO proposal

In regard to voltage, the NEMMCO proposal relates to the following clauses:

- 4.9.2 (dispatch instructions to scheduled generators);
- S5.2.5.3B (generating unit response to voltage disturbance).

Clause 4.9.2 concerns dispatch-related instructions by NEMMCO to scheduled generators. Scheduled generators are normally 30MW or greater in size¹⁶. NEMMCO proposes to include the power to instruct non-scheduled generators of greater than 30MW in relation to reactive power, allow for generating systems and refer to agreed performance standards.

Schedule S5.2.5.3B concerns generating unit response to voltage disturbances. This clause extends the requirements under previous clause S5.2.5.3 to non-scheduled generation, refers to generating systems rather than units and introduces automatic and minimum access standards.

Views in submissions

The issues raised in first and second round submissions include:

- REGA (first round) considered that schedule S5.2.5.3B should be reviewed, by the Reliability Panel, and only those changes required for wind incorporated at this time

¹⁶ Rules clause 2.2.2(a).

- Auswind and Vestas (first round) considered that distribution system operating obligations will require generators to trip for voltage well within the ranges set out in clause S5.2.5.3B(e)(3);
- the AER (second round) suggested that clause S5.2.5.4(b) be augmented to include 'as a result of any power system disturbance during which voltage at the connection point varies within';
- Auswind/REGA, Pacific Hydro and Vestas (second round) did not agree with the use of normal voltage in clause S5.1a.4 as the use of normal voltage implies that power system equipment may be required to be continuously rated at 120%;
- Roaring 40s (second round) also considered that the over voltage requirements in clause S5.1a.4 should be reviewed with a view to tightening the system standard and reducing the cost of integrating new generation into the NEM;
- Roaring 40s (second round) generally supported the clarity and flexibility incorporated in clause S5.2.5.4 of the Draft Rule but do suggest that the reference to 100 MW in clause S5.2.5.4(c)(2) be replaced by the size of currently the largest unit in the region;
- Citipower/Powercor (second round) supported the draft determination and indicated that the allowable variation in Victoria for 66 kV and HV in rural areas is $\pm 10\%$, which is consistent with NEMMCO's proposal;
- Vestas (second round) noted that in respect to clause 4.9.2(a)(2), a wind generator can be required to reduce its output or be scheduled downwards but not upwards;
- Vestas (second round) considered that the automatic access standard for voltage disturbances in clause S5.2.5.4(a)(1) of the Draft Rule is too arduous and equipment requirements should be based on a realistic study;
- Vestas (second round) also considered that the minimum access requirement for voltage disturbances of a voltage to frequency ratio of 115% for more than 2 minutes is on the border of the capability of existing technology; and
- other first round issues in relation to clause 4.9.2 and other aspects of clause S5.2.5.3B are outlined in Table 4.1.4.

The Commission's consideration and reasoning

The Commission notes REGA's view that only those changes to clause S5.2.5.3B that are relevant to wind generation should be included in the current Rule change proposal. The Commission considers the changes to lie within the scope of the current proposal as they are presented in NEMMCO's Rule change proposal. The Commission is required to assess NEMMCO's proposal in accordance with the requirements of the NEL. The Commission also notes that the statutory timeframes that apply to that assessment make seeking the advice of the Reliability Panel as part of that process impracticable. This leaves open the possibility that the Rule could require the Panel to review the effectiveness of the proposal at a later time. The

Commission sought the views of stakeholders in this regard, noting that the review would need to be justified on its merits.

The Commission notes that a number of generators submitted that the changes require performance beyond that required in a distribution system. For example, the proposed minimum access standard requires continuous uninterrupted operation through voltages in the range of 90% to 110% of normal voltage. The Commission understands that the typical range for distribution systems is narrower, in the order of 94% to 106%. The Commission also understands that the generators who made submissions in respect of this issue consider that, as voltage fluctuations are normally considered to be a local quality of supply issue, only distribution level performance should be required.

Requiring generator plant to perform to the proposed higher standard may have generator cost implications although this was not quantified in submissions. On the other hand, increased performance would reduce the risk of cascading failure due to the loss of generation following a transmission contingency event that causes voltages to reduce or increase suddenly. This is important from a power system security perspective. It is also important to note that the requirements as to the wider range are only for the period associated with riding through the disturbances. On balance, the Commission considers that power system security considerations should prevail and that the changes proposed by NEMMCO are appropriate. However, the Commission invited further submissions from stakeholders as to the likely cost impacts.

In respect to clause 4.9.2(a)(2) and the requirement for a level or schedule of power, the Commission notes that the clause refers only to scheduled generating units. The Commission understands that a wind turbine generator is not registered in the category, but rather as an intermittent non-scheduled generating unit. Accordingly, the Commission does not accept this suggestion.

In respect to clauses S5.1a.4 and S5.2.5.4 and all references to normal voltage and nominal voltage and the suggestion that normal voltage be changed to nominal voltage, the Commission notes the extent of the concerns regarding this matter. However, the Commission does not accept these concerns for the following reasons.

- Clause 5.1a.4 clearly specifies the application of ‘nominal voltage’ and ‘normal voltage’.
- ‘Normal voltage’ is always to be regarded as ‘nominal voltage’ except where the NSP has requested a different voltage level to be applied, and has written approval from NEMMCO for the application of that different voltage level.
- A Connection Applicant can rely on the fact that normal voltage is to be designated as the reference voltage from the time that the NSP provides the Connection Applicant with written details of the technical requirements as required by the proposed new clause 5.3.3(b1). This information is to be made available to the Connection Applicant within 20 business days after the receipt of the connection enquiry, which appears to be reasonable when considering the purchasing requirements of the Connection Applicant.

Pacific Hydro appears to have experienced situations where an NSP had not correctly applied the principle specified in clause 5.1a.4. One method of removing any doubt about the application of this principle is to add a requirement to clause 5.3.3(b1) to ensure that the NSP includes the applicable voltage level in its written response to the connection enquiry. This modification would only increase the transparency of the existing obligations on the NSP rather than impose an additional obligation on the NSP.

The Commission notes the concerns raised in submissions that the term 'normal' is being used in different ways by different parties, and the confusion that the terminology is bringing to the access seeking process. However, any change needs to be publicly tested prior to it being made.

In respect to clause S5.1a.4 and the suggestion by Roaring 40s to review the system standard for over voltage, the Commission considers that further review of these standards at this stage of the consultation would not be appropriate. Such a review of the over-voltage standards could be undertaken as part of the broader technical standards review.

In regard to a situation where the NSP requires that a particular connection point have its 'normal' [reference] voltage level declared to be 10% above the nominal voltage under the above process, in this situation the Connection Applicant would be required to purchase suitable equipment that can withstand a further 10% under normal operating conditions, and up to a further 30% under contingency conditions.

If this technical requirement is too onerous, the Rules allow the Connection Applicant to either challenge the NSP requirement under the Rules dispute resolution process, in order to show that the conditions at that connection point are less onerous, or decline to make a connection at that location. Accordingly, the Commission has not amended the Rule.

In respect to clause S5.2.5.4(a)(1) and the concern with the over voltage duration, the Commission notes that the suggestion has not provided an alternate clause and the considers the current clause appropriate.

In respect to clauses S5.2.5.4(a) and (b) and the suggestions to qualify the application of continuous uninterrupted operation to voltage, the Commission notes that the suggestions were not supported by an explanation of the merit for the change. The Commission also notes that the definition of continuous uninterrupted operation (including the variations suggested in the second round) means that a generating system or unit is in-service prior to a disturbance, and continues to operate (within its performance standards) during that disturbance and after the disturbance has subsided.

The Commission considers that the purpose of paragraphs (a) and (b) is to specify the performance standard that is to apply to voltage disturbances for the automatic and minimum access standards. On this basis, the Commission considers that there is no requirement to further qualify the term continuous uninterrupted operation as suggested, but rather to ensure it points to the condition that is to be specified, which in this case is voltage. The Commission has made minor changes to reflect this position to the Rule to be made.

In respect to clause S5.2.5.4(c)(2) and the suggestion to increase the 100 MW threshold, the Commission notes that the clause conditionally provides for the threshold to increase on the basis that NEMMCO and the NSP both consider the increase to be reasonable in the circumstances.

Other issues (first round)

Table 4.1.4.

Stakeholder	Clause	Issue	AEMC considerations
Auswind, REGA, Vestas	4.9.2(b) and (b1)	Distribution connected wind farms often have a requirement imposed by the NSP in the connection agreement, to remain within a designated voltage range, to avoid affecting customer voltages. Clause (b1) is only correct if NEMMCO accept the connection agreement voltage limits.	The clause recognises connection agreement requirements to restrict a NEMMCO instruction to within both the performance standard and the connection agreement.
Roaring 40s	S5.2.5.3B	"Normal voltage" should be more clearly defined and refer to one voltage set point and not a range of voltages. The requirement of S5.1a.4 far exceeds the capability of most wind plant	Normal voltage is defined by the NSP and NEMMCO as part of the access negotiations. Normal voltage is defined at a single voltage point. S5.1a.4 applies to the automatic access standard. Access can still be negotiated for performance below this requirement.
Auswind, NGF, REGA, and Vestas	S5.2.5.3B	Lower voltages are already significantly lower than IEC60034	The voltage ranges required in this clause are realistic for Australian conditions
NGF	S5.2.5.3B(a)	Suggest a curve be supplied for this clause	A curve is applied for over voltages in S5.1a.4. This clause is appropriate as written.
Auswind, NGF, REGA and Vestas	S5.2.5.3B(a)(4)	70-90% of normal voltage is not realistic except for transient conditions	This is a requirement of the automatic access standard. Access can still be negotiated for performance below this

Stakeholder	Clause	Issue	AEMC considerations
			requirement.
Auswind, NGF, REGA and Vestas	S5.2.5.3B(b)	The minimum standard requires +/-10% on normal voltage where the automatic standard requires only 100% of normal. In addition the minimum standard conflicts with S5.1a.4 which only requires 110% of normal voltage for 10 minutes	The relevant part of the automatic standard (S5.2.5.3B(a)(1)) refers to Table S5.1a.4 which requires voltage of at least 110% continuously. The curve in the Table S5.1a.4 graph has been extended to the end of the graph to make this clear. Clause S5.2.5.3B(a)(2) has been changed to "90% to 110%" to remove any ambiguity.
Auswind, NGF, REGA and Vestas	S5.2.5.3B(b)(1)	This is a higher obligation than that of the automatic access standard (S5.1a.4)	Changing clause S5.2.5.3B(a)(2) to 110% as suggested above means the minimum access standard in S5.2.5.3B(b)(1) will be the same as the automatic access standard but for a more limited voltage to frequency range.
Auswind, REGA, Roaring 40s Vestas	S5.2.5.3B(c)(2)	The 100MW limitation appears arbitrary. The limit should be assessed on a case by case basis. The basis of negotiation should not be prescriptive but simply required to be on a good faith basis.	The issue here is that the plant trip must not cause a power system security issue or lead to severe disruption or cascading failure. Experience indicates that 100 MW is appropriate. But the Commission agrees that it should be allowed to be negotiated, if a different amount of generation loss can be accepted without causing a power system security issue.
Auswind, NGF, REGA	S5.2.5.3B(d)	"Abnormal" is not defined and could mean anything.	This clause needs to be expressed as it is as there are likely to be different

Stakeholder	Clause	Issue	AEMC considerations
and Vestas			issues needing to be addressed at different locations in the system. The Commission notes that recourse may be had to the Chapter 8 dispute resolution process in the event that differences in interpretation arise.
NEMMCO	s. 4.9.2(b)(3)	Remove the words “at its terminals or” to be consistent with objective of referring to connection points rather than generator terminals	Agreed. Rule to be made amended accordingly

4.1.5 Disturbances following contingency events

NEMMCO proposal

In regard to disturbances following contingency events, the NEMMCO proposal relates to the following clauses:

- S5.2.5.3C (generating unit response to disturbances following contingency events).

This proposed clause S5.2.5.3C replaces current clause S5.2.5.3 and provides for more specific treatment of generating unit response to disturbances following contingency events. NEMMCO argued the changes were necessary because they explicitly state what events are covered, introduce automatic and minimum access standards and extends the requirement to distribution systems.

Views in submissions

The issues raised in first and second round submissions include:

- Auswind, NGF, Pacific Hydro, REGA and Roaring 40s (first round) were concerned that three phase faults and faults following recloser events are included in the requirements
- Auswind, NGF, REGA, Roaring 40s and Vestas (first round) were concerned that the requirements on automatic reclose equipment are not defined, in particular whether single pole or three pole reclosure is included and what number of reclose events should be catered for;
- Auswind, NGF and Vestas (first round) were concerned that the automatic access standard is excessive, requiring a generator to assess matters beyond their knowledge, making more difficult to connect to a distribution network compared to a transmission network;

- the NGF (first round) submitted that the requirements of the automatic access standard in clause S5.2.5.3C(b)(1)(iv) of NEMMCO's proposed Rule following faults on distribution networks are too arduous for transformer ended lines where the fault clearance time may be of the order of seconds;
- Auswind, REGA and Vestas (first round) submitted that the requirements of the automatic access standard in clause S5.2.5.3C(b)(2)(ii) of NEMMCO's proposed Rule requiring a generating unit to supply at 95% of the active power existing just prior to the fault within 100ms of the fault being cleared is too arduous for distribution connected wind farms, and Vestas consider that compliance with this clause may depend on wind conditions;
- Auswind, REGA and Vestas (first round) submitted that it is common for winds farms not to control the system voltage and the minimum access standard should reflect this;
- the AER and NEMMCO (second round) suggested an additional clause requiring the access standard to fully document all fault locations and types of fault and conditions for which the generating system will not be capable of remaining in continuous uninterrupted operation;
- Auswind/REGA (second round) considered the requirements on riding through faults in clause S5.2.5.5(b)(1)(iv) are more onerous for distribution connected wind generators while their impact on security is smaller;
- Auswind/REGA and Vestas (second round) considered clause S5.2.5.5(b)(2)(i) is incorrectly worded and requires a generator to put out 400% of its output in the event of a three-phase fault at or close to the point of connection;
- Auswind/REGA (second round) suggested that distribution system voltages in excess of +6% are generally unacceptable due to the impact on customers, making the control philosophy different to that for distribution network;
- Auswind/REGA (second round) suggested that NEMMCO be required to take into account the requirements of the DNSP when considering a negotiated access standard for a distribution network connected generator;
- Roaring 40s (second round) considered that clause S5.2.5.5(c)(1)(ii)(A) of the Draft Rules creates the provision for generation not in excess of 100 MW being disconnected on a fault;
- Vestas (second round) considered that clauses S5.2.5.5(b)(1)(iii) and (iv) of the Draft Rules should be amended to provide a 175ms continuous uninterrupted operation requirement for all faults except credible contingencies and three phase faults in a transmission system cleared by the relevant primary protection systems;
- Vestas (second round) considered that the automatic standard for riding through disturbance in clause S5.2.5.5(b)(2)(ii) of the Draft Rules is not applicable to wind generators as they are not able to actively recover the voltage on the grid;

- Vestas (second round) considered that the minimum access standard for riding through disturbance in clause S5.2.5.5(c)(1)(ii)(A) and (iii)(A) of the Draft Rules should be amended to delete (A) as the critical element is the impact upon power quality not the level of output;
- other issues are outlined in Table 4.1.5

The Commission's consideration and reasoning

Clause S5.2.5.3C(a) defines the types of faults in respect of which the rest of clause S5.2.5.3C imposes requirements on generators. Those requirements are to ensure sufficient generators remain connected to the power system after such faults in order to avoid major disruptions or cascading failure of the power system which would lead to substantial load loss for reasonably foreseeable events.

The Commission understands that the underlying issue raised in submissions is that the proposed clause imposes a requirement to ride through faults that, under Chapter 4 of the Rules, would not be considered credible contingency events. Briefly, "credible contingency events" are the kinds of events that NEMMCO considers to be reasonably foreseeable. The question is whether plant should be required to be designed to ride through the additional events.

Other provisions of Chapter 5 of the Rules require NSPs to avoid widespread disruption and cascading failure for events that are defined in Chapter 4 as non-credible. Events provided for (including three phase faults and tripping events followed by recloses) do occur and the power system should be able to ride through them acceptably to avoid cascading failure of the power system. The Commission understands that a three phase fault is more likely to occur in distribution systems if the distribution lines are not protected by an overhead earth-wire. Tripping events followed by recloses are a relatively common occurrence on both transmission and distribution systems.

The Commission accepts that meeting the requirements of the proposed clause S5.2.5.3C is likely to impose additional costs on generators. However, the Commission considers that the costs associated with a power system security failure as the result of generators tripping off as the result of disturbances are likely to be larger.

With respect to the concerns regarding automatic reclosers, the Commission understands that the requirements of automatic reclose equipment vary throughout the power system. The Commission considers that, under the clause, it will be the responsibility of the NSP to provide information on the automatic reclose equipment requirements as part of the access process.

The Commission notes the NGF's submission that the automatic access standard makes the connection to a distribution system more difficult than to the transmission system and is too great for transformer ended lines and points remote from the main system. However, the Commission notes that this comment concerns the automatic access standard which outlines desirable performance. It is open to generators to negotiate another standard.

The Commission believes that while the amount of distribution connected generation remains small, voltage control could be handled primarily by devices connected to

the NSPs networks and transmission connected generators. The Commission recognises that requiring distribution connected generators to be able to assist in voltage control will add to the cost of such generation. However as the amount of distribution generation increases, it is reasonable for these generators to assist in controlling voltages as doing so assists in maintaining overall power system security. On balance the Commission concludes that the security benefits are likely to exceed the additional costs.

With respect to the concern raised by Auswind, REGA and Vestas in relation to proposed clause S5.2.5.3C(c)(2), the Commission notes that the minimum standard in fact continues to recognise that it is not the role of a distribution connected wind farm to control system voltage. The Commission does not therefore propose to amend the proposed clause.

The Commission notes that, in response to the concern of Auswind, REGA and Vestas that generators are not in a position to know certain information, the information in question would be conveyed by the NSP as part of the access negotiation process.

In respect to clauses S5.2.5.5(b)(1)(i), (c)(1)(i) and the suggestion by the AER and NEMMCO to exclude faults from 'credible contingency events', the definition of 'credible contingency event' is an event that is likely to involve the failure or removal from operational service of a generating unit or transmission element. The definition excludes a cause associated with a three phase fault. Accordingly, paragraph (b)(1)(i) and (b)(1)(ii) are mutually exclusive. The definition excludes distribution networks, and accordingly paragraph (b)(1)(i) and (b)(1)(iv) are mutually exclusive.

In regard to paragraph (b)(1)(iii), whilst these type of faults in a transmission system are captured by the definition of 'credible contingency event', the criteria in subparagraphs (A) and (B) act to limit their general effect that would otherwise be available to a 'credible contingency event'. The Commission agrees it is the intent that subparagraph (iii) should qualify a credible contingency event. On the basis of this analysis, the Commission considers that in order for sub-paragraph (iii) to take effect, there needs to be a qualifier on subparagraph (i) in the form of 'other than a fault referred to in (iii)'. On balance, the Commission has decided to accept the concerns of interested parties that the current arrangements are not working as was intended and accordingly has made this variation to the Rule.

In respect to the comments of Auswind/REGA regarding clause S5.2.5.5(b)(1)(iv) and the requirement to ride through a disturbance, the Commission notes that this suggestion is in regard to an automatic access standard. The Commission considers that the key issue appears to be the requirement in a distribution network for a 3 phase fault (+ other faults) to be cleared in circuit breaker fail time (if one is installed). If a circuit breaker fail protection is not installed it is the greater of 430ms or the primary protection time. That is, the minimum time is 430ms. Auswind/REGA suggested making transmission and distribution compliance the same and remove clause S5.2.5.5(b)(iv). The Commission does not consider it appropriate to make this suggestion at this time.

In respect to clauses S5.2.5.5(b)(1)(iii) and (iv) and the suggestion by Vestas to amend 430 milliseconds, the Commission notes that the suggestion relates to the automatic access standard and there is option of a negotiated access standard.

In respect to clause S5.2.5.5(b)(2)(i) and the suggestion by Auswind/REGA and Vestas that the clause be completely rewritten as it requires the generator to put out 400% of its output in the event of a three phase fault at or near the point of connection. The Commission notes that this clause is part of the automatic access standard and NEMMCO have indicated that it is needed to provide voltage support during faults, and that approximately 7% of current generators can meet this requirement.

In respect to clause S5.2.5.5(b)(2)(ii) and the concern of Vestas that current standard wind technology is not able to actively recover the voltage of the grid, the Commission notes that the suggestion relates to the automatic access standard, and such wind technology can negotiate a lower standard.

In respect to clauses S5.2.5.5(b)(2)(ii), (c)(2), and the requirement for the voltage to not exceed 6% in a distribution network, and to clause S5.2.5.5(b)(2)(iii), and the comment that the requirement is subject to wind conditions, the Commission notes that the suggestions by Auswind/REGA and Vestas relates to the automatic access standard and the option to negotiate lower is available.

In respect to clause S5.2.5.5(c)(1)(ii)(A) and (iii)(A) and the suggestion by Roaring 40s to increase the 100MW threshold value for small generators, the Commission notes that this matter was analysed in section 4.1.4 of this Rule Determination (not withstanding that the section 4.1.4 suggestion related to a negotiated access standard whereas this suggestion relates to a minimum access standard) and it was concluded that the section 4.1.4 clause carried sufficient flexibility to accommodate the concerns of the interested party. In relation to this clause, the Commission notes that no similar flexibility is available to the generator seeking access. However, the Commission does not consider it appropriate to amend the clause at this stage.

In respect to clause S5.2.5.5(c)(1)(ii)(A) and (iii)(A) and the suggestion by Vestas to remove (A), the Commission notes that the NEMMCO proposal has justified the inclusion of the 100 MW threshold on the basis that "it may be reasonable to allow small distribution connected plant to trip for a distribution fault provided there is no material adverse impact on other Network Users". By removing (A), the impact is to extend the requirement for continuous uninterrupted operation to apply to all generating plant, which appears to be contrary to the suggestion. With no clear basis for extending the requirement, the Commission does not consider it appropriate to make this change at this stage of the process.

In respect to clause S5.2.5.5(f) and the suggestion by Auswind/REGA that NEMMCO take into account the DNSP requirements, the Commission notes that under clauses S5.2.5.5(d)(1)(iii) and S5.2.5.5(d)(2) NEMMCO and the relevant NSP, which may be a DNSP, are required to consider the relevant control and protection systems and the range of operating conditions that apply in that network.

In relation to the AER and NEMMCO's suggestion to insert a new clause to require the access standard to fully document all fault locations, fault locations and conditions for which the generating system will not be capable of remaining in continuous uninterrupted operation, the Commission considers that the reasons for such a clause have not been substantiated and that clause S5.2.5.5(g) already includes a requirement to document any operational arrangements necessary to ensure the generating system will meet its agreed performance levels under abnormal network

or generating system conditions. Therefore the Commission has not adopted this proposed change.

Other issues (first round)

Table 4.1.5.

Stakeholder	Clause	Issue	AEMC considerations
Auswind, NGF, REGA and Vestas	S5.2.5.3C(b)(1)(iii)	The definition of "transmission system" includes any 66kV to 220kV network that operates in parallel to and provides support to the higher voltage network. The fault clearance times for 100kV and above are defined in Table S5.1a.2). There is no definition for fault clearance times at lower voltages.	For voltages below 100kV the test requires the application of a fault (of the applicable type) for 430ms
NGF	S5.2.5.3C(b)(1)(iii)	No consideration has been given as to significant torque fluctuations on machines during these situations which may cause major damage.	These clauses set the automatic access standard. If a generator cannot meet these requirements it may seek negotiated access under paragraph (f).
Auswind, NGF, REGA and Vestas	S5.2.5.3C(b)(2) and S5.2.5.3C(b)(2)(iii)	Such amount not to exceed requirements under clause S5.2.5.1.	
NGF	S5.2.5.3C(c)(1)(ii)	Allowance should be made for small generators connected to transmission systems as well.	A small generator connected to the transmission system could be subject to the same conditions as clause (c)(1)(iii)(A), (B), and (C). These have been applied to (c)(1)(ii) as well.
Auswind, NGF, REGA and Vestas	S5.2.5.3C(d)	Unsynchronised automatic reclose must be avoided due to the high risk of damage to generators	This would be resolved during negotiation of access arrangements

Stakeholder	Clause	Issue	AEMC considerations
Auswind, NGF, REGA and Vestas	S5.2.5.3C(e)	Abnormal conditions are mentioned in several cases and the intention should be clearly defined.	This clause needs to be expressed as it is as there are likely to be different issues needing to be addressed at different locations in the system. The Commission notes that recourse may be had to the Chapter 8 dispute resolution process in the event that differences in interpretation arise.

4.1.6 Partial load rejection

NEMMCO proposal

In regard to partial load rejection, the NEMMCO proposal relates to the following clauses:

- S5.2.5.4 (partial load rejection).

Partial load rejection describes the performance of a generator when it is subject to loss of some of the load supplied by it. The current clause S5.2.5.4 requires continuous uninterrupted operation following the loss of load. NEMMCO proposed that this clause be deleted as it has caused considerable confusion and because the key part of the clause has been addressed in the frequency rate of change requirements in new proposed clause S5.2.5.3A.

Views in submissions

The issues raised in first and second round submissions include:

- VENCORP (first round) considered that the clause needs to be retained to cover sudden load change events because, while it is recognised that sudden load change events will generally be followed a few seconds later by a consequential frequency change, some generator control systems will initially move in the wrong direction in response to a sudden load change, making the disturbance more arduous from a generator viewpoint than a pure frequency disturbance;
- Auswind, REGA and Vestas (first round) submitted that they could agree to deletion, subject to resolving any remaining issues associated with the proposed clause S5.2.5.3A;

- AER and NEMMCO (second round) considered that clause S5.2.5.7, as reinstated in the Draft Rule, does not work for asynchronous generators as they don't respond to loading level reductions imposed from the power system;
- AER and NEMMCO (second round) considered that NEMMCO should advise on the negotiated access standard for load rejection because if many generating systems trip on loss of a load, or an interconnector trips, this could lead to a major under-frequency event;
- (second round) considered when dealing with units that have a controlled energy source into a prime mover, such as steam technology
- Citipower/Powercor (second round) agreed with the Commission's proposal to retain the current load rejection clause S5.2.5.4;
- ETNOF (second round) was unsure how the actual rejection performance could be recorded in the connection agreement, if the connection agreement is signed before the unit is commissioned and tested, which implies the NSP to commit to testing;
- Pacific Hydro (second round) noted that following a large load loss the power system asynchronous generators will continue to operate at their pre-contingent levels provided that the frequency and voltage remain within the protection settings on the machines, while synchronous machines must respond to avoid over speeding. Wind turbines (asynchronous generators) can be compliant with either a reduction of power for high system frequencies or have a rate of change of frequency protection setting, while no generators can inject a load at their terminals as required for proving or testing compliance with S5.2.5.7; and
- Vestas (second round) considered that the compliance of a generating unit may be different from that of a generating system and suggests greater flexibility in time or/and percentage as the requirements of the automatic access standard for load rejection are on the border of existing technology in industry.

The Commission's consideration and reasoning

The Commission has considered the comments above. Subsequent discussions with industry have indicated that the clause may be difficult to apply to wind generation and asynchronous generation technologies but that it has been satisfactorily applied to some wind connection applications. However, the Commission agrees that the proposed clause S5.2.5.3A does not satisfactorily cover all generator control systems.

The Commission considers that the clause is still required to demonstrate that continuous uninterrupted operation can be maintained for such systems. In reaching this view the Commission has taken into account that the likely costs of compliance are small (and may only require changing settings on certain control systems) whereas the benefits in reducing the probability of cascading failure are likely to be great. The Commission has also made minor consequential changes to existing clause S5.2.5.4 to reflect the other changes being made as part of this Rule determination.

In respect to clause S5.2.5.7 and the reinstatement of the clause, the Commission notes the concerns of a number of second round submissions. However, the Commission notes that the key point of this clause is to ensure that a generating unit (or generating system) provides Continuous Uninterrupted Operation during a contingency event when partial load rejection of a generating unit occurs, rather than to specify the nature of the partial load rejection of the units. On this basis, it would appear that the clause places certain restrictions on synchronous machines without placing any apparent restrictions on asynchronous machines.

From this perspective, the Commission considers that if the clause was restricted to synchronous generating units only, so that asynchronous generating units were carved out of the clause, the application of the clause would become clearer and there would be no change in impact on generating units or on power system security. The cleanest method of restricting this clause to synchronous generating units is to remove asynchronous generating units from the application of the clause and the Commission has made this amendment to the clause.

In respect to clause S5.2.5.7(b) and the concern of Vestas that the specified values were on the border of existing technology, the Commission notes that the suggestion relates to the automatic access standard and does not consider an amendment appropriate.

In respect to the AER and NEMMCO's comments on clauses S5.2.5.7(b) and (c) and the changes relating to loading level reduction, the Commission agrees that the suggested changes generally improve the operation of the clause except that they have possibly made compliance test harder to administer by omitting "in less than 10 seconds". NEMMCO views the test as being the worst case, and if continuous uninterrupted operation does not occur for the worst case (an instantaneous load reduction) then the generator has failed the automatic access standard. However, the Commission considers changing the standard from less than 10 seconds to instantaneous reduction at this stage of the Rule making process as not appropriate and has not made this change but has adopted the other suggestions.

In respect to clause S5.2.5.7(e) and the concept suggested by the AER and NEMMCO of the insertion in the Rules of the principle on which the negotiation should take place, the Commission considers that the additional requirement is a point of clarification of a NEMMCO advisory matter that would otherwise be dealt with under another paragraph. However, in this particular clause the Commission notes that the general obligation on NEMMCO to advise on matters relating to negotiated access standards had not been included in the Draft Rule and has included this requirement in the Rule to be made. The Commission considers that any further amendments at this stage of the process would need to be publicly tested.

4.1.7 Protection of generation

NEMMCO proposal

In regard to protection of generation, the NEMMCO proposal relates to the following clauses:

- S5.2.5.8 (protection of generating units from power system disturbances);
- S5.2.5.9 (protection systems that impact on power system security);

- S5.2.5.10 (protection to trip plant for unstable operation).

The changes to S5.2.5.8 are designed to base the requirements on generator size rather than whether they are classified as “scheduled” or “non-scheduled”. The reason for this is that large wind generators are, under the current Rules, considered to be “non-scheduled” and, on that basis, are not required to meet the standards. The methods of meeting power system security have also been clarified. Clause S5.2.5.9 has also been changed to remove technology specific wording.

Views in submissions

The issues raised in first and second round submissions include:

- Auswind, NGF, REGA and Vestas (first round) considered that the removal of clause S5.2.5.8(c) means that “abnormal conditions becomes an undefined term;
- Hydro Tasmania and the NGF (first round) considered that the proposed clause S5.2.5.8(a)(2) appears to place controllability obligations on generating plant, rather than deal with issues relating to protection of plant from system disturbances;
- the NGF (first round) considered that the original wording of clause S5.2.5.8(a)(2)(i) implies that a minimum access standard of no protection except for an automatic 50% load shed, which would be putting all participants at risk;
- the NGF (first round) also considered that clause S5.2.5.8(a)(2)(ii) of NEMMCO’s proposed Rule overrides the requirements of (i);
- Auswind/REGA (second round) considered that the frequency level should be stated in clause sS5.2.5.8(a)(2)(i) and (ii), rather than left to NEMMCO;
- Auswind/REGA (second round) considered that it is not possible to comply with three seconds requirement in clause S5.2.5.8(a)(2)(i)(A) using existing generation unit technology and existing communication and control systems;
- Auswind/REGA (second round) considered that the disconnect time in clause S5.2.5.8(a)(2)(i)(B) could be meet if the requirement is extended;
- Auswind/REGA (second round) noted that generating units will continue to operate until an operating parameter goes out of range, and may not recognise an island situation;
- Citipower/Powercor (second round) considered that clause S5.2.5.8(a)(2) of the Draft Rule is inconsistent because it opens with a reference to ‘generating system’ but sub-clause (i)(A) and (i)(B) refer to ‘the generating unit’;
- NEMMCO (second round) considered that in respect to clause S5.2.5.8(a)(1), the relevant protection system or control system should not disconnect the generating system or any of its generating units;

- the NGF considered that the Draft Determination and Draft Rule did not address the points it raised in relation to S5.2.5.8(a)(2)(i) and S5.2.5.8(c) in relation to
- Snowy Hydro (second round) considered that the minimum access standard in clause S5.2.5.8(a)(2)(i)(A) and (2)(ii) of the Draft Rule cannot be met by our hydro units and possibly not by our gas turbine plant because of the 3 second time frame stipulated as the minimum response time;
- Vestas (second round) was concerned that clause S5.2.5.9(a)(2) of the Draft Rule does not clearly define the redundancy requirements for generating system;
- other first round issues are outlined in Table 4.1.7.

The Commission's consideration and reasoning

The Commission considers that clause S5.2.5.8(a)(2) in NEMMCO's Rule change proposal extends the requirement for transmission connected generators to reduce output (when frequency exceeds a specific level) to non-scheduled generating systems of more than 30MW. While non-scheduled generation currently represents a relatively small percentage of the total generation, as that proportion increases, those generators will be needed to assist in managing power system security. The Commission recognises that this clause will add additional cost to some generators, but considers that the needs of power system security must prevail. On balance, and subject to the matters below, the Commission has decided to proceed with the changes as proposed by NEMMCO.

In respect to clause S5.2.5.8(a)(2)(i)(A) and the concern of Auswind that if the reduction of generation refers to 'active power' then the 3 second requirement is unacceptable, the Commission notes that if the 3 second requirement cannot be met, the generator would have recourse to paragraph (2)(i)(B) for its performance standard.

In respect to clause S5.2.5.8(a)(2)(ii) and the concern of the NGF that paragraph (ii) appears to override the requirement of paragraph (i), the Commission notes that subparagraphs (2)(i) and (2)(ii) provide a choice for those generators who have a governor and no choice for those generator who don't have a governor. That is, a generator without a governor must conform with subparagraph (2)(i) in reducing its output if the frequency exceeds a specified level, whereas a generator with a governor has a choice of either (2)(i) or (2)(ii) for the same event.

In respect to clause S5.2.5.8(c) and the concern of Auswind/REGA that a generator may not automatically disconnect for an island condition, the Commission notes that the requirement to automatically disconnect is discretionary for all parties. The Commission understands that if NEMMCO or an NSP wish for a generating system to automatically disconnect then that party must negotiate for a control scheme to be installed such that automatic disconnection occurs under the desired event. On this analysis, the Commission considers that the meaning of 'automatically disconnect' could be improved and has amended the draft of this clause.

In respect to clause S5.2.5.9(a)(2) and the suggestion by Vestas that sufficient redundancy should apply to a 'generating system' rather than a 'generating unit', the

Commission notes that this paragraph applies to a ‘faulted element’ and in this regard is a continuation of the provision contained in paragraph (a)(1). In paragraph (a)(1) a direct relationship has been established between a ‘generating system’ and a ‘faulted element’, and the Commission sees no reason why this relationship would not be applied to paragraph (a)(2). The Commission notes that the suggestion relates to an automatic access standard and there is the option to negotiate another standard.

In respect to clause S5.2.5.10(a)(2) and the suggestion by Vestas that a ‘generating unit’ should be referred to as a ‘generating system consisting of generating units’, the Commission considers that this variation changes the intent of the clause, since the paragraph caters for an automatic access standard which should apply on a unit basis, not a system basis. If the generator can’t meet the standard on a unit basis, then it can obtain a negotiated access standard, as provided for in paragraph (c). However, the Commission notes that an improvement in the clarity of this requirement could be achieved if a reference was made to an asynchronous generating unit, as had been used elsewhere in Chapter 5. Such a reference would prompt the need for a new term ‘asynchronous generating unit and the Commission has created such a definition in Chapter 10.

Other issues (first round)

Table 4.1.7.

Stakeholder	Clause	Issue	AEMC considerations
Auswind, REGA and Vestas	S5.2.5.8(a)(1)	Refers to clauses S5.2.5.8(b)(2) and(b)(3) which do not exist	The references should be to S5.2.5.8(a)(2), (3) and (4). These have been corrected.
Vestas	S5.2.5.8(a)(2)(i)	This is highly subjective. There must be an objective criteria in this provision	The clause is quite explicit and no change required
NEMMCO	S5.2.5.8(a)(2)(i)(A)	6 seconds should be amended to 3 seconds. The latter correctly appeared in the marked up version of the proposed Rule and the change to the clean version is to ensure consistency	Agreed. Rule to be made reflects 3 seconds.
Auswind, NGF, REGA and Vestas	S5.2.5.8(a)(4)(iii)	There is no clause S5.2.5.8(b)(3) referred to	S5.2.5.8(a)(4)(iii) has been corrected to refer to S5.2.5.8(c).

Stakeholder	Clause	Issue	AEMC considerations
Auswind, NGF, REGA and Vestas	S5.2.5.8(d)	This is a definition of an NSPs overall liability. It has no place in generator standards and the liability exemption is too wide	This is an existing requirement. It appears to be situated appropriately. In the absence of an alternative definition as to scope, the Commission has not amended the clause.
Vestas	S5.2.5.9(e)	Redundancy systems are required only at the substation system and should not be required on each individual generating unit	Refers to negotiated access standard. Where the redundancy systems are required would be part of that negotiation.
Auswind, NGF, REGA and Vestas	S5.2.5.10	Most pole-slip protection only detects pole slips and disconnects the units. It will not prevent a pole-slip from happening	Clause S5.2.5.10 needs to be reworded to “disconnect it promptly when a condition that would lead to pole slipping ...is detected”

4.1.8 Impact on network capability

NEMMCO proposal

In regard to protection of generation, the NEMMCO proposal relates to the following clauses:

- S5.2.5.12 (impact on network capability);

NEMMCO argued the changes are necessary because the increase in the volume of intermittent (wind) generation raises the risk that networks may be unable to maintain supply capability. Thus, NEMMCO proposes that generators connected to the networks should be required not to have a net negative impact on network transfer capability. The proposed changes increase the current requirements to include other types of network impact including reductions of import capacity into another region. They also provide that the generator must, to the satisfaction of NEMMCO and the NSP, take into consideration in the design of the generating plant measures appropriate to mitigating any negative impact to the level of the minimum standard and at a maximum additional cost of five per cent of the capital cost of the generating system.

Views in submissions

The issues raised in first and second round submissions include:

- Auswind, REGA and Vestas (first round) submitted that clause S5.2.5.12(c) should include a reference to appropriate Australian and international plant standards, and that, when considering the five per cent of the project cost at the discretion of NEMMCO and the NSP, the requirement for dynamic reactive power support must be directly related to the generation project and not an existing system shortfall;
- Auswind/REGA (second round) considered that a reasonability test should be used to clause S5.2.5.12(a) of the Draft Rule when considering a reduction in network capability because, in general, all generation can cause a small negative offset to the transfer capability but this usually does not reduce reliability in a region;
- Citipower/Powercor (second round) agreed (with the Draft Rule) in that a cap of 5% of generating system capital to mitigate a negative impact has no firm basis;
- NEMMCO (second round) accepted the removal of the 5% cap of generating system capital but is concerned that NSPs be allowed to recover the cost of restoring the network capability, and that the clause does not provide an incentive on the generator to minimise its impact on the network capability;
- NEMMCO (second round) considered that under clause S5.2.5.12(g) the provision of control systems that increase power transfer capability should only be at the cost to the NSP if the power transfer would be increased beyond the requirement of the automatic standard (i.e. beyond the levels that would exit if the generating system were not connected);
- Vestas (second round) considered that the requirement in clause S5.2.5.12(b)(3) with respect to an inter-regional impact should not be a requirement on a generating system, it should be a requirement of the transmission system, dependent upon local grid characteristics; and
- other first round issues are outlined in Table 4.1.8.

The Commission's consideration and reasoning

First round

In relation to including in clause S5.2.5.12(c) as suggested by Auswind, REGA and Vestas, relevant Australian and international standards, the Commission notes that the submissions did not identify the standards referred to nor make it clear what impact those standards would have on the required level of performance. Without that information, the Commission is not in a position to consider amending the clause in the manner suggested.

In respect to clause S5.2.5.12(d) NEMMCO proposed in the first round that up to five per cent of the project cost be allocated for measures to mitigate any reduction in power transfer capability due to the generator connection. The Commission notes that NEMMCO's proposal effectively provides discretion to the NSP and NEMMCO to determine what the relevant requirements for connection are on a case by case basis and to require the generator to contribute to the cost of meeting the standard.

NEMMCO's proposal is based on the contention that it would be an inherently problematic exercise to detail in the Rules the technical requirements required to ensure the maintenance of network transfer capability in all circumstances. The proposal purports to provide a workable way forward that addresses the risks to the generator by:

- being as specific as practicable in the standard in the Rules; and
- only requiring additional expenditure to meet the minimum standard; and
- in providing that the specific requirements be addressed on a case by case basis, capping the additional cost impact to the generator at five per cent.

The Commission notes that it is a central tenet of the access negotiation framework, that a connection applicant be provided with all of the information concerning the relevant technical requirements during the negotiation process so that the applicant may make an informed commercial decision as to whether to enter the connection agreement. This is supported by the technical standards in the Rules being as clear as possible as to what those requirements are in advance with the detailed requirements being provided as part of the negotiation process.

In the current context, having being informed by the NSP as to the technical requirements, the generator should then be free to negotiate with the NSP to alter those requirements, pay for a network augmentation or both. If the generator decided not to fund mitigation of the reduction in power transfer capability then, subject to meeting its own performance requirements, it should then be open to the NSP to accept the reduction in network capability or to decline to connect the generator. The Commission considers that NEMMCO and the NSP should not be in a position to require the generator to undertake expenditure where it has not agreed to do so.

The view that the NSP should recover the cost of maintaining its network transfer capability from the generator via the connection agreement is consistent with the Commission's position in its recent Rule Change on transmission pricing¹⁷. There, the Commission considered that generation investment does not "cause" new transmission investment to be undertaken in the shared network. This is because shared transmission investment is primarily undertaken to serve the needs of reliable supply to loads. However, where a new generator imposes a negative impact on the transfer capacity of the network the needs of loads are no longer met to the same level they were before. That is, the generation investment has "caused" a reduction in the reliable supply to loads. Under this condition, the NSP should be able to recover the costs of ensuring that the network is able to maintain its transfer capability from the generator. The Commission considers that this approach is consistent with the causer pays principle.

The Commission also considers that if NEMMCO's proposal to provide for capped discretionary expenditure was appropriate, NEMMCO did not provide justification to support the proposition that the five per cent figure is a reasonable cap in the

¹⁷ National Electricity Amendment (Pricing of Prescribed Transmission Services) Rule No. 22 on the Commission's website.

circumstances. In consequence of the above, the Commission has not accepted this part of the proposal.

In the second round, the Commission notes that Powercor supported the unconditional removal of the 5% cap. However, NEMMCO proposed a further change to the Commission’s Draft Rule which requires the negotiated access standard to include the ‘reasonable provision of control systems’, but it is silent on who must pay for the cost of the ‘control system’. The Commission notes that the term ‘control system’ is defined wide enough to include NSP equipment as well as generator equipment. If the negotiation is to cover generator and NSP control systems and to determine which party is to pay for those control systems then this suggested requirement could have the effect of unduly delaying the connection application process whilst the NSP sought to recover the cost of its control system equipment from the generator.

However, when considered in a broader context, the Commission notes that the term ‘control system’ is used in the automatic and minimum access standards in the same way as proposed by the NEMMCO’s second round suggestion. Further, the Commission notes that the term ‘control systems’ has been used in precisely the same way in the current Rules for these access standards. In these provisions, ‘control system’ is a defined term and has the Glossary meaning, which is not restricted to the generator’s controls system. That is, the NEMMCO proposal is no more onerous than the current Rules for these two standards. For this reason, the Commission supports the change in the negotiated access standard to include a reference to control systems. The Commission has varied the Rule accordingly.

The Commission agree with Vestas that the requirement in clause S5.2.5.12(b)(3) with respect to an inter-regional impact should not be a requirement on a generating system because it is the role of the NSP to maintain network capability. The Commission does note that clause S5.2.5.12(g) does allow the NSP to negotiate with the connecting generator where the transfer capability could be increased by the provision of a control system by the generator.

Similarly, the Commission does not agree with NEMMCO’s view with respect to clause S5.2.5.12(g) that the NSP should only be responsible for the cost of control systems that increase power transfer capability beyond the automatic standard. Rather the Commission considers that it is the responsibility of the NSP to maintain the network capability. In addition, the wording proposed by NEMMCO would prohibit a NSP negotiating with the connecting generator unless the generator was already meeting the automatic standard. Accordingly, the Commission has not adopted NEMMCO’s proposed amendment to this Rule.

Other issues (first round)

Table 4.1.8.

Stakeholder	Clause	Issue	AEMC considerations
Auswind, NGF, REGA and Vestas	S5.2.5.12(a)	This is not well defined. It does not assist generators in defining physical obligations that are measurable and able	The clause is satisfactory as it is. Different requirements at different locations will be spelled out by

Stakeholder	Clause	Issue	AEMC considerations
		to be tested for compliance.	the NSP and NEMMCO as part of the connection process
VENCorp	S5.2.5.12(e)	The drafting of clause S5.2.5.12(e) is confusing. It is suggested that the requirements of this clause should be added to (b), as it is effectively an extension of the minimum standard.	The clause has been deleted for the reasons discussed above.

4.1.9 Control systems and stability

NEMMCO proposal

In regard to control systems and stability, the NEMMCO proposal relates to the following clauses:

- S5.2.5.13 (control systems and stability);

The changes replaced the current clause relating to 'excitation control system'. NEMMCO have argued that the changes are required because they have been re-written in terms of scheduled and non-scheduled and synchronous and asynchronous generators, and set automatic and minimum standards.

Views in submissions

The issues raised in first and second round submissions include:

- Auswind, NGF, REGA, Roaring 40s and Vestas (first round) submitted that under the proposed automatic access standard;
 - small plant would not be able to meet the requirements;
 - it should allow generating system as well as units;
 - it makes the generator responsible for controlling voltage within the power system;
 - generating systems consisting of small generating units cannot comply;
 - the requirement that generating systems must have a power system stabiliser is a technology specific requirement as stabilisers only pertain to synchronous machines;
 - operational monitoring of key variables including inputs and outputs would be overly onerous for small plant;
 - instability and impact are not appropriately defined; and

- the clause would cause uncertainty as to how support network voltages during faults would be quantified or tested.
- TransGrid (first round) suggested that the proposed new clauses S5.2.5.13(b)(3)(i) and S5.2.5.13(c)(4)(i) are based on the assumption of an AVR gain of 200, equivalent to a voltage regulation tolerance (set point error) of 0.5%, and this only holds under open circuit conditions. NEMMCO subsequently proposed changing the minimum access standard for voltage regulation in both synchronous and asynchronous sections of this clause to remove reference to 0.5% regulation;
- VENCorp (first round) recommended, and NEMMCO subsequently agreed in its second round submission, that two categories of excitation system be included in the rules to account for differing capabilities with respect to ceiling voltage in clause S5.2.5.13(b)(3)(vi) and the rise time in clause S5.2.5.13(b)(3)(viii);
- VENCorp (first round) also recommended that the step size in clause S5.2.5.13(b)(4)(v)(A) and (B) should be changed to 2.5%, as 5% is considered unnecessarily large;
- Auswind/REGA (second round) considered that:
 - the requirement for each input in clause S5.2.5.13(b)(2)(i) of NEMMCO's proposed Rule may not be achievable in modern digital controllers;
 - clauses S5.2.5.13(b)(3)(iv) and (4)(iv) should be changed to refer to 'nominal' instead of 'normal' voltage;
 - the requirements in clause S5.2.5.13(d)(3)(ii) regarding voltage control and not generally applicable in DNSP networks;
 - the choice of the 100 kV threshold in clause S5.2.5.13(d)(4)(i) is arbitrary and does not reflect the range of system conditions that can occur for systems, particularly in rural areas, and rather the criterion should be required performance of the NSP; and
 - the process of establishing a negotiated access standard should be free and all parties should act in good faith to achieve the best overall result for the long term benefit of consumers, whereas clauses S5.2.5.13(e) and (f) act against this principle and should be deleted;
- Roaring 40s (second round) considered that the provisions for control of reactive power output in clause S5.2.5.13(d)(3)(i) should be enhanced to give better integration of wind farm reactive capability into overall system voltage control, potentially at a lower cost;
- Vestas (second round) considered that in respect to:

- clauses S5.2.5.13(b)(1) and (d)(1)(i), in the past it has been difficult to prove compliance with 'adequately damped' due to difficulty in achieving suitable test conditions;
 - clauses S5.2.5.13(b)(4)(i) and (d)(5)(i) suggest change requirement to 1.0%;
 - clause S5.2.5.13(b)(4)(iii), the present criterion of 95% to 105% is unacceptable because it may fall outside the capability of existing industry generators;
 - clause S5.2.5.13(b)(4)(v)(A) the present criterion of 5.0 secs for 5% voltage disturbance is unacceptable because it may fall outside the capability of existing industry generators;
 - clause S5.2.5.13(b)(4)(v)(B) and (d)(5)(ii) the present criterion of 7.5 secs for 5% voltage disturbance is unacceptable because it may fall outside the capability of existing industry generators;
 - clause S5.2.5.13(b)(4)(v)(B) the present voltage disturbance of 2.5% criterion is unacceptable because it may fall outside the capability of existing industry generators;
 - clause S5.2.5.13(b)(4)(vi) the present criterion of 5% step change in the voltage set point of less than 2 seconds is unacceptable because it may fall outside the capability of existing industry generators;
 - clause S5.2.5.13(d)(1)(ii) the neper is not an SI unit that is in common use and request that an alternative be used; and
 - clauses S5.2.5.13(d)(3)(i) and (ii), which refers to the voltage requirements in clause 5.1a.4, are too high and the requirements should be based on a realistic study.
- other first round issues are outlined in Table 4.1.9.

The Commission's consideration and reasoning

The Commission considers that the automatic access standard represents the desirable performance of a generator to assist NEMMCO in meeting their requirements for power system security. Any generator which cannot meet the automatic access standard has the opportunity to negotiate access, where the minimum acceptable performance will be related to no material adverse impact on customers.

The Commission accepts that the automatic access standard is defined in such a way as to not be technology neutral, but this is unavoidable. The Commission understands that it may not be possible for an asynchronous generator to provide a power system stabiliser. In the Australian context, power system stabilisers are helpful in managing stability issues. The Commission also notes that the proposed changes by NEMMCO extends the requirements for power system stabilisers from their current level of generators greater than 100MW to all generators wishing to connect via the automatic access standard. The net effect of this could be to make all

generators no matter what their size consider negotiated access. On balance the Commission considers that the requirements of the automatic access standard are appropriate.

The Commission agrees with the first two VENCORP issues as they deal with the reasonable requirements of different technologies of exciter systems. The third issue raised by VENCORP relates to the size of the voltage step change to be applied to a generator and that the proposed change is requiring a generator's control system to hold it stable for a 5% change in voltage. The Commission notes that there are arguments for and against this.

The argument for the change is that in order to ensure power system security is not diminished it is necessary to require generators to prove they can stably ride-through a 5% change in voltage, because voltage changes of this magnitude can occur, and this value has not been changed in these proposed Rules changes. On the other hand applying a voltage change of this magnitude during tests risks running into non-linear behaviour of the control system, which will not give a real understanding of the control system's capability. The Commission believes on balance that the changed clauses as proposed should stand as a 5% step change can occur in practice.

In respect to clause S5.2.5.13(a) and NEMMCO's suggestion to introduce a new term 'static excitation system', the Commission has made this change as it supports changes to paragraphs (3)(vi) and (4)(viii) and accepts this definition is needed to distinguish between the different control system techniques used for synchronous generating units and asynchronous generating units.

In respect to clause S5.2.5.13(a)(2)(i) and Auswind's suggestion that 'each input' may not be achievable, the Commission notes that the suggestion relates to the automatic access standard and there is an option to negotiate to another standard.

In respect to clauses S5.2.5.13(b)(1) and (d)(1)(i) and the suggestion by Vestas about demonstrating compliance that a control system is 'adequately damped', the matter is discussed in section 4.1.2 of this Rule determination.

In respect to clause S5.2.5.13(d)(3)(ii) and Auswind's suggestion that DNSPs do not want generators to regulate voltage, the Commission notes that although the suggestion relates to the minimum access standard, the Commission does not have sufficient information to address this issue at this stage of the process and may be considered in a later technical review.

In respect to clauses S5.2.5.13(b)(3)(iv) and (4)(iv) and the suggestion by Auswind and REGA that 'normal' should be changed to 'nominal', the matter is addressed in section 4.1.4 "Voltage" of the Rule determination.

In respect to clause S5.2.5.13(b)(3)(vi) and NEMMCO's proposed change to the excitation ceiling voltage value of '2 times', and in respect to clause S5.2.5.13(b)(3)(viii) and the time taken to increase rise time to ceiling voltage, the changes are consistent with the VENCORP first round suggestion, assist in clarifying the different values that apply to different technologies, tightens the performance requirement for synchronous generating units which is reasonable, retains the existing value for all other types of excitation systems, and improves the clarity of the provision. The Commission has amended the Rule.

In respect to clauses S5.2.5.13(b)(4)(i) and (d)(5)(i) and the suggestion by Vestas to change the performance band to '1.0% of the set point', the Commission has not made this change as the 0.5% value proposed by NEMMCO is in the current Rules and the Vestas submissions did not provide a justification for the alternative value. The Commission also notes that the clause S5.2.5.13(b)(4)(i) is an automatic access standard and that the equivalent minimum access standard in clause S5.2.5.13(d)(5)(i) was modified to remove a specific level of regulation accuracy.

The Commission considered that the following proposed amendments should not be adopted at this stage of making the Rule because they were substantive and introduced by stakeholders following the publication of the Draft Determination, and hence cannot be tested by further consultation under this Rule making process but could be the subject of a further Rule change proposal or the subject of the Commission's future review of the technical standards:

- in respect to clause S5.2.5.13(b)(4)(iii) and the suggestion regarding the present criterion of 95% to 105%;
- in respect to clause S5.2.5.13(b)(4)(v)(A) and the suggestion regarding the present criterion of 5.0 seconds for a 5% voltage disturbance for the automatic access standard;
- in respect to clauses S5.2.5.13(b)(4)(v)(B) and (d)(5)(ii) and the suggestion regarding the present criterion for a settling time of 7.5 seconds for a 5% voltage disturbance;
- in respect to clause S5.2.5.13(b)(4)(v)(B) and the suggestion regarding the present criterion for a 2.5% voltage disturbance for the automatic access standard;
- in respect to clause S5.2.5.13(b)(4)(vi) and the suggestion regarding the present criterion of a 5% step change in the voltage set point for less than 2 seconds for the automatic access standard;
- in respect to clause S5.2.5.13(d)(1)(ii) and the suggestion regarding an alternative be used for the 'neper'¹⁸.

In respect to clause S5.2.5.13(d)(3)(i) and the suggestion by Roaring 40s to supplement 'voltage' by adding 'reactive power' for the minimum access standard, the 100kV boundary indicates that this requirement generally applies to transmission connected generators, or generators that are electrically close to the transmission network. Whilst the Commission recognises the merits of the Roaring 40's view as a general principle, on the transmission network the Commission considers that voltage is a more relevant performance measure than reactive power. In subparagraph (ii), reference is made to 'voltage or reactive power' consistent with the Roaring 40's view. Whilst the Commission recognises that an argument may be put forward in the future to vary the boundary value of 100kV, the Commission

¹⁸ The Commission notes that this unit is referenced in the Standard Handbook for Electrical Engineers by Donald Fink, and is commonly used by NEMMCO and NSPs.

considers that such an argument has not been sufficiently made at this time to justify an amendment.

In respect to clauses S5.2.5.13(d)(3)(i) and (ii) and the concern of Vestas with the over voltage duration, the matter has been discussed in section 4.1.4 of this Rule determination.

In respect to clauses S5.2.5.13(e) and (f) and Auswind's suggestion to delete the paragraphs, the Commission does not agree in principle that the negotiated access standard should be free of criteria that limits the manner in which the negotiation should occur. In this particular technical requirement, the control system has such a significant impact on power system stability as to warrant the quality control systems that perform to the automatic standard, and only vary from the standard under exception circumstances.

Other issues (first round)

Table 4.1.9

Stakeholder	Clause	Issue	AEMC considerations
NGF	S5.2.5.13(b)	Referred to generating unit capability – should include generating systems.	Agreed and amended in Rule to be made
VENCorp	S5.2.5.13(b)(1)(ii)	It is recommended that the draft words "any mode of oscillation" should be changed to "any critical mode of oscillation", so that slight degradation of any heavily damped mode of oscillation is excluded from this consideration.	Agreed and amended in Rule to be made
Auswind, NGF, REGA and Vestas	S5.2.5.13(c)(3)	If transmission connected is intended then this should be stated rather than a voltage level. There are 132kV distribution lines in the network. Is clause (c)(3)(i) meant to relate to transmission and (c)(3)(ii) to distribution.	This clause is reasonable as drafted. High voltage installations greater than 100kV need to have a voltage regulator. It doesn't matter whether it is called transmission or distribution.
Roaring 40s	S5.2.5.13(c)(3)	The ability to test and verify the performance of control systems is inescapable but the requirements are very vague and need clarification.	This clause relates to the minimum access standard. The requirements of this clause would be spelt out by the NSP during connection negotiations.

Stakeholder	Clause	Issue	AEMC considerations
			The clause is satisfactory.
Auswind, REGA and Vestas	S5.2.5.13(c)(5)(i)	The requirement to regulate the voltage possibly within the generation system and not at the connection point removes the flexibility with which a voltage control system could be implemented on a wind farm.	This clause relates to the minimum access standard. The location is subject to negotiation through the negotiated access arrangements. This potentially includes the connection point. There is no problem with the clause.
Hydro Tasmania	S5.2.5.13(d)	Clause is quite prescriptive in its description of the technology which is required to meet the automatic standard.	Agreed but needs to be to interact with all other stabilisers on the power system so keep as proposed.

4.1.10 Fault current

NEMMCO proposal

In regard to fault current, the NEMMCO proposal relates to the following clauses:

- S5.2.9 (fault current);

The changes create a new section. NEMMCO argued the changes were necessary because they have included generating systems as well as generating units, and required NSPs to consider alternate network configurations.

Views in submissions

The issues raised in first and second round submissions include:

- Auswind, REGA and Vestas (first round) submitted that NEMMCO has not justified the change, and there are no known issues with S5.2.9 as it is currently drafted;
- VENCORP (first round) recommended that the meaning of clause S5.2.9(a)(1)(ii) of NEMMCO proposed Rule be clarified by adding "the contributing level that will ensure that the total fault current can be safely interrupted..." to the beginning of the clause;
- Auswind/REGA (second round) considered that the basis for the requirement in clause S5.2.8(a)(1)(i) of the Draft Rule that "three times" the combined maximum continuous current of the operating generating units of

the generating system is arbitrary and not justified, and Vestas suggest that the requirement be set by the NSP;

- The NGF (second round) was concerned that clause S5.2.8(e) of the Draft Rule, which removes liability for any loss or damage from the NSP, is separated from the remainder of the clause, while Vestas considers that the requirement should be symmetrical with generators not being liable for loss or damage on either the power system, or within the Generator's facility;
- Vestas (second round) considered that the requirements of clause S5.2.8(a)(1)(ii) of the Draft Rules may not be achievable and suggested separate independent automatic access standards for synchronous and non-synchronous generator types because some generating units do not have a controlled short circuit contribution.

The Commission's consideration and reasoning

The Commission notes that the submissions did not identify specific issues with the proposed clause other than to comment that it represents a "substantial change". The Commission agrees that NEMMCO did not provide sufficient comment in its proposal to justify why the changes should be made. Subsequent discussions with NEMMCO revealed that the changes were proposed as a consequence of NSP experience in dealing with wind farm connection applications. The Commission notes that the changes introduce automatic and minimum access standards and a requirement for generator equipment to withstand fault current. The Commission believes that these represent improvements on the current clause and, in the absence of specific reasons to the contrary, has decided to largely accept the changes to the clause recommended by NEMMCO, subject to the comments below.

In respect to clause S5.2.8(a)(1)(i) of the Draft Rule and the suggestions regarding the justification for "three times", the Commission notes that the suggestions relate to the automatic access standard, and that a variation to the clause has been provided. The Commission accepts the view that the NEMMCO proposal had not justified why 'three times' needs to be included in this package of changes. The Commission is of the view that this detailed requirement should be further justified before it is included in the Rules, and has deleted the requirement.

In respect to clause S5.2.8(a)(2) of the Draft Rule and the suggestion by Vestas regarding the level that can be safely tripped by a circuit breaker, the suggestion relates to the automatic access standard and without further reasons for amending the standard, the Commission has decided not to amend the clause.

In respect to clause S5.2.8(e) of the Draft Rule and the suggestions from the NGF and Vestas regarding the TNSP liability indemnity, this provision is not contained in the existing clause S5.2.9 of NEMMCO's proposed Rules. Nor had NEMMCO justified why this clause should be located within the fault current technical requirements. The Commission notes that an identical provision is located at clause S5.2.5.8(f), which relates to "Protection of generating systems from power system disturbances", where paragraph (f) is classified as a "General requirement". The Commission considers that clause S5.2.5.8(f) is sufficient to cover the NSP liability in all situations, found no objection to the provision being located in this clause, notes that the provision in clause S5.2.5.8(f) is contained in the current Rules, and finds no reason

to include clause S5.2.8(e) in the Rule to be made. The Commission has made the necessary changes based on this analysis.

4.1.11 Technical matters to be coordinated

NEMMCO proposal

In regard to technical matters to be coordinated, the NEMMCO proposal relates to the following clauses:

- S5.2.3 (technical matters to be coordinated);

NEMMCO argued the changes were necessary because they ensure the standards to be applied to networks constructed by generators comply with appropriate design criteria.

Views in submissions

The issues raised in first and second round submissions include:

- Auswind, NGF, REGA, VENCORP and Vestas (first round) submitted that clause S5.2.3(b) requires plant to not comply with the Australian standards, does not recognise international standards and may call for plant to exceed the Australian standards which is unreasonable;
- Auswind/REGA (second round) noted that, in respect to clause S5.2.3(b)(1), in many cases Australian Standards have not yet processed and established standards for wind turbines (IEC standards do exist) and in respect to clause S5.2.3(b)(2) the ESAA does not write earthing standards any more, with the correct standard being ENA EG1-2006: Substation Earthing Guide;
- Roaring 40s (second round) considered that Australian system and plant standards should be harmonised with international standards to the extent practical, as the Australian national electricity market has little ability to influence generation plant design standards of major world markets; and
- Vestas (second round) proposed that equivalent international standards may be accepted in clause S5.2.3(e), subject to negotiation.

The Commission's consideration and reasoning

In respect to clause S5.2.3(b)(1) and the first round suggestion by various parties that International Standards should be referenced ahead of Australian Standards the Commission considers that the Australian and international standards are guidelines and that the Rules may set the relevant NEM standard including where this overrides those standards. The Commission notes that the submissions do not identify what standards should apply or the impact they would, if adopted, have on the proposed performance levels. In the absence of that information, the Commission has no reason to vary the NEMMCO proposal.

In the second round submissions, the Commission notes that several parties were concerned with the use of an Australian Standard. One party stated that there were no Australian Standards for wind generators. In regards to this matter, the Commission would expect that if there were no relevant Australian Standards, the

parties to the negotiation, and acting in good faith, would adopt other relevant technical standards that provide a rational basis for the negotiation so as to meet the intent of the Rule. However, the Commission accepts that if the negotiation was to stall on the basis that the parties could not agree to accept a relevant international standard, then the suggestion to include a reference to International Standards would have merit. On balance, the Commission has decided to accept the concerns of interested parties that the current arrangements would benefit from improved clarity and has amended the Rule to reflect the Commission's position on this issue, detailed above.

4.1.12 Active power

NEMMCO proposal

In regard to active power control, the NEMMCO proposal relates to the following clauses:

- S5.2.5.14 (active power control);

Under clause 4.8.9 NEMMCO can issue directions to scheduled and market generators to maintain or re-establish the power system to a secure operating state, a satisfactory operating state, or a reliable operating state. This proposed change to the Rules:

- formalises the requirement that scheduled generators must be able to control their output to maintain system security and reliability; and
- extends this requirement such that all large generators, either scheduled or non-scheduled but larger than 30 MW, must be able to control their output in response to directions or instructions from NEMMCO.

Views in submissions

The issues raised in first and second round submissions include:

- the NGF (first round) suggested that the proposed automatic access standard in clause S5.2.5.14 be changed to accept an allowable dispatch error of 1%;
- Auswind and Vestas (first round) suggested that the word "automatically" be removed from the negotiated access standard to allow both automatic and manual processes that occur within 5 minutes of receiving a dispatch instruction to occur;
- NEMMCO (first round) proposed a change to the wording of clause S5.2.5.14 to make the minimum standard subject to energy source availability to ensure consistency with the automatic standard;
- Auswind/REGA (second round) noted that an increase in active power output under clause S5.2.5.14(a)(1)(i) is not possible for wind generators due to wind availability;
- Auswind/REGA (second round) asserted that the requirement in clause S5.2.5.14(a)(1)(ii) for a linear response, and the requirement in clause S5.2.14(a)(2)(i) reduce or increase output within 5 minutes at a constant rate

cannot be met exactly by wind generators and compliance cannot be guaranteed without knowledge of the range of possible power levels;

- Auswind/REGA (second round) considered that electronic instructions under clause S5.2.14(a)(2)(i) and (iii) and S5.2.14(c) are acceptable but verbal instructions under clauses S5.2.14(b)(2)(i) and (iii) and S5.2.14(c) may be potential difficulty to comply with;
- Auswind/REGA (second round) considered that the requirement in clause S5.2.14(d) to prevent its output changing within five minutes is not possible for a wind generator as its output is dependent on wind and that the requirement that each control system must be adequately damped should be interpreted with respect to the generator, not the grid;
- NEMMCO (second round) considered that non-scheduled units and 'semi-scheduled' units should be dispatched under clause S5.2.5.14(a) and (b) on a consistent basis with scheduled generating units, that is, as the gross generation at the machine terminals.

The Commission's consideration and reasoning

The NEMMCO dispatch process specifies the generation targets for scheduled generators with the aim of managing the network flows and hence system security. However, currently non-scheduled generators do not receive dispatch targets and the dispatch process cannot always optimize network flows and reliability outcomes. This is particularly true where the output of a non-scheduled generator increases the flows in the network element where it is connected, which in turn can constrain the flows on parallel network elements.

The Commission understands that some non-scheduled generators are connecting to the power system in areas where network limits can be exceeded. At present only the scheduled generators are required to alter their active power output to ensure network limits are maintained. This can result in increased prices for generation and lead to problems with reliability in some instances. NEMMCO's proposed Rule changes require that both scheduled and non-scheduled generation can be used to ensure network limits are maintained, which will allow the appropriate instruction to be used.

The Commission considers that the factors that determine whether a generator affects system security and reliability are its size and location, rather than it being registered as either scheduled or non-scheduled. The Commission acknowledges that the proposed Rule will impose additional costs on the proponents of non-scheduled generators. However, these costs are likely to be relatively small and only involve changes to control systems in most instances. The benefits are likely to be improved security and reliability, an increased technical envelope of network capability and reduced generation prices to the market. On balance the Commission supports requiring all large generators to have an active power control capability.

In respect to clause S5.2.5.14(a)(1)(i) and the suggestion by Auswind and REGA that the required change in active output is not possible due to wind variability, the Commission notes that the suggestion relates to the automatic access standard, has not provided an alternate clause to replace the proposed clause nor has there been a clear justification as to why this change should be made. Accordingly, the

Commission does not consider it appropriate to adopt this suggestion at this stage of making the Rule, but would consider this matter in its further technical review if requested by an interested party.

In relation to Auswind and REGA's suggestions that wind farm generating units cannot provide an exactly linear reduction with consecutive five minute requests or change output within 5 minutes at a constant rate, the Commission notes that the suggestions relate to the automatic access standard and does not necessarily need to be met, subject to the negotiated access standards, unless necessary to maintain system security. Accordingly, the Commission does not consider it appropriate to adopt this suggestion.

Similarly, in respect to clauses S5.2.5.14(a)(2)(i) and (iii) and the suggestion by Auswind and REGA regarding an instruction electronically issued by a control centre, the Commission notes that the suggestion relates to the automatic access standard and does not necessarily need to be met, subject to the negotiated access standards, unless necessary to maintain system security. Accordingly, the Commission does not consider it appropriate to adopt this suggestion.

In respect to clause S5.2.5.14(b)(2)(i) and the suggestion by Auswind and REGA to change output at a maximum rate of TBD MW/sec, the Commission notes that the proposed change is incomplete and that there has not been a clear justification as to why this change should be made. Accordingly, the Commission does not consider it appropriate to adopt this suggestion at this stage of making the Rule, but would consider this matter in its further technical review if requested by an interested party.

In respect to clauses S5.2.5.14(b)(2)(i) and (iii) and the suggestion by Auswind and REGA to modify the reference to verbal instructions, the Commission notes that the proposed change removes the opportunity for some generators to receive dispatch instructions verbally, and at the same time raises the concern that all dispatch instructions for this type of technology must be verbal. However, this requirement is a minimum access standard and the suggested flexibility is evident in paragraph (c) of the negotiated access standard.

In respect to clause S5.2.5.14(c) and the preference of Auswind and REGA for electronic instructions, there appears to be nothing preventing a generator having electronic facilities to receive control centre instructions.

In respect to clause S5.2.5.14(d) and the comment by Auswind and REGA that generator output is dependent on wind, the Commission notes that the reference to the 'output changing within 5 minutes' is discretionary and not mandatory and will be resolved during negotiation.

In respect to clause S5.2.5.14(f) and the suggestion by Auswind and REGA that the requirement be interpreted with respect to a generator and not the grid, the Commission notes that whilst the term 'control system' is defined to include both generator and NSP equipment, the control system referred to in this paragraph is the generator control system and not a grid control system by virtue of the cross-reference to paragraphs (a) and (b).

4.1.13 Remote monitoring

NEMMCO proposal

In regard to remote monitoring, the NEMMCO proposal relates to the following clauses:

- S5.2.6.1 (remote monitoring);
- S5.2.6.2 (communications equipment).

NEMMCO proposes to modify the remote monitoring requirements so that they apply to generators or generating systems greater than 30 MW in size regardless of whether they are classified as scheduled or non-scheduled. In addition, the proposal would require wind farms to provide remote monitoring of wind speed and direction which NEMMCO considers necessary to improve the accuracy of short-term forecasts of wind farm generation.

Views in submissions

The issues raised in first and second round submissions include:

- general support for the proposed change from the submissions;
- Auswind, REGA and Vestas (first round) considered that the amended clause S5.2.6.1(a)(2)(ii) would appear to require more information for a non-scheduled generating system of less than 30 MW size than clause S5.2.6.1(a)(2)(i) does for a non-scheduled generating unit with a nameplate rating of 30 MW or more;
- Auswind/REGA (second round) preferred a requirement to comply with relevant international standards for remote monitoring rather than the requirements of clause S5.2.6.1(a)(3) and the cross reference to clause 4.11, the requirements of which should be subjected to negotiation;
- Auswind/REGA (second round) considered that clause S5.2.6.1(a)(3) and (c)(3) should be changed from referring to 'real time' transmission of data to 'transmit to NEMMCO's controls centres data sampled at the SCADA time as specified by NEMMCO';
- Auswind/REGA (second round) considered that requirement to provide the status of the 'tap-changing transformer tap position' in clause S5.2.6.1(b)(1)(ii) should not apply to individual generating units in an aggregated generation system;
- Auswind/REGA (second round) considered that the requirements of clause S5.2.6.1(b)(5) for the provision of data should apply for the generation system, and not individual generators, and such measurements should be taken from installed measurement equipment, not individual wind turbine generators;
- Vestas (second round) considered that the provision of two separate telephone facilities under clause S5.2.6.2(a) may have commercial implications considering the remote locations of generating systems;

- Vestas (second round) did not consider that independent backup telephone facilities can be provided under clause S5.2.6.2(c), especially for remote sites;
- Vestas (second round) considered clause S5.2.6.2(d) should refer to the central remote monitoring system for the aggregated generating system.

The Commission's consideration and reasoning

Remote monitoring concerns participants' abilities to transmit to NEMMCO's control centre real time data to enable the system operator to carry out its market and power system responsibilities.

The Commission supports there being the same requirements on large non-scheduled generating units or systems that already apply to scheduled generators as it considers that the factors that determine whether a generator affects power system security and reliability are its size and location rather than how it has been classified. Scheduled generators provide forecasts of their output through the pre-dispatch and projected assessment of system adequacy (PASA) processes set out in Chapter 3 of the Rules. It agrees that for consistency, other large generators should provide equivalent, or the best available, information if possible. In the case of wind generators, this includes measurement information concerning wind speed and direction and these variables should be made available to assist the process of forecasting wind farm generation.

The Commission considers with respect to the comment made in submissions in relation to the remote monitoring requirements on generators less than 30 MW and those greater than 30 MW, that the requirements appear reasonable.

In respect to Auswind's preference to comply with relevant international standards, this matter is discussed in section 4.1.8 of this Rule determination.

The requirement to provide the tap-changer status and Auswind's comment on this requirement relates to the automatic access standard and does not necessarily need to be met, subject to the negotiated access standards, unless necessary to maintain system security.

In respect to clause S5.2.6.1(b)(5) and Auswind's comment about the reference to wind farm, the Commission accepts that the information is required for the generating system, not for each generating unit. The reference to 'wind farm' specifies the particular type of generating system from which this information is required. Accordingly, the Commission has made appropriate amendments to the Rule.

In respect to clause S5.2.6.2(a)(1) and the suggestion by Vestas that two separate telephone facilities may have commercial considerations for generating systems, the Commission notes that the suggestion relates to the automatic access standard and does not necessarily need to be met, subject to the negotiated access standards, unless necessary to maintain system security.

In respect to clause S5.2.6.2(c) and the request for clarification by Vestas of backup telephone facilities, the Commission would expect that the NSP and/or NEMMCO would advise on the arrangements that would represent backup telephone facilities. Accordingly, the Commission does not accept this suggestion.

In relation to the comments by Vestas on references to ‘central remote monitoring system’ and ‘aggregate generating system’, the Commission notes that the phrase ‘central remote monitoring system’ carries a different meaning to the phrase ‘to a communications interface in a location reasonably acceptable to the NSP’, and considers that the latter phrase works as was intended.

4.1.14 Generating units and systems

NEMMCO proposal

NEMMCO has used the terms “generating units” and “generating systems” both separately and together throughout the proposed changes to the technical standards. These terms are defined in the Rules as follows:

A “generating unit” is the actual generator of electricity and all the related equipment essential to its functioning as a single entity.

A “generating system” is a system comprising of one or more generating units and includes auxiliary or reactive plant that is located on the generator’s side of the connection point and is necessary for the generating system to meet its performance standards.

Views in submissions

The issues raised in first and second round submissions include:

- Auswind, the NGF, REGA, Roaring40s, VENCORP and Vestas (first round) were concerned that obligations have been placed unfairly on individual generating units where it would be more appropriate to place the obligation on the generating system, which would allow more technologies to meet the required performance standard at potentially lower; and
- NEMMCO (second round) believed that in regard to a generating system remaining in ‘continuous uninterrupted operation’ it is not clear whether a plant would be compliant if at least part of it remained in continuous uninterrupted operation.

The Commission’s consideration and reasoning

The Commission agrees with the views raised in submissions. It also notes that NEMMCO expressed the same intention in its proposal and has provided that flexibility in a number of the proposed clauses. The Commission considers that the terms “generating units”, “generating units and generating systems” and “generating units or generating systems” should be replaced by the term “generating system” in a number of the clauses of the Rule to be made to give full effect to NEMMCO’s intention and the views in submissions. It also considers that the term “generating unit” should be replaced with “generating system including all operating generating units” in several other clauses. The changes have been made in the Rule to be made. The Commission has not identified any transitional issues in relation to this amendment as the Commission is of the view that the amendment is less onerous for existing units and systems.

4.1.15 Other technical requirements

In regard to other technical requirements, the NEMMCO proposal relates to the following clauses:

- S5.5.2, S5.5.4, S5.5.5, S5.5.6 and S5.5.7 (technical details to support application for connection and connection agreement);

NEMMCO proposed that these clauses be amended. In regard to clause S5.5.7, NEMMCO advised that the modification removed the data schedules S5.5.1 and S5.5.2, and allows their replacement to be changed outside of the Rule change process. This is because the data requirements need to change from time to time to reflect changes in technology. It is proposed that changes to these schedules will be made through a Rules consultation procedures.

The Commission’s consideration and reasoning

In regard to clause S5.5.6 and the deletion of ‘synchronous’ from ‘generating system’, the Commission agrees that the removal of this word permits the cause to operate as was intended. The Commission notes that any small generating unit (under 30MW), connecting to a distribution network is not likely to significantly impact on power system security. Therefore, the Commission considers that there is no reason why this provision should not be extended to include asynchronous generating unit as well as synchronous generating unit. Accordingly, the Commission has made this variation to the Rule to be made.

4.1.16 Glossary definitions

NEMMCO proposal

NEMMCO proposed a number of new definitions:

- “access standard”;
- “adequately damped”;
- “considered project”;
- “continuous uninterrupted operation”.
- “generating system design data sheet”;
- “generating system model guidelines”;
- “generating system settling data sheet”;
- “nominal voltage”;
- “non-scheduled generating system”;
- “normal voltage”
- “rated active power”;

- “scheduled generating system”.

In addition, NEMMCO proposed alterations to the following existing terms:

- “generating system”;
- “Generator”;
- “nameplate rating”;
- “reliability”.

In the second round, the following new definition was proposed by NEMMCO:

- “restricted model information”.

Views in submissions

The issues raised in first and second round submissions include:

Adequately damped

- Hydro Tasmania (first round) considered that reference to a damping ratio is also applicable to second order systems and, while second order approximations may be appropriate in some circumstances, this cannot be considered as universally possible with acceptable outcomes; and
- Vestas (second round) considered that the neper is not an SI unit that is in common use and request an alternate be used.

Considered Project

- Auswind/REGA (first round) suggested adding a new paragraph (a)(3) ‘the Connection Applicant has obtained all necessary planning and development approvals’: and
- NEMMCO (second round) suggested that paragraph (a) be changed to place the assessment of material impact on ‘another Connection Applicant’.

Continuous uninterrupted operation

- the AER and ESIPC (first round) submitted that the definition of continuous uninterrupted operation differs from that accepted in a recent case before the National Electricity Tribunal¹⁹, and that NEMMCO’s proposed definition is difficult to interpret and would lead to difficulties in the exercise of the AER’s powers to enforce the relevant standards. The AER recommends retaining the status quo until the Commission’s proposed wider review of technical standards is completed;
- Auswind/REGA (second round) suggested changing ‘delivering ... reactive power’ to ‘supplying or absorbing reactive power’;

¹⁹ NECA v NRG Flinders Operating Services Pty Ltd: Final Determination (15 August 2005).

- ESIPC (second round) suggested a key measure of a generator’s compliance with the standards is its ability to continue to operate during periods where frequency or voltage fluctuate within defined tolerances or during the moments of and immediately following a fault or other credible contingency. As such, the clarity and enforceability of the definition of Continuous Uninterrupted Operation becomes of critical importance to the technical standards provisions. The definition as proposed suffers from a number of deficiencies that make it both hard to interpret and hard to enforce. In this regard, ESIPC supports the drafting changes proposed by the AER and NEMMCO; and
- Vestas (second round) suggested that the definition should only depend upon continuous delivery of active and reactive power, i.e. the last part of definition is unnecessary.

Other terms

- Auswind/REGA (second round) suggested deleting the reference to ‘normal voltage’ as it is not needed and adjusting the definition of ‘nominal voltage’;
- Vestas (second round) considered that the definitions of ‘non-scheduled generating system’ and ‘scheduled generating system’ are circular;

The Commission’s consideration and reasoning

Adequately damped

The Commission notes that there is no definition of adequately damped in the current Rules. Discussions with NEMMCO indicated that the term is difficult to define and that if there is clearly a single dominant frequency then this indicates that a second order approximation can be used and the damping ratio calculated. Otherwise the measurement can be decomposed into separate frequencies and the test for adequate damping can be applied to each identifiable frequency. The definition is a step in the right direction. Given that the submission provided no alternative to this definition, the Commission accepts the definition as proposed by NEMMCO.

In reference to the suggestion on the ‘neper’, the Commission notes its consideration in section 4.1.9 of this Rule determination.

Considered Project

In respect to the suggestion to add a new paragraph to recognise the status of planning and development approvals, the Commission considers that this new requirement will widen the definition of a ‘considered project’ and cannot be made at this stage of the process without further consultation on its impact. Further discussion on the definition of considered project is in section 4.2 of this Determination.

Continuous uninterrupted operation

The Commission considers that the proposed definition is an improvement on the current Rules which leaves the term undefined. The Commission considers that

NEMMCO have proposed the new definition to move from ride-through provisions that are currently unable to be met by some technologies to a more reasonable position. This definition is central to NEMMCO's proposals for the requirements of ride-through capability of generators. However, as noted in Section 4.3 above, the Commission is concerned to ensure that the compliance and enforcement regime is as effective as possible and invites specific feedback from stakeholders on the impact that the definition would be likely to have in this regard.

The variations to the Draft Rule definition, as presented in the NEMMCO second round submission, are well explained by the combined comments of NEMMCO, AER and ESIPC. The Commission understands that the changes were arrived at through a collaborative approach. The Commission accepts the proposed changes as it clarifies the definition of continuous uninterrupted operation and makes it more consistent with the findings of the National Electricity Tribunal.

The Commission considers that the suggestion by Auswind/REGA on this definition has been reasonably addressed by the amendments the Commission has made to the definition.

The suggestion by Vestas to remove all reference to 'all essential auxiliary and reactive plant...' is not supported by adequate reasoning to justify the impact of the deletion. Accordingly, the Commission does not accept this suggestion.

Other terms

In respect to the terms 'normal voltage' and 'nominal voltage', the matter is discussed in section 4.1.4 of this Rule determination.

4.2 Provision of information

NEMMCO's proposal

In regard to the provision of information, the NEMMCO proposal relates to the following clauses:

- 3.13.3(k), (l), (m) and (r) (standing data);
- 5.1.3(f) (principles);
- 5.33(c) (response to connection enquiry);
- 5.3.4(g) (application for connection);
- 5.3.8 (provision and use of information);
- 8.6.2(m) (exceptions);
- S5.2.1(b) and (d) (outline of requirements);
- S5.2.4 (provision of information);
- S5.5.2 (technical details to support application for connection and connection agreement);

- S5.5.4 (technical details to support application for connection and connection agreement);
- S5.5.5 (technical details to support application for connection and connection agreement);
- S5.5.6 (technical details to support application for connection and connection agreement);
- S5.5.7 (technical details to support application for connection and connection agreement).

NEMMCO and NSPs use technical data and models of generation control systems to assess the power system's transfer capabilities under a range of conditions. NEMMCO submitted that it has experienced difficulty obtaining adequate models for some new generation proposals, particularly wind farms, because some wind farm technologies are relatively new and accurate models have not yet been determined, manufacturers are reluctant to provide the information due to commercial sensitivity and because of limitations in the Rules concerning NEMMCO's ability to specify the relevant information and test model parameters. The proposed Rules:

- clarify NEMMCO's power to obtain the relevant models and information;
- expand the requirements to cover generating systems of 30 MW or larger in size irrespective of whether they are classified as scheduled or non-scheduled;
- remove technical details from the Rules and include them in guidelines and procedures to be developed by NEMMCO concerning the information required to be provided; and
- provide for NEMMCO to have the models verified through testing.

NEMMCO also proposes to provide for the staged disclosure of plant technical information to prospective connection applicants so that they may assess the performance impact of their own plant on the power system and also to other parties to increase the base of expert opinion available.

Views in submissions

A number of first round submissions were made with respect to the proposed changes. These stated that the changes:

- provide inadequate protection for commercially sensitive information – for example, simply declaring that information is confidential would not be sufficient to protect the rights of the owners of such information;
- allow an absolute, rather than a reasonable or confined, discretion to NEMMCO to provide information to third parties for the purposes of undertaking research or providing advice to Registered Participants or potential investors;

- in relation to releasing registered offer and bid data, appears to conflict with the confidentiality obligations under clauses 5.3.8 and 5.2.3(c);
- introduce requirements that are unduly specific for the purpose for which they are required, are onerous and are poorly drafted; and
- would have the effect of delaying wind farm development in the NEM and, in any event, would require a period of transition before they could be complied with.

Under NEMMCO's proposed clause 5.3.2(e), NSPs would be required to provide information to a connection applicant sufficient to identify the impact that another project may have on that connection.

ETNOF (first round):

The Electricity Transmission Network Owners' Forum (ETNOF) submitted that the term "another project" is insufficiently defined to enable NSPs to fulfil this obligation. It also submitted that further consideration should be given as to whether NEMMCO should, as proposed, have sole responsibility for the dissemination of plant information.

Auswind/REGA (second round):

In respect to a general point, Auswind/REGA have included comments from several manufacturers with their suggested changes to the Rules, these illustrate the concern that the wind turbine manufacturers have concerning their intellectual property. While Auswind/REGA acknowledged that NEMMCO require data to study the system and manage system stability and that participants deserve to study network adequacy for the development of connection applications, it is not viable for all IP to be made public. Auswind/REGA trusted that AEMC will give this careful consideration in light of the developing renewable energy sector and the management of the system's mathematical modelling.

In respect to clause 3.13.3(k), confidential information provided to NEMMCO by a registered participant should not be made available to other registered participants.

In respect to clause 3.13.3(k), should be no mention of Model Guidelines in the rules, or if mentioned, as an advisory not only and not enforceable.

In respect to clause 3.13.3(r), the terms 'reasonable' and 'reasonably' are used throughout the Rules. Use of these terms introduces uncertainty to the interpretation of the Rules and represents a risk for participants, especially Generators seeking a connection agreement. Suggest these terms be removed from the Rules.

In respect to clause 5.1.3(f)(2), agree importance of confidentiality of information. Declaring that information is confidential is not sufficient to protect the rights of the parties.

In respect to clause 5.3.4(g), concerned about potential risk of disclosure of confidential IP to third party via this clause.

In respect to clause 5.3.8(b), Vestas has concern relating to the provision of company IP and the subsequent disclosure to a third party suggested variation to existing clause is provided).

In respect to clause S5.2.1(b)(2), information subject to confidentiality concerns as noted previously.

In respect to clause S5.2.1(d), compliance with 5.1a may be a problem.

In respect to clause S5.2.4, a number of manufacturers are deeply concerned with the provision of data clauses and it is evident that Intellectual Property rights need to be carefully considered without compromising the ability to study the network. We think that further work on S5.2.4 is required.

In respect to clause S5.2.4(a)(2), would prefer no mention of Model Guidelines in Rules, or if mentioned, as an advisory note only. In particular, a requirement to provide "all data..." is not acceptable due to intellectual property disclosure concerns.

In respect to clause S5.2.4(b)(4), the requirement of this clause to provide detailed information on the generating unit must respect the requirement for protection of the Intellectual Property of manufacturers of generation system plant. This plant includes the generating units and any associated equipment such as dynamic reactive plant.

In respect to clause S5.2.4(b)(5), Generators cannot provide unencrypted source code due to IP concerns.

In respect to clause S5.2.4(b)(5), NEMMCO should not nominate specific software simulation products. It is suggested that the Block Diagram is provided by the Generator, and then NEMMCO may produce the model in the software of their choice. Suggest (b)(5) be deleted in total.

In respect to clause S5.2.4(d), information should not be updated unless a significant change has been incorporated.

In respect to clause S5.2.4(e), Generator should provide Block Diagram, not models.

In respect to clause S5.2.4(g), this clause requires the information under (b)(4) to be provided in a non-confidential form, which is not acceptable, nor practice elsewhere in the world. The requirement of this clause to provide detailed information on the generating unit must respect the requirement for protection of the Intellectual Property of the manufacturers of generating system plant... This clause is not consistent with clause (f) which stipulates that "all information provided under this clause S5.2.4 must be treated as 'confidential information'.

In respect to clause S5.2.4(g), the 3.13.3(k) Rule as drafted does not go far enough. Declaring that information is confidential is not sufficient to protect

the rights of the parties that are the source of that confidential information. What are the consequences of information being declared as being “confidential”? Will the Rules outline that? Further, there is discrepancy between this provision and the accompanying comment and the practical effect that 3.13.3(k1) is likely to have. What enforcement rights in relation to infringement (i.e. failure to keep information confidential) are there?

In respect to clause S5.5.2, S5.5.5 would prefer no mention of Model Guidelines in the rules, or if mentioned, as an advisory note only. Suggest ‘block diagram’ or ‘Generating System Control Description’ as a replacement for ‘Model Guidelines’.

In respect to clause S5.5.2, previously Block Diagrams were required, the change to requiring models will significantly increase project cost and potentially delay projects.

In respect to clause S5.5.4 to S5.5.7, change ‘Generating System Model Guidelines’ to ‘Generating System Control Description’.

In respect to clause S5.5.6, change ‘...supplied if required...’ to read ‘...supplied if reasonably required...’.

In respect to clause S5.5.7, earlier this year, NEMMCO published a series of documents on generator registration including one entitled “Wind Farm Model Guidelines and Checklist”. This document was published prior to any Rule change to mandate such document and was NOT developed in accordance with Rules consultation process. Upon finalisation of this Rule change, NEMMCO must be instructed to subject this document to a full Rules consultation process.

In respect to clause S5.5.7(a)(3) and the requirements when developing mathematical models, the implications of this need to be carefully considered. The mathematical models referenced here should have the same level of fidelity/accuracy as the power system mathematical model, ie. The detail included should not be more than is appropriate.

In respect to clause S5.5.7(b), change ‘...NEMMCO must have regard to...’ to read ‘NEMMCO must observe any pre-existing Confidentially Agreements, and have regard to...’.

In respect to clause S5.5.7(d), Vestas would like to see a definition of minor (a change may not be considered minor to all parties). Alternatively, all changes should be subject to the consultation procedures.

In respect to clause S5.5.7(m), confidential information should not be disclosed. Suggest delete this exception.

In respect to clause S5.5.7(n), performance standards are between the Generator, the NSP and NEMMCO, not with all other NSPs. Specific permission should be sought for this to happen on a case by case basis as required. Suggest delete this exception in total.

NEMMCO (second round):

In respect to a general point, we support the dual-model concept in the draft, and suggest improvements to address issues of confidentiality and fitness for purpose of the models, and to generally improve the process of supplying the less detailed model.

In respect to a general point, under the AEMC's proposed drafting there is some contradiction about the confidentiality of the model. Some clauses state that the information is confidential, and restrict its provision to other parties, while others describe the less-detailed model as 'non-confidential'. Non-confidentiality implies that the model could be published or provided to anyone, whereas the concept of confidentiality as defined in the current Rules allows the confidential information to be provided to others only as allowed under the Rules... NEMMCO considers that it would be better if both the detailed and less-detailed versions of the model were considered confidential and protected from public distribution.

In respect to a general point, both the detailed and the less detailed models must be fit for purpose. The current drafting has no test for determining the adequacy of, or set minimum requirements for the models, and therefore, there is no basis for rejecting a less-detailed model, if for example, the performance it predicts differs significantly from that predicted by the detailed model for the same power system conditions. In such circumstances the release of the less-detailed model could be potentially misleading. NEMMCO proposes that both forms of the model must be consistent with the model guidelines, in order to ensure that an adequate standard of model is obtained.

In respect to a general point, to implement this concept NEMMCO has proposed a new defined term 'restricted model information' to identify: (a) the more detailed model (when an acceptable alternative model has been provided); and (b) source code associated with both model forms.

In respect to a general point, under the current drafting source code would be confidential, and only required to be provided to NEMMCO. NEMMCO suggests extending this to: (a) a requirement for source code for the less-detailed model; and (b) permit sharing of source code with NSPs.

In respect to a general point, model object code is derived by compiling the model source code to a binary format. It has been NEMMCO's practice to provide on request to Registered Participants a library of object code for all the models (under clause 3.13.3(k)) so that Participants can run their own transient stability studies... The alternative would be for individual Participants to develop their own source code for each model from the block diagrams and compile this code to produce object code. This would be prohibitively expensive and inefficient. NEMMCO proposes to preserve the current arrangements by clarifying that object code (or equivalently encrypted models, used by some software vendors) is not 'restricted model information' even though it is derived from source code that is 'restricted model information'.

In respect to clause 3.13.3(k)(2)(ii), existing information is from a range of sources including TNSPs (through (f) and (g)) and Generators (through S5.2.4 and schedules 5.5.1 and 5.5.2) so drafting can't refer to S5.2.4(g).

In respect to clause 3.13.3(k)(2)(ii), add phrase 'except for *restricted model information*' to be consistent with the principle of Generators providing detailed and less-detailed dynamic simulation models, one for use by NEMMCO and TNSPs, the other for general use.

In respect to clause 5.3.4(g), the phrase 'that is a generation project' has been included because the information listed is specific to generation, but the clause is general to all types of connection.

In respect to clause 5.3.4(g)(2), insert 'restricted model information' and expand reference to clause S5.2.4(b)(4) to be consistent with the proposed principle of having a detailed and less-detailed dynamic simulation model for generating plant.

In respect to clauses 5.3.8(a)(3) and (b), suggest deleting the reference to clause 5.3.2(c) and adding instead to paragraph (b) permission for information to be shared between NSPs...as well as between a NSP and NEMMCO. The link into 5.3.2(c) doesn't lend itself well to this usage. The proposed wording is clearer and keeps all the references to permitted usage of the information together in clause 5.3.8.

In respect to clause 5.3.8(c), the phrase 'except for restricted model information' is needed for consistency with the principle of allowing a detailed and less-detailed dynamic simulation models for generating plant under S5.2.4.

In respect to new clause 5.3.8(d), it is suggested that new paragraph (d) be included as this specifically allows for the provision of information under clauses 3.13.3(l) and (m), avoiding conflict with this clause, and also sets limits on when the information is to be provided under clause 3.13.3(l) and (m).

In respect to clause 5.3.8(h), suggest extending the requirement to a person 'intending to become a Registered Participant', as the person may have an executed connection agreement, but not yet have registered. The information about which NEMMCO is advised should include changes to dynamic models, control system settings and metering installations in addition to changes to performance standards and arrangements for updating models.

In respect to clause 5.3.8(h), suggest extending the requirement to a person 'intending to become a Registered Participant', as the person may have an executed connection agreement, but not yet have registered. The information about which NEMMCO is advised should include changes to dynamic models, control system settings and metering installations in addition to changes to performance standards and arrangements for updating models.

In respect to clause S5.2.4(b)(1), extend to include the date that an application to connect is made as an option.

In respect to clause S5.2.4(b)(3), suggest amending to clarify its intent. The intend of the clause was to allow a shorter notification period if the alteration was the result of repairs following a plant failure. The suggested wording also clarifies that this information is only required if the alteration results in a change in plant performance.

In respect to clause S5.2.4(b)(4) and (5) and the requirement 'sufficient for NEMMCO and NSPs to perform load flow and dynamic studies', transfer this requirement to paragraph (4) to improve clarity. Its additional application to subparagraph (5) is not required.

In respect to clause S5.2.4(e)(5)(i), qualify the model of the power system with 'excluding restricted model information'.

In respect to clauses S5.2.4(g) and (h), dynamic models need to be provided by the Connection Applicant at the time of submission of the connection application, so that analysis can be done by the NSP and NEMMCO of the proposed access standards. The same information needs to be made available to other Connection Applicants once an offer to connect has been made... in order for the proposed arrangements for two levels of model (under paragraphs (b) and (g) to work) the Connection Applicant will need to provide models under paragraphs (g) and or (b) at time of submission of their connection application.

In respect to new clause S5.2.4(i), it has been added to clarify that even though the source code is restricted model information, the object code derived by compiling it is not restricted model information because the compilation process protects the intellectual property. This is to preserve the current practice of distributing object code to Participants under clause 3.13.3(k), which is an efficient way of enabling Participants to perform simulations. The alternative is that participants would have to write their own source code for each of the models from the block diagrams and then compile them in order to run the simulations. This would be extremely costly and impractical.

In respect to clause 11.5.2, and the exemption that the provision of a model under clause S5.2.4 does not apply to a person who has commenced applying to be registered. NEMMCO disagrees with this proposal because a lack of models for some significant generating plant would reduce NEMMCO's capability to assess power system security as NEMMCO would have no model information to predict the impact of such plant on the capability of the power system. The model information is required for all significant plant, and there should not be an exemption that allows a Generator to avoid this obligation.

NGF (second round):

In respect to a general point, the NGF considers that connecting parties should provide all necessary data and models to all NSPs and NEMMCO to fully test the proposed connection before commissioning. That said, it is important that the requested data is truly required. We therefore support further examination of information requirements as part of the technical standards review.

Roaring 40s (second round):

In respect to clause S5.5.7, instances have occurred where wind turbine generators have been prevented from generating due to the Generator Registration process being delayed. These delays have occurred due to the difficulties associated with satisfying NEMMCO's demand for information... Roaring 40s suggest that in many cases the cost of the delays incurred outweigh the value of reduced operational safety margins that would result from more precise modelling, especially considering the size and electrical location of the project within the network. If the information requested was technically and contractually possible for the Developer to supply, or not of high intellectual property value to the Wind Turbine Supplier, the information would be supplied without delay.

In respect to clause S5.5.7, Roaring 40s do not believe that NEMMCO should have the ability to request information that is not directly associated with their primary role, and suggest that the motive of developing a local market should not be considered in relation to this issue. If wind turbine suppliers are required to divulge high value intellectual property in order to be involved in the Australian market, it is likely that this will discourage manufacturers from participating in the Australian market, or possibly restrict the range of products offered. It appears that this phenomena is causing substantive economic detriment to these [China and the US] markets by reducing competition between suppliers and excluding more efficient "latest generation" turbines...Roaring 40s considers that the overarching economic implications of technical information provision and release are best managed by the AEMC...While we consider it entirely appropriate and indeed desirable for NEMMCO...to take the lead role in developing these provisions, there are substantial risks in placing ultimate custodianship of these provisions with NEMMCO.

Vestas (second round):

In respect to clause 11.5.5, an arrangement whereby changes proposed by NEMMCO should be subject to adjudication before they are used to determine an application for connection would be fairer. What does 'substantially the same' mean?

The Commission's consideration and reasoning

The Commission agrees that NEMMCO and the relevant NSPs should have access to sufficient information, including modelling information, necessary to assess the impact of proposed connections on the power system and that, consistent with other changes included in NEMMCO's Rule change proposal, this should be applied to both scheduled and non-scheduled generation for generating systems of 30 MW or more in size.

The Commission also recognises that allowing that information to be provided to relevant third parties such as:

- parties in the process of considering connecting may assist in preventing overinvestment; and

- other persons undertaking research or advising Registered Participants or potential investors
- has the potential to promote greater industry expertise with respect to the relevant technologies.

The Commission understands that disclosure has the potential to result in more efficient and effective outcomes for electricity users over time. However, the Commission also understands that such an arrangement must be balanced with concerns regarding Intellectual Property.

The Commission recognises that in seeking the ability to release information, NEMMCO is attempting to encourage the development of the local market for wind generation technology in particular. However, the Commission notes that the benefits of disclosure must be balanced against the need to ensure that commercially sensitive material is appropriately protected. The Commission also notes the second round comments received in regard to this proposition.

In addressing the above issues, it needs to be clear:

- what the information is that NEMMCO and the relevant NSPs require and why it is needed;
- what parts of that information are commercially sensitive and therefore require protection;
- how the processes NEMMCO has proposed will ensure appropriate protection;
- the timeliness of providing this information when assessed against the maturity of the industry to manage such information so as to placate any concerns with the handling of the information; and
- that there are appropriate transitional arrangements in place to accommodate parties who do not have equipment that is compliant, or ready access to the range of necessary information prescribed in the NEMMCO proposal.

The issues are interrelated. A lack of clarity as to the information required makes it difficult to be satisfied that the information is appropriately protected. Without confidence as to that level of protection, it also becomes difficult to assess whether the discretion a party has to release that information is reasonable. For example, if NEMMCO considers it necessary that it have an absolute discretion to release information to a generator's potential competitors, then it becomes important that there be strong confidence that the version of the material that is released is non-confidential.

Considerations arising from first round submissions

The Commission notes from the first round submissions that the concerns of those parties who made submissions relate principally to three sets of information proposed to be provided to NEMMCO and/or the relevant NSP. The three sets are:

- the functional block diagrams and associated information in proposed revised clause S5.2.4(b)(4);

- the simulation source code referred to in proposed clause S5.2.4(b)(5); and
- the information proposed to be contained in the generating system model guidelines, generating system design data sheet and generating system settings data sheet referred to in proposed new clause S5.5.7(a).

NEMMCO stated that the purpose of all three sets of information is to allow generating plant to be modelled in load flow and dynamic stability assessments with sufficient accuracy to permit power system operating limits to be assessed, proposed access and performance standards to be assessed and plant and control system settings to be assessed to ensure the best performance of the power system.

Under proposed clause S5.5.7, the content of the guidelines and data sheets are to be developed by NEMMCO in accordance with the Rules consultation procedures. The Commission understands NEMMCO's intention to be that, initially, the two data sheets will replicate existing Schedules 5.5.1 and 5.5.2 and that the information required that is specific to wind generation technologies will be developed and incorporated into the guidelines and data sheets during the consultation process.

The Commission understands that submissions on this issue are being driven principally by concerns in relation to wind generation and the fact that the technology is relatively new. It understands that parties who made submissions were strongly concerned that:

- the processes proposed by NEMMCO to protect the commercial value of the three sets of information referred to above are inadequate; and
- there is a lack of detail in the proposed Rule as to the content of the guidelines and data sheets – in particular, wind farm connection applicants may be unable to comply with the requirements to lodge the relevant information as part of the connection and registration process with any failure to comply would presumably result in a refusal by NEMMCO to register the plant.

The Commission notes that the risks identified in theory apply to all forms of generation. It also notes that:

- the functional block diagram and associated information, but not the simulation source code, and what is expected to be the initial content of the data sheets, is information that is currently required of connecting generators, including wind farms; and
- at the time of writing the draft Rule determination, NEMMCO had available on its website a Wind Farm Model Guidelines and Checklist document²⁰ that identifies material that NEMMCO considers relevant to the existing S5.2.4 requirements – it is understood that NEMMCO intends that a version of that material should form part of the detailed requirements under the revised clause S5.2.4 and/or the guidelines and data sheets.

²⁰ NEMMCO's website is located at www.nemmco.com.au.

The Commission recognises that wind technology is relatively recent and that it will take a further period of time to develop the appropriate detailed information requirements.

However, the Commission agrees that the three sets of information referred to are crucial in providing NEMMCO with the ability to manage the impact of new connections on power system security. The information is also important to enable NSPs to manage the impact on quality of supply for network users.

On the basis of the material referred to above, the Commission considered that relevant stakeholders currently have sufficient experience in relation to, and understanding of, the nature of the information likely to be required that makes it appropriate that parties who wish to connect to the power system must provide that material to NEMMCO and the NSP as part of the connection process. This is irrespective of the fact that the detailed requirements will not be finalised for a further short period of time.

Overall, the Commission proposed to address the issues raised in NEMMCO's proposal and in submissions by making the following amendments to the Draft Rule:

- that new connection applicants must provide the three sets of information to NEMMCO and the NSP as proposed;
- that they must also provide non-confidential versions suitable for release to relevant third parties other than NEMMCO and the relevant NSP of the functional block diagram and associated information in proposed clause S5.2.4(b)(4) and the material to be provided in accordance with the guidelines and data sheets – the Commission considered it would not be possible to specify a non-confidential version of the simulation source code referred to in proposed clause S5.2.4(b)(5) and has accordingly made it clear that the information not be released to those third parties; and
- that NEMMCO and the NSP may only release to third parties the non-confidential versions of the functional block diagram and associated information and the guidelines and data sheets.

The Commission considered that these requirements would provide connection applicants with appropriate protection in relation to information that they consider to be commercially sensitive and that NEMMCO and the NSPs would receive the information they require to meet their system security and quality of supply obligations.

In principle, the potential benefits to both electricity investors and users to be derived from relevant third parties being able to access non-confidential versions of the information referred to are also important. In practice, the extent of those benefits will ultimately depend on whether those non-confidential versions provide material sufficient to address the needs of those third parties. In order to ensure that this is in fact being achieved, the Commission also proposed to review the effectiveness of the above requirements within two years of the date of commencement of the Rule.

The Commission recognised the importance of these issues, and in the Draft Determination strongly encouraged feedback from stakeholders as to the way

forward including specific options for improving the arrangements. As part of that feedback, the Commission invited comments in relation to ETNOF's submission that consideration should be given to the appropriateness of parties other than NEMMCO being able to release information to relevant third parties other than the connection applicant. The Commission acknowledges that it received a number of submissions stating concerns with this arrangement.

Additionally, the Commission noted ETNOF's view that the term "another project" in proposed clause 5.3.2(e) is too broad. This comment also relates to the proposed definition of "considered project" in Chapter 10 of the Rules. Both attempt to identify the projects of other parties that appear reasonably close to connecting to the power system and that would, if connected, have an impact on the connection applicant's own project. As noted above, requiring the NSP to provide the connection applicant with information in this regard would minimise the risk of the applicant over-investing. The issue identified by ETNOF is that too wide a definition may impose an unworkable obligation on the NSP to so advise. The Commission has amended the Draft Rule definitions to reflect that the NSP's reasonable opinion as to whether the project would materially affect the connection applicant's plant, should be the relevant test. In making this change the Commission noted that the proposed clause 5.3.2(e) had been relocated as clause 5.3.4(g) in the Draft Rule. Further comment on this matter in regard to second round submissions has been provided in Section 4.3 of this Rule determination.

Intellectual Property (second round)

In respect to the matter of the release of Intellectual Property (IP) to third parties, as prescribed in a number of clauses, and the suggestion that it is not viable for all IP to be made public, the Commission notes the overall concerns of the parties. On the one hand, NEMMCO has addressed its concerns by providing the Commission with a number of proposed variations to the Draft Rule which would, in their view, substantially reduce industry concerns on this matter. On the other hand, industry members have raised reasonable arguments as to why all of this information should not be released to third parties. At the same time, the industry parties have recognised that IP should be provided to NEMMCO and the NSP to allow these parties to fulfil their legitimate obligations under the Rules.

The Commission considers that as it is crucial for NEMMCO and the NSPs to receive accurate information on the operating performance of a generator's plant, the right for these parties to receive confidential information which is classified as Intellectual Property should be embraced by the Rules. This information would include a set of functional block diagrams, the parameters of each functional block, characteristics of non-linear elements and simulation source code. The principle is that the generator is responsible for the model that captures the detailed dynamic performance of its plant, and NEMMCO may initiate testing if they have a concern about the model being satisfactory.

On further analysis, the Commission considers that the framework for the provision of confidential information can be separated into the following two parts:

1. confidential information provided to NEMMCO and the NSPs (NEMMCO and NSP information); and

2. information provided in a non confidential form to third parties (third party information).

On this two part basis, the solution presented in the Draft Rule appeared to have unanimous support when only applied to NEMMCO and NSPs. Accordingly, the Commission has determined to change the framework presented in the Draft Rule to adopt only the first part at this time.

The Commission considers that the balance of trade-offs for the second part needs to be given further consideration taking into account the new technology emerging in the environment. Is it more important that third parties have access to confidential information that may erode a competitor advantage, or is it more important that third parties have access to confidential information to enable them to perform power system simulation studies? And what cost should a third party bear in gaining access to this confidential information?

The Commission also considers that there are benefits in the confidential information in Chapter 5 being disclosed to third parties in circumstances that are acceptable to all relevant parties. This would assist generator proponents to develop their projects and associated applications to connect while maintaining the confidentiality of the manufacturer's intellectual property. To this end, it is the view of the Commission that NEMMCO should take steps to form a working group or similar forum which would involve relevant industry representation, including manufacturers and wind farm proponents, to identify the process surrounding how and when currently confidential information should be made available to affected third parties. A Rule change proposal may be the appropriate vehicle to implement these arrangements.

The Commission notes that in the past NEMMCO has made generator data available to third parties under the current clauses 3.13.3(k)(1)(i) and (ii). As described above, the Commission has made a decision to prevent the disclosure by NEMMCO or the NSP of confidential information. The Commission has not maintained the right of NEMMCO to disclose such data to third parties that exists in the current Rules on the basis that the Commission considers it appropriate to treat new and existing generators in the same manner. The Commission considers that the terms of reference for the NEMMCO working group to consider confidential information will comprehensively address the issue of what data should be disclosed and create a more effective long term arrangement.

From a broader perspective, a Generator who is seeking to model the operation of the NEM, including the performance of other participants, could be expected to do so in the first instance from their knowledge and experience with generation and grid technology. If they needed to have unique knowledge about a nominated generating unit, the entity should (in the first instance) apply normal commercial and legal techniques to gain access to that information. However, NEMMCO specifically notes that such an arrangement would be "costly and impractical".

The framework for the provision of information between generators, NSPs and NEMMCO is to cover the rights of NEMMCO and the NSPs to access confidential information regarding accurate models of generator performance. Third party access to information that NEMMCO proposed as part of its Rule change proposal and the Commission modified in the Draft Rule, has been removed from the Rule to be made.

As a consequence of the Commission's decision to remove NEMMCO's ability and in some circumstances the NSP's ability to supply confidential information to third parties, the definition of *considered project* in Chapter 10 has been amended to remove the reference to generator projects. The references to transmission and distribution network augmentations have been retained in the definition of *considered project* because the Commission sees the benefit of such information when negotiating access standards and for the generator in preparing an application to connect (see S5.2.4(e)(5)(i)).

Similarly, the reference to *considered projects* in clauses S5.2.5.4(d)(2), S5.2.5.5(d)(1)(ii), S5.2.5.12(c)(1)(ii) and S5.2.8(d)(2) has been replaced by 'other relevant projects'. In each case the Commission considers that the NSPs and NEMMCO have access to the necessary information on these other relevant projects.

Other matters (second round)

In respect to clauses 5.3.8(a)(3) and (b) and the suggestion that the information can be disclosed between NSPs and NEMMCO and also between NSPs for the purposes of negotiating an access standard, the Commission accepts that this change improves the clarity of the provision. However, in its amendment to the Rule, the Commission has qualified the information sharing between NSPs to circumstances where the information is materially relevant to the other NSP to ensure confidential information is not inadvertently disseminated amongst NSPs.

In respect to clause 5.3.8(h) and NEMMCO's suggestion that the requirement be extended to a person who intended to register, the Commission notes that the provision has been widened to include any person whose intention is to register as a Registered Participant. The Commission notes that NEMMCO has justified the widening of the scope of this provision to a category of person who may have signed a Connection Agreement but had not yet been registered with NEMMCO. The Commission accepts that any incorrect information in the Connection Agreement that becomes apparent to the person should be brought to NEMMCO's attention as soon as possible. However, the Commission considers that the phrase 'person who intends to become a Registered Participant' is too broad, and clause 5.3.7(g) effectively limits the obligation in clause 5.3.8(g) to only Registered Participants who have entered into a connection agreement with a NSP.

NEMMCO (second round) proposed a clarification to the timeframe for information to be provided under clause S5.2.4(b)(1). The Commission understands that a proposed performance standard forms part of the application to connect and has therefore amended this clause to clarify the Rule to be made.

In respect to clause S5.2.4(b)(4) and (5) and the suggestion that the reference to load flow and dynamic simulation studies be limited to subparagraph (4) only, the Commission has made this change as it improves the operation of the provision.

In respect to clause S5.2.6.1(a)(1) and the suggestion that terms 'reasonable' and 'reasonably' be removed from the Rules, the Commission notes that these terms have only been included for the purpose of clarification, as parties are required to act in a 'reasonable' manner under general legal principles. Removal of these terms from the Rules does not affect the legal obligations imposed on these parties.

In respect to clause 11.10.2 and the suggestion that the exemption on providing models at the commencement date of the new Rules to certain people should be removed, the Commission notes that NEMMCO is concerned with the provision that removes the need for a person who is in the process of registering as a Registered Participant at the commencement date from providing model information as part of the S5.2.4 provisions.

On review, the Commission understands that it is normal practice for a person to commence this registration process after a Connection Agreement has been signed, which in turn is after a Connection Application has been submitted. That is, the registration process is the last phase of the sequence of achieving network access.

The Commission also understands that prior to executing a Connection Agreement under the existing Rules, the person has provided the NSP and NEMMCO with all necessary information for studies to be conducted on power system security, power system quality and reliability of supply. In particular, clause S5.2.4(b)(1), (2) and (3) of the current Rules specifies a range of information which taken together represents the components of the model that is referenced in the NEMMCO proposal. The Commission considers that a person, who at commencement date of the Rule to be made, has commenced the registration process but has not been granted registration status by NEMMCO, either has or should be in the position to conform to the new provisions contained in the Rule to be made.

The Commission notes that it would be unfair for a person, who under the current Rules did not expect to provide source code and other minor information requirements of clause S5.2.4, to have its registration process unduly delayed whilst it prepared and/or assembled the necessary information. For this person, the Commission considers that it is fair for a 6 month extension to be granted, such that NEMMCO can proceed to complete the registration process based on the current requirements without the full set of data required by the new Rule being provided, in the knowledge that within 6 months of the commencement date the person who is granted registration will provide the remaining information.

The Commission notes concerns in relation to the development of the Generating System Design Data Sheet, the Generating System Setting Data Sheet and the Generating System Model Guidelines ("the documents"). The Commission has included a requirement that NEMMCO must develop a version of the documents in accordance with Rules consultation procedures by 1 March 2008. The requirement to conduct the Rules consultation procedures was placed on NEMMCO in the Draft Rule and has been retained in the Rule to be made. However, if NEMMCO does commence the Rules consultation procedures prior to the making of the Rule, clause 11.10.5 allows NEMMCO to be taken to satisfy those requirements of the Rules consultation procedures that NEMMCO has already undertaken to prevent any unnecessary duplicity.

In addition, until NEMMCO publishes the requisite documents under clause S5.5.7, schedules 5.5.1 and 5.5.2 that are being deleted are taken to be the Data Sheets until at the latest, 29 February 2008.

4.3 Access negotiation and compliance

NEMMCO's proposal

In regard to access negotiation and compliance, the NEMMCO proposal relates to the following clauses:

- 2.2.1(e) (registration as a generator);
- 2.9.2 (admission as a registered participant);
- 5.1.2(a) (purpose);
- 5.1.3(b2) (principles);
- 5.2.2(b) (connection agreements)
- 5.2.5(a) and (b) (obligation of generators);
- 5.3.1 (process and procedures);
- 5.3.2(a) and (e) (connection enquiry);
- 5.3.3(b) (response to connection enquiry);
- 5.3.4A(a), (b), (d) and (g) (negotiated access standard);
- 5.3.5(a), (d) and (g) (preparation of offer to connect);
- 5.3.6(e) (offer to connect);
- 5.3.7(a), (a1), (a2), (a3), (e) and (f) (finalisation of connection agreements);
- 5.3.7A new (submission of performance standards);
- 5.3.7B new (acceptance of performance standards);
- 5.3.8 (provision and use of information);
- 5.3.9 (procedure to be followed by a generator proposing to alter a generating system)
- 5.3.10 new (acceptance of performance standards for generating plant that is altered);
- 5.4.1 (applicability);
- 5.4.2 (advice of inconsistencies);
- 5.7.3(a, (c) and (e) (right of testing);
- 5.7.6(a1), (g) and (h) (tests of generating units requiring changes to normal operation);

- 5.10 new (performance standards – transitional arrangements);
- 5.11 new (acceptance of performance standards);
- 5.12 new (performance standard compliance);
- S5.2.5.10(d) (protection to trip plant for unstable operation).
- S5.2.5.12(d) (impact on network capability).

NEMMCO submitted that the current Rules for negotiating access:

- do not provide sufficient guidance as to the technical requirements leading to a lack of consistency between the completed performance standards applicable to different connecting parties;
- do not allow the adverse impact of the connection on supply reliability to customers to be taken into consideration;
- limit the effectiveness and efficiency of compliance monitoring and enforcement by:
- exempt some owners of older plant from complying with performance standards;
- restrict NEMMCO's input into the assessment and wording of proposed performance standards during the negotiation process;
- restrict the ability to revise performance standards except where plant has been modified; and
- require a review of all performance standards where plant has been modified rather than just those that are affected by the modification.

NEMMCO proposed a range of changes to the access negotiation framework contained in Chapter 5 of the Rules and also to the participant registration process set out in Chapter 2 of the Rules. According to NEMMCO, the changes would provide enhanced guidance as to the relevant technical requirements, introduce reliability of supply as a basis for access negotiation, streamline the compliance process by recording performance standards in a performance agreement outside of the connection agreement, relaxing some restrictions on how generator performance standards can be modified and requiring NEMMCO input to the wording of performance agreements before connection agreements could be executed.

Views in submissions

Reliability of supply

- ESIPC (first round) considered introducing requirements on generator connection applicants not to impact on reliability of supply was not solely an issue for the negotiation of performance standards, that is, ensuring reliability of supply is a complicated task involving the performance of many elements of the supply chain and it would be inappropriate to place the responsibility for doing so solely on generators;

- ETNOF (second round) considered that NEMMCO providing advice on reliability of supply gives it relatively unfettered power of veto in relation to negotiations between a NSP and a connection applicant, without any guidance on the exercise of this power. ETNOF also considered that this power is inconsistent with NEMMCO's current roles while the NSPs already have responsibilities for reliability; and
- Vestas (second round) considered that the requirement for the negotiated access standard in clause S5.2.5.12(d) to include operation arrangements to the satisfaction of NEMMCO is subjective.

The Commission's consideration and reasoning

The Commission notes that ensuring reliability of electricity supply to customers is a key objective for the operation of the power system and, as noted in Chapter 2 of this Rule determination, for the technical standards framework. NEMMCO's proposal is to set:

- a general obligation that access standards negotiated for generating plant must be set at a level that will not adversely affect supply reliability; and
- a technical standard (clause S5.2.5.12) which provides that the impact a generator has on network capability is a specific way that a generator can affect reliability of supply (and also power system security).

The Commission agrees that the connection of generating plant may, in certain situations, have an adverse impact on supply reliability, including the specific situation addressed in proposed clause S5.2.5.12, and that it is in the interests of consumers to ensure that this risk is appropriately managed. This is particularly the case in view of the increasing amount of wind generation in the NEM.

NEMMCO's proposed Rule change included a provision that allowed NEMMCO to consider reliability of supply when advising the NSPs on a negotiated access standard. The Commission adopted this in its Draft Determination and in the Draft Rule. NEMMCO included this requirement to address concerns that under some circumstances new generation can materially reduce the overall reliability of supply to consumers, even though system security issues have been addressed. The Commission reconsidered the issue in light of the second round submissions and, on further reflection, decided not to adopt this aspect of the proposed Rule change.

The connection of a new generating unit or generating system may adversely affect system security, either by reducing stability or thermally overloading a network element, but this can generally be solved by reducing the transfer limits within the network. At present NEMMCO can impose conditions on access so that the generator can be connected securely, but this may be partially achieved at the expense of reducing the network transfer capability and this reduction in network capability can potentially reduce the reliability of the network.

NEMMCO's Rule change proposal would have given NEMMCO the power to impose requirements that are higher (or tighter) than those necessary to meet security but would be necessary to retain the current network transfer capability, and hence reliability. In some instances the reliability issue may be solved by imposing operating restrictions on the connecting generator (for example reducing output

when an associated thermal limit is binding, thus avoiding the impact on reliability) but in instances the issue could only be solved by imposing additional costs on the proponent to restore network transfer capability. Imposing these additional costs on generators would only be economically justifiable if the costs are less than the benefits of restoring reliability, and may not be economically efficient in that further tightening of the technical standards may deliver even further reliability benefits. Therefore, the Commission considers that imposing these additional costs on a connecting generator in the absence of at least a rudimentary economic analysis may be inefficient and unfair to the proponent.

The Commission also notes that NEMMCO has a number of roles in relation to reliability that include:

- maintaining a reliable operating state under clause 4.2.7, which includes directions and the reserve trader;
- advising the Reliability Panel, particularly in relation to the power system security and reliability standards ;
- converting the reliability standard (0.002%) to minimum reserve levels (MRLs);
- providing projected assessment of reserve levels through the projected assessment of system adequacy (PASA) and the Statement of Opportunities (SOO);
- approving settings on equipment for stability, which affects the transfer capability of the network and hence potentially on reliability.

These functions of NEMMCO primarily relate to the reliable planning and operation of the power system as a whole. NEMMCO's planning role in relation to reliability is limited to calculating the minimum reserve levels, provision of information and stability settings. NEMMCO's roles are all in terms of the overall reliability of the power system, rather than local supply implications.

The responsibility for planning the networks for reliability is primarily a NSP responsibility. The NSP consider the system standards in schedule 5.1 and relevant jurisdictional requirements when planning their networks for reliability. In the case of augmentations they apply the Regulatory Test, either the Reliability Limb or by calculating the value of reliability under the Market Benefits Limb. In the case of connection assets the NSPs are still required to meet the relevant system standards including reliability.

Therefore, the Commission considers that the responsibility for reliability within a region is best placed with the relevant NSP as it has the regulatory incentives to optimise the planning of its network and the impact of a new connecting generator. Accordingly, the Commission has removed the obligation on NEMMCO to advise on this matter and any other provisions relevant to this obligation, in the Rule to be made.

Performance standards for existing plant

- AER, ETNOF, the NGF and PacificHydro (first round) submitted that consideration of the changes to do with revisiting the content of the

performance standards for existing plant should be deferred until completion of the Commission's review into the enforcement and compliance with technical standards, and that those performance standards should be based strictly on the access standards that applied at the time.

- NEMMCO (second round) suggested a clarification to clause 5.2.5(a) to relate the particular connection agreement to the relevant facilities rather than the NSP, since separate agreements for separate generating systems is common.

The Commission's consideration and reasoning

In respect to clause 5.2.2, and as noted in Chapter 2 of this Rule determination, the National Electricity Code provided a specific process for settling performance standards for plant connected to the network at the launch of the market. The intention was to reflect the fact that such plant had a variety of capabilities based on requirements that existed at the time of their connection²¹. The resulting performance standards, whether below the minimum access standard or not, were preserved or "grandfathered".

NEMMCO submitted that the results of the grandfathering process have turned out to be unsatisfactory in practice with elements of the resulting performance standards being either difficult to interpret, inaccurate or missing. It proposed that, in any reassessment by NEMMCO of those performance standards, those standards must meet the technical standards applicable to that plant and must also provide an effective basis for compliance and enforcement.

NEMMCO also proposed that generators, market customers or MNSPs who:

- were not registered with NEMMCO at the time the performance standards for those existing plant commenced²² and who subsequently became registered; or
- were a party to a connection agreement but who are not registered as at the date the Rule to be made comes into effect,

be required to submit performance standards to, and have those standards assessed by, NEMMCO. The intention behind this proposal is to ensure that performance standards are settled for plant that were outstanding prior to the relevant commencement date, but were not properly captured by, the original grandfathering process.

As noted above, the Commission has indicated in its report to the MCE on the enforcement of, and compliance with, the technical standards²³ that there were material deficiencies in that grandfathering process. In particular, the part of the process that deemed the content of performance standards where they could not otherwise be agreed between the parties was a failure. Consistent with the recommendations contained in the report, the Commission made a Rule²⁴ that

²¹ Rules, clauses 4.13 and 4.14.

²² 16 November 2003 for plant in a region of the NEM other than Tasmania or 29 May 2005 for those in Tasmania (definition, Rules Chapter 10).

²³ Op cit, footnote 2.

²⁴ Rule No. 21 "National Electricity Amendment (Resolution of existing generator performance standards) Rule 2006", published 7 December 2006.

requires all generators that do not have adequate performance standards to develop suitable performance standards and register those performance standards with NEMMCO prior to 1 June 2007.

For that part of the NEMMCO proposal dealing with this issue, the Commission has determined to not accept the proposed changes under this current determination. It is the Commission's view that the Rule No. 21 (Resolution of existing generator performance standards) requiring all generators register performance standards better addressed the problem. The Commission consider that NEMMCO's proposal in relation to this issue although identifying a problem requiring resolution attempts to restore the deeming process that was central to the failure of the grandfathering process originally. They would therefore not satisfactorily address the issue raised by NEMMCO. The Commission notes that new Rule No. 21 is designed around a negotiate /expert decision model and so avoids the need to deem any content.

Performance standards for new plant

A large number of submissions were received with respect to these changes. Stakeholders were concerned that the proposed changes would fundamentally change, serve to frustrate and/or unnecessarily complicate, the access negotiation process, potentially leading to delays and higher costs to connection applicants and consumers. Specific concerns raised were that the amendments would:

- change the existing negotiation framework so that NEMMCO effectively became a party to the negotiations rather than its role as an advisor to the NSP on technical matters concerning power system security and reliability;
- give NEMMCO a power of veto over the access negotiation process by preventing the NSP and connecting party from executing a connection agreement they had negotiated unless NEMMCO determined that the performance standards that resulted from that process were satisfactory;
- allow NEMMCO to weaken the access negotiation process by treating the performance standards as part of a separate performance agreement made between the applicant and NEMMCO rather than as standards included in the connection agreement between the applicant and the NSP; and
- allow NEMMCO to circumvent the process by affording it a largely unfettered power to impose terms and conditions on connection applicant registration in relation to ensuring power system security, reliability or quality of supply.

A number of the issues raised in first round submissions are identified and addressed in Table 4.3.1 below. Specific comments from submissions included:

- VENCORP (first round) disagreed with NEMMCO's proposal to delete paragraphs 5.2.2.(c) and (d) submitting that those paragraphs assist in preserving the obligations contained in connection agreements;
- VENCORP (first round) submitted that it would be inappropriate for NEMMCO to be involved in assessing performance standards in relation to quality of supply matters as these fall under the NSPs area of responsibility;

- VENCORP (first round) submitted that the existing clause 5.3.6(e) should not be deleted as it allows NSPs to negotiate access terms and conditions that vary from the Rules where relevant consideration such as geographic factors make such variation necessary;
- Auswind/REGA (second round) considered that many technologies cannot meet the proposed automatic access standards contained in clause 5.1.3(d), and the Rules should be clear that both the NSPs and NEMMCO are obliged to negotiate in good faith to reach agreement on negotiated access standards;
- Auswind/REGA (second round) considered that 'adversely' in clauses 5.3.4A(b)(2) and (3) should be qualified with 'materially';
- Auswind/REGA (second round) proposed a new clause 5.3.4A(f)(5) to place an obligation on the NSP to advise the Connection Applicant of NEMMCO's reasons for rejection;
- EnergyAustralia (second round) considered that, in respect to clause 5.3.4A, a general comment on the deadlines and timetables set for responses by interested parties also needs to be made that indicates that the timetable should be seen as those able to be met in the majority of cases and benchmarks to strive, acknowledging that a more relaxed timetable for some more complicated proposals;
- EnergyAustralia (second round) considered that clauses 5.3.4A(f)(2) and (4) do not provide sufficient discretion for a DNSP to reject a proposal based on negotiated access standards in cases where the proposal affects the performance of the network or quality and reliability of a customer's supply;
- EnergyAustralia (second round) considered that clause 5.3.4A does not provide sufficient discretion for a DNSP to reject a proposal based on automatic access standards if the DNSP is aware of factors which would affect the performance of the network or quality and reliability of a customer's supply;
- ETNOF (second round) considered that a new paragraph to clause 5.3.4A(e) requiring NEMMCO to provide reasons why a proposed negotiated access standard would have a material adverse affect on power system security or reliability of supply;
- ETNOF (second round) considered that 'adverse affect' in clauses 5.3.4A(f)(1)(i) and (ii) should be qualified with 'material';
- NEMMCO (second round) considered that clause 2.2.1(e)(3) should be deleted as some of the plant for which registration is sought may not meet the current technical requirements;
- NEMMCO (second round) considered that clause 5.4.2(a) needs to be referenced to the criteria set out in clause 5.3.4A to clarify that any negotiated change to the performance standards should be in accordance with the negotiating framework set out in this chapter, rather than just negotiated in good faith;

- Vestas (second round) considered that it is not possible to provide all required information under clause 2.9.2 prior to registration;
- Vestas (second round) considered that references to NEMMCO's opinion in clauses 5.3.4A(f)(2) and (3) and the NSP's opinion in clause 5.3.5(d) are subjective;
- Vestas (second round) considered that the requirement in clause 5.3.5(g) that the Connection Applicant pays the costs associated with remote control equipment and remote monitoring equipment, as required by NEMMCO, may have significant impact on existing installations, especially if the code is to be retrospective;
- Vestas (second round) considered that the generator should only need to negotiate a compliance monitoring program with the NSP and that it should only consist of an ongoing monitoring program to examine actual faults on the network as simulation of faults is problematic;
- Vestas (second round) noted that there is not a process for determining what are reasonable generator expenses under clause 5.7.3(d);
- Vestas (second round) considered that the requirement in clauses 5.7.3(e)(1) and (2) for NEMMCO to be satisfied or hold a reasonable opinion, judge evidence as reasonably satisfactory, 'satisfied', 'opinion', 'reasonable' are subjective and should not be used in this technical standard; and

The Commission's consideration and reasoning

The access negotiation process in Chapter 5 of the Rules is a core component of the national access regime for electricity networks. As an effective access regime, the Rules must satisfy the criteria for an effective access regime under Part IIIA of the Trade Practices Act (C'th) 1974 (TPA). The Commission has been mindful of the relevant requirements of the TPA, and in particular, the criteria listed in the Competition Principles Agreement²⁵ in the preparation of the amendments to the negotiating process under Chapter 5 of the Rules. In particular, that to the fullest extent possible, terms of access should be on terms agreed between owners of facilities and the persons seeking access.

However, under the NEL and the Rules, NEMMCO has specific responsibility for ensuring the safe, secure and reliable operation of the power system for the benefit of users of the system. It is therefore recognised that NEMMCO has a strong and legitimate interest in ensuring that the performance requirements that result from the access negotiation process are clear, able to be complied with and do not threaten the safe, secure and reliable operation of the system. In a similar way, NSPs have an interest in the process resulting in performance requirements that ensure that connected plant does not impact unduly on the quality of supply provided to other local network customers.

²⁵ See NCC guidelines – The National Access Regime: A Guide to Part IIIA of the Trade Practices Act (Appendix 3).

The current access negotiation process recognises NEMMCO's interests by requiring that:

- at the outset of the negotiation process, the NSP must seek information from NEMMCO as to the technical requirements concerned with power system security and reliability (the relevant mandatory, automatic and minimum access standards) and must then advise the connecting party of those requirements; and
- should the connecting party then wish to negotiate a particular standard between the automatic and minimum levels (because they are not able to meet the automatic access standard), the NSP must seek and accept the advice of NEMMCO in relation to whether the proposed performance standard is acceptable in terms of the power system security and reliability requirements.

The Commission understands that NEMMCO's experience has been that, having received NEMMCO's advice, the NSP and connecting party then proceed to negotiate and agree performance standards that are often not clear, able to be complied with or require acceptable levels of plant performance. However, under the current Rules, NEMMCO has no ability to reject the performance standards after the connection agreement has been entered into. NEMMCO may then be placed in the position where it must operate the power system more conservatively, and therefore less efficiently, in order to ensure that the system is not put at risk. Poor quality standards also make it more difficult to monitor whether the connected party is complying with its performance obligations and to enforce actions for breach. The changes proposed by NEMMCO are designed to provide it with powers to ensure that an effective set of performance standards can be put in place to address those risks.

The Commission accepts NEMMCO's argument that elements of the way in which the existing access negotiation process in Chapter 5 of the Rules are expressed can result in inadequate performance standards. However, the Commission also accepts the views put in submissions that the solutions that NEMMCO proposes in order to address the issue would effectively make NEMMCO a third party to what is intended fundamentally to be a bilateral commercial negotiation process and also allow it to circumvent parts of that process should it so desire.

In the draft Rule determination, the Commission's view was that the underlying issue about NEMMCO's role is more effectively addressed by improving the wording concerning the current process to make it clearer where the relevant responsibilities lie. In particular, it must be made clear that a proposed negotiated performance standard, where it may impact on power system security must only be accepted by the NSP on the advice of NEMMCO. The Commission also accepted NEMMCO's proposal that NEMMCO could also provide advice on adverse effects to reliability of supply. The Commission also gave NEMMCO the option to advise on all matters relating to its functions under the NEL.

The Commission also notes that under proposed new clause 2.9.2(d), NEMMCO would have the power to impose terms and conditions on connection applicant participant registration in relation to ensuring power system security, reliability or quality of supply. The Commission understands that this addition was designed to operate such that any inadequacies in the performance standards that resulted from

the access negotiation process could be addressed at registration. The Commission has not accepted this aspect of the proposal on the basis that the proposed clause would confer a very broad power to impose conditions on registration that go far beyond the scope of the current Rule proposal. The Commission is satisfied that the changes it has made to the access negotiation process discussed above adequately address the concern identified by NEMMCO.

For the same reasons outlined above, the Commission agrees with VENCORP's first round submission that existing paragraphs 5.2.2(c) and (d) should be retained. Those paragraphs are important in ensuring the central role of the connection agreement subject to any overriding power system security, supply reliability and quality of supply obligations on the parties to those agreements contained in the Rules.

The Commission is not accepting the changes proposed by NEMMCO to clause 5.3.1 which would have the effect of placing limits on the access regime in terms of voluntariness and who may seek access. The Commission is aware that there are ambiguities contained within the current Chapter 5 rules, but takes the view that these matters should be the subject of a separate and comprehensive review or Rule proposal, and are not appropriately addressed in an ad hoc way in the context of NEMMCO's current proposal.

The Commission agrees with NEMMCO's proposal to delete existing clause 5.3.6(e). Doing so is consistent with the technical standards framework whereby room to negotiate is, where feasible, provided to account for differences in plant technology and location but subject to the requirement that access standards may not be negotiated below the minimum.

A number of other first round issues were raised in submissions and these are addressed in Table 4.3.1 below.

Several second round submissions queried the merit of providing NEMMCO with a power to veto negotiations between a person and the NSP, and ETNOF submission stated that the proposed arrangements were inconsistent with the conceptual basis of the Trades Practices Act 1974 (C'th) ("TPA"). Under the existing Rules NEMMCO provides certain advice in relation to the proposed standard, the NSP is bound to reject the standard and NEMMCO has in effect "vetoed" that standard forming part of the connection agreement. The Commission notes apart from removing the requirement on NEMMCO to advise on reliability of supply, the Rule to be made reflects the same veto role that NEMMCO has under the existing rules. The broadening of the "advisory matters" under the Rules is in fact an alignment with NEMMCO's functions under the NEL rather than an extension to the scope of NEMMCO's advisory role.

Despite the views raised in second round submissions, the Commission maintains that clarifying and, as appropriate, enhancing NEMMCO's role in negotiating the technical requirements for negotiated access standards is consistent with the Competition Principles Agreement.

In respect to clause 2.2.1(e)(3), the Commission has accepted NEMMCO's second round suggestion that this clause should be deleted, as the performance standard should be the basis of NEMMCO's acceptance of the technical suitability of the generating plant.

In respect to clause 2.9.2 and the second round suggestion by Vestas that not all information can be provided prior to registration, the Commission has not adopted this view because NEMMCO may not be able to commence the registration process in the absence of the complete set of information required by NEMMCO.

In respect to clause 5.1.3(d) and the second round suggestion of Auswind and REGA that the principles should specify that both NEMMCO and the NSPs should act in good faith when participating in the development of a negotiated access standard, the Commission accepts that such a principle should underpin the negotiation process, but considers that such principles apply and are specified where appropriate. The Commission is aware that good faith obligations may have effects on other aspects of the Rules including the dispute resolution procedures and does not consider it appropriate to specify this obligation in all contexts without proper consultation. That being said, the Commission is of the view that all parties should act in good faith regardless of the person's role in the market.

In respect to clause 5.3.4A and the suggestion that the deadlines and timetables should be reviewed, the Commission considers that allowing exceptions to the deadlines and timetables would introduce uncertainty to connection applicants and could introduce delays.

In respect to clause 5.3.4A and EnergyAustralia's suggestion that a DNSP should be able to reject a proposal based on an automatic access standard, the Commission does not consider that this suggestion is in keeping with the access standards framework, nor with the current definition of the term 'automatic access standard', where if the standard is met the Applicant is entitled to connect without further consideration by the NSP. The automatic access standard is either prescribed in Chapter 5 of the Rules or set by the Reliability Panel (clause 5.3.3(b3)) on request of a Registered Participant and after a Rules consultation process has been conducted. The purpose of this arrangement is to provide the highest possible level of certainty to investors.

In respect to new clause 5.3.4A(e) and ETNOF's suggestion that a paragraph be added to require NEMMCO to provide reasons for its advice, the Commission does not accept that NEMMCO needs to be explicitly required to give reasons as it is too prescriptive. Requiring NEMMCO to give reasons may result in the connection agreement negotiations being bogged down. However, the Commission does note that NEMMCO is required to respond to the NSP in writing. The Commission suggests that before such a requirement is included in the Rules it should be tested with stakeholders. The Commission has the same view in relation to Auswind and REGA's suggestion for the NSP to provide reasons.

In respect to clause 5.3.4A(f)(2) and (4) and the suggestion by Vestas that the provisions do not provide sufficient discretion for a DNSP to reject a proposed negotiated access standard, the Commission considers that the arrangements under the current Chapter 5 and the Chapter 5 amendments in the Rule to be made give the DNSP the appropriate discretions to deal with matters relevant to the DNSP's connection point and these relate primarily to the 'performance of the network' and the 'quality of supply'.

In respect to clause 5.3.5(g) and the suggestion by Vestas that the payment of costs may have a significant impact on existing installations and the possibility of

retrospectively, the Commission notes that this comment is made in relation to an 'offer to connect' which is only invoked for facilities that do not have a Connection Agreement. The clause does not relate to facilities that have an existing Connection Agreement, nor does it retrospectively relate to facilities with an existing Connection Agreement.

In respect to clause 5.7.3(b) and the suggestion by Vestas that a compliance monitoring program should be viewed in a certain way, the Commission notes that there appears nothing preventing the generator taking the expressed view to the negotiation process with the NSP and NEMMCO, with the outcome subject to mutual agreement amongst the parties.

Table 4.3.1

Stakeholder	Clause	Issue	AEMC considerations
Vestas	2.9.2(a)(3)	Concern with NEMMCO's ability to assess whether participant "will continue to be able to comply"	Agree that requirement is unworkable. Words not included in Rule to be made
Vestas	5.3.4A(a)	Words "adverse effect" appear to lack objectivity or level of materiality	These are the existing requirement and have not been amended
VENCorp	5.3.4A(a)	Add sub-paragraph (6) "for generating plant that was in service prior to 1988, a negotiated standard below the minimum access standard may be agreed, provided it is consistent with the design performance for such generating plant, and documented as agreed performance standards in the relevant Connection Agreement"	As indicated above, the NEMMCO/NGF Rule change proposal regarding the performance standards for existing plant which resulted in Rule No.21 of 2006 being made addresses this issue.
Vestas	5.3.4A(d)	The timelines set out in this revised clause do not align with other clauses which require NEMMCO's adjudication.	These timelines reflect the existing process and are acceptable
VENCorp	5.3.7(a3)	Amend to recognise that NEMMCO doesn't need to "accept" standards relating to quality of supply as an NSP responsibility.	This clause to be excluded from the Rule to be made for the reasons discussed further above
Auswind,	5.3.7A and	Where NEMMCO have the	These clauses to be

Stakeholder	Clause	Issue	AEMC considerations
NGF, REGA, Roaring 40s, VENCorp and Vestas	5.11.2(a)	words "copy of the proposed connection agreement" - this should be limited to the relevant technical and operational sections of the connection agreement.	excluded from the Rule to be made for the reasons discussed further above
VENCorp	5.3.7A(d)	It is not considered appropriate that NEMMCO should be involved with quality of supply standards, as this is a TNSP area of responsibility, not NEMMCO's.	
NGF and REGA	5.11.2(a)	Replace words "up-to-date" with "current"	
Auswind, NGF, REGA and Vestas	5.4.2(a)	NEMMCO should also be required to negotiate in good faith	NEMMCO is not a formal party to the negotiations. Clause has therefore not been amended
Roaring 40s	5.7.3(a)	Add 'or generating system' where NEMMCO refer to "generating unit" as for wind farms some standards are only met at the connection point	Agreed and Rule to be made amended
VENCorp	5.7.3(e)	The concluding paragraph the words be modified to read "... Submits evidence reasonably satisfactory to NEMMCO and the relevant TNSP that the generating unit or generating system is complying..."	The clause concerns power system security and is therefore a NEMMCO issue. Change not agreed
Auswind and NGF	5.12(a)(3)	This should be assessed at the time of connection and not impose an ongoing requirement that may require plant upgrades in the future	This is an existing requirement. Clause is important to power system security and so obligation should be continuous. Clause does not require plant upgrades. No change made in the Rule to be made other than the clause remains in its

Stakeholder	Clause	Issue	AEMC considerations
			original position as clause 4.15 for the reasons described above
Auswind, NGF, REGA and Vestas	5.12.(b)	Duplication with 5.7.3(b)	This refers to an existing requirement. Agree there appears to be an overlap. Propose not to remove but to address in Commission's broader technical standards review to be completed by 30 June 2008. As with the above, the clause remains as clause 4.15
Vestas	5.12.(b)	Requirement to institute and maintain compliance program may involve cost to generators	This is an existing requirement and central to the effectiveness of the compliance and enforcement regime. No change made in the Rule to be made. As with the above, the clause remains as clause 4.15

Performance standards for modified plant

A number of the issues raised in first and second round submissions are identified and addressed below or in Table 4.3.2 below. Specific comments from submissions included:

- AusWind, the NGF, REGA, Roaring 40s and Vestas (first round) submitted that modified generating units should only be required to meet the performance levels in their existing performance standards whereas the proposed Rule would required them to meet the relevant minimum access standards;
- AusWind/REGA (second round) submitted that the table in clause 5.3.9(d) has been historically written for single large synchronous generating units and does not directly apply to non synchronous generating units and units that are part of an aggregated generation system where the performance is defined at the point of connection;
- AusWind/REGA (second round) considered that clause 5.3.9 should be augmented to enable a refund to generator if fees paid exceed the actual costs;
- AusWind/REGA (second round) proposed that significant changes to the generator be treated under clause 5.3.10(a) as a modification to the original

connection agreement handled as, while the original performance standards established prior to commissioning should be maintained for insignificant alterations;

- AusWind/REGA (second round) considered that in respect to clause 5.3.10(b) compliance to all tests is difficult to demonstrate so a general set of tests should be developed to establish what constitutes significant changes;
- AusWind/REGA (second round) also considered that requiring modified plant to meet the minimum access standard under clause 5.3.10(b)(2) may discourage a generating unit that is currently grandfathered below the minimum standard to make the most efficient upgrades;
- AusWind/REGA (second round) considered that all parties, and not just generators, should be required to negotiate in good faith under clause 5.7.3(b);
- EnergyAustralia (second round) considered that in arrangements in clause 5.7.6(b), where NEMMCO has a power to direct a NSP to require a test where it considers that the analytical parameters for modelling of a generating unit or system are inadequate, has the potential to be confusing for generators and the power should be given directly to NEMMCO;
- ETNOF (second round) proposed that clause 5.3.10 regarding the acceptance of performance standards for generating plant that is altered be amended to require NEMMCO to provide reasons why it is not satisfied with the altered generating plant;
- ETNOF (second round) did not consider that the proposed amendments to clause 5.7.6(b)(2), tests of generating units requiring changes to contribute to normal operation, contributed the stated objective of NEMMCO's proposal or are consistent with the principle that generator compliance should be at the generator's cost;
- ETNOF (second round) considered that the generator should be responsible for all costs associated with performing the tests associated with clause 5.7.6(i) as the generator is the cause of the test and beneficiary by way of demonstrating compliance;
- NEMMCO (second round) suggested that the qualifier 'unless otherwise agreed by the Network Service Provider and NEMMCO' be inserted into the clause 5.3.9(d) to give some discretion to the NSP and NEMMCO on a case by case basis to allow flexibility for unusual technologies where a generator is proposing to alter a generating system;
- NEMMCO (second round) suggested that clauses 5.3.10(a) and (b) in relation to the acceptance of performance standards for altered generating plant be amended to align better to the NSP and NEMMCO roles; and
- Vestas (second round) considered that clause 5.1.2(a)(2)(ii), the purpose for the Chapter 5 of the Rules, should be amended so that it only applies to material modifications to a connection to the network.

Performance standards for modified plant

First round

In respect to clauses 5.1.2(a), 5.3.9, 5.3.10 and 5.7.6, the Commission agrees that generators should be able to be refurbished in a way that ensures that any change to plant performance that impacts on power system security is addressed via revised performance standards but without the generators being required, as they currently are under the Rules, to revisit all of the performance standards by repeating the Chapter 5 access negotiation process in its entirety.

The Commission notes the concerns raised in submissions that the proposed changes would require that any proposed revised performance standards must not be lower than the applicable minimum access standards and that this could be used as a way of requiring plant performance to be upgraded over time. This raises an issue of intergenerational equity which is discussed in detail in the next sub-section below. In the interim, the Commission notes that it is strictly for a generator to decide whether to upgrade its plant. In doing so, the generator should be aware that there is a prospect that different performance standards may result from that decision. However, consistent with the technical standards framework outlined in Chapter 2 of this Rule determination, the Commission agrees that the current exception with respect to plant with grandfathered performance standards should be preserved where those standards lie below the minimum.

The Commission refers to the discussion above in relation to the changes proposed by NEMMCO concerning its role in approving performance standards for new plant. The Commission considers that the changes proposed in relation to approving revised performance standards for modified plant must likewise remain consistent with the allocation of responsibilities under the existing access negotiation model, namely, that the NSP retain the right to approve particular proposed standards but must follow the advice of NEMMCO in doing so.

The Commission therefore accepts NEMMCO's proposal to require that generators submit revised performance standards that relate to the modified aspects of the plant. This is subject to the exception in relation to grandfathered performance standards and changes made by the Commission in the Rule to be made to ensure that NEMMCO's role in relation to the proposed revised performance standards remains to advise the NSP whether the alterations compromise power system security.

A number of additional first round issues were raised in submissions. These are addressed in Table 4.3.2 below.

Second round

In respect to clause 5.3.9(d) and the suggestion by Auswind and REGA that the table has been written for synchronous generating units, the Commission notes that changing this table would require a review that included stakeholder consultation.

In respect to clause 5.3.9(d) and the suggestion that the NSPs and NEMMCO be given discretion to vary the conditions on a case by case basis to cater for unusual technologies, the Commission accepts that this change will improve the operation of the clause. Accordingly, the Commission has made this variation to the Draft Rule.

In respect to clause 5.3.9(f) and the request for clarification on whether the arrangement to cover a possible NEMMCO fee is reasonable, the Commission notes that it is economically responsible for a party to recover the direct costs of providing a service. The Commission notes that the service is in regard to 'altered generation plant' which is already the subject of a performance standard and registration status. The act of altering the plant requires parties to reassess information associated with that altered plant, and such a service carries with it a service costs. The Commission concludes that this arrangement is reasonable. Accordingly, the Commission does not propose to act on this request for clarification.

In respect to new clause 5.3.9(i) and the suggestion by Auswind and REGA that any excess recovery be refunded to the generator, the Commission considers that this suggestion may have regulatory merit, as the initial payment is based on an estimate. The party who is paying the estimated amount should have access to some redress if the amount demanded can be shown to be excessive. On the other hand, the Auswind and REGA are silent on the situation where the amount demanded is less than the actual costs incurred by the NSPs and NEMMCO. Therefore, the Commission considers that this matter needs further consideration and consultation with all relevant parties and has not made any amendments to the Rule.

In respect to clauses 5.3.10(a) and (b) and the suggestion by Auswind and REGA that a difference between insignificant and significant alterations be recognised, the Commission considers that there may be merit in accommodating this suggestion. However, the Commission notes that the suggestion recognises that an agreement on what constitutes 'significant changes' has to be reached and that it is not possible to achieve this agreement at this stage of the Rule making process and for this reason has not made an amendment to the Rule.

In respect to clause 5.3.10(b)(2) and the suggestion by Auswind and REGA that the current drafting would discourage alteration of plant that had grandfathered performance standards below the minimum access standard, the Commission notes that there is a concern about the loss of the grandfathered status when the plant undergoes an alteration. The Commission agrees with the principle that when a plant is altered the performance should be upgraded to at least the relevant minimum access standard specified in the Rules for those standards affected by the alteration. The Commission considers that distinguishing between the different pieces of a generating unit, and the standard that should apply, requires further consideration and consultation as to how best to create rules dealing with this matter.

In respect to clause 5.7.6(b) and EnergyAustralia's suggestion that generator testing should be directly managed by NEMMCO, the Commission notes that this suggestion is contrary to the access framework which places the NSP in direct control of the relationship with the Registered Participant, or the person intending to be registered.

In respect to clause 5.7.6(i) and EnergyAustralia's suggestion that it is not apparent how requiring each party to bear their own costs contribute to the stated objective of NEMMCO's proposal, the Commission notes that the current Rules imply in clause 5.7.6(h) that the NSP and NEMMCO bear their own costs while the equivalent draft Rule in clause 5.7.6(i) makes this explicit.

In respect to clause 5.7.6(i) and (j) and ETNOF’s suggestion that the generator bear the full cost of the test, the Commission notes that this suggestion has restored the current provision in the Rules and added a further new paragraph to enable the generator and the NSP to recover their costs if the test show that the model’s parameters were adequate. The Commission accepts that paragraph (i) in the Draft Rules has broadly covered two different test conditions, one that is stipulated under paragraph (a) and one that is stipulated under paragraph (b). The Commission recognises that these two test conditions need to be covered by different cost recovery provisions. The Commission considers the paragraph (h) in the current Rules works for the conditions specified in paragraph (a) where the NSP is responsible for initiating tests. The Commission also recognises that there may be merit in adopting the ETNOF suggestion that requires NEMMCO to reimburse the generator and NSP if the test under paragraph (b) show that the model was adequate. However, such change requires further testing and should not be made at this stage of the process.

Other Issues (first round):

Table 4.3.2

Stakeholder	Clause	Issue	AEMC considerations
NGF	5.3.9	Generator to submit to the NSP and NEMMCO details of any prospective changes, rather than just those changes that in its opinion lead to a change in the performance standard.	The clause is adequately worded, as it only requires a submission only for those changes that will affect the performance of the generating system.
NGF	5.3.9(c)	The table is not necessarily accurate. Modifications may be made to equipment (e.g. rewinding a machine or changing an AVR) without changing its performance. Statements on design or test data should satisfy and a submission under 5.3.9(b)(4) should not be required.	The requirements are appropriate
Vestas	5.3.9(e)	The clause is open-ended and contractually infers unlimited liability	The clause as written is acceptable as it deals with reasonable costs of NEMMCO and other NSPs.
Hydro Tasmania	5.7.6	The clause lacks incentives on NEMMCO and TNSPs to limit the cost of generating tests	The provisions of clause 5.7.6 contain a number of requirements that should have the effect of preventing unreasonable testing
Roaring 40s	5.7.6(a1)	Words such as “NEMMCO reasonably considers” are too	Unworkable to specify options in detail. The phrase

Stakeholder	Clause	Issue	AEMC considerations
		vague.	is acceptable
Roaring 40s	5.7.6(a1)	Amend clause to refer to 'generating system'	The words as they are currently written are appropriate.
Roaring 40s	5.7.6(a1)	Performance standards should be defined at the connection point of the to the power system	Defining by connection point not applicable to clause 5.7.6(a1).
Auswind, NGF, REGA, Roaring 40s and Vestas	5.7.6(h)	should require that the cost of tests required by NEMMCO under clause 5.7.6(a1) should be able to be recovered from NEMMCO.	Previously the clause required generators to bear their own costs of tests. It has been extended to include NEMMCO and NSPs. Proposed clause to remain.

Upgrading performance standards when technical standards change

Stakeholders submitted in the first round that NEMMCO's proposal to require that performance standards be upgraded when there is a change or addition to the technical standards should not be adopted as they are unacceptable. The requirement is open-ended and provides no regulatory certainty that generators will be able to comply with the Rules in the future. Participants would be required to upgrade their plant after building them and agreeing to a set of performance standards. Comments from second round submissions include:

- NEMMCO (second round) considered that the transitional arrangement in clause 11.5.3(b) of the Draft Rule, whereby (unless otherwise agreed) a generator and NSP will continue an access standard negotiating process in accordance with the old Chapter 5 (as if the Amending Rule had not been made), are inappropriate and would effectively delay the implementation of the new technical requirements by 1 to 2 years. NEMMCO proposed that the cut off should apply at the signing of the connection agreement;
- NEMMCO (second round) considered draft clauses 11.5.3, 2.2.1(e)(3) and 2.2.1(e)(4) do not allow for the situations where:
 - the connection agreement predates previous technical standards changes in November 2003 and there has been no registration of a Generator for that plant; and
 - a person seeks to re-register plant for which there is a connection agreement that pre-dates November 2003
- the NGF (second round) considered, in respect to draft clause 11.5.3, that it is important that anyone who is connected or reasonably advanced in the connection process, as evidenced by a signed connection agreement, not be

disadvantages by virtue of any changes to the standards and that a connecting party should not be required to modify its plant to meet changed standards in the Rules unless modifying the plant; and

- Pacific Hydro (second round) and Vestas (second round) supported the ability for existing access negotiations to be able to continue under the old Chapter 5, in accordance with draft clause 11.5.3.

The Commission's consideration and reasoning

Upgrading performance standards when technical standards change

In respect to proposed clause 5.10, NEMMCO provides that, where a technical standard changes or a new technical standard is introduced, the relevant connected party must submit to NEMMCO a proposed performance standard in respect of the altered or new technical standard.

The issue raised is one of intergenerational equity, namely, the complementary concerns that:

- incumbent plant owners may gain a competitive advantage if new plant is required to meet higher standards when connecting at a later point in time; and
- incumbent plant may be placed at a disadvantage if required to retrofit to meet new higher standards as this may involve a greater cost than building new plant to meet those standards.

This issue was discussed by NECA in its December 2001 report on the technical standards framework²⁶. It proposed as follows:

- a facility that has been allowed to connect based on access standards at the time, including any allowed variations below that standard, not be required to upgrade to meet new standards except in exceptional circumstances; and
- standards for new plant should not be set at a level to compensate for any shortcomings of existing plant.

If participants wish to modify their plant to the extent that it would require a change to their connection agreement, then the same provisions would apply to them as to a new connection applicant and they would need to comply with the standards existing at the time. Under extreme circumstances, where the performance of a plant to its existing registered performance standards was causing material harm to the power system or substantial risks to security, there are arrangements proposed that would allow NEMMCO to order a plant upgrade. Any decision to require an upgrade would be subject to restrictions and to review.

The current Rules do not reflect NECA's proposals. Rather, once performance standards have been agreed, they remain in force until renegotiated. Were the performance of a connected party to become inadequate relative to the evolving needs of the system over time, NEMMCO would presumably be required to direct that participant under its powers set out in clause 4.8.9 of the Rules in order to

²⁶ Op cit, footnote 6, p 16.

maintain power system security and reliability. That power concerns operational directions only and anything more than an infrequent use of those powers would be problematic from the perspectives of power system operation, compliance and enforcement.

It is important to note that the power system is expected to evolve over time as the nature and patterns of both demand and supply change. It is essential that both the technical and performance standards are able to evolve to meet those changes in a way that balances the need for investment certainty with the fundamental concern to ensure power system security, and quality of supply. The Commission considers that, in principle, the technical standards framework should operate to minimise intergenerational inequities in the same way that it attempts to minimise technological or geographical inequities, subject to meeting those fundamental objectives.

The Commission notes that NEMMCO's proposal is an attempt to address this difficult issue. The amendments would constitute a major change to the existing arrangements. The Commission further notes that NEMMCO provided no explicit rationale for the changes in its proposal. During discussions with the Commission, NEMMCO submitted that the changes were intended only to require the documentation of existing performance against a new or altered technical standard, not a formal revision of the relevant performance standards themselves. This does not reflect the proposed clause as drafted. Further, the Commission is concerned that the outcome would be the same, namely, that there would be an expectation of performance referenced to a new or altered technical standard that had not been agreed between the parties. Finally, the Commission notes that NEMMCO did not provide evidence as to how the changes may impact on connected parties and network customers sufficient to demonstrate that there would be likely to be a net benefit to consumers resulting from their adoption.

The Commission has determined not to accept the amendments but notes that, as indicated in Chapter 2 of this Rule determination, it has recommended as part of its report to the MCE on the enforcement and compliance with technical standards that the Commission conduct a further review concerning the scope of the technical standards. The Commission intends to fully address the issue of intergenerational equity as part of that review including, in particular, the way in which the technical and performance standards evolve and interact over time.

Instead of the NEMMCO proposal in 5.10, the Commission has introduced transitional arrangements to cover the commencement of the Rule to be made. Clauses 11.10.3, 11.10.4 and 11.10.5 contain the relevant provisions.

In respect to clause 11.10.3(b) and NEMMCO's suggestion that the provision be deleted, NEMMCO's major reason for this comment appears to be that there would be a delay to the implementation of the new technical requirements for those generators who currently are in discussion with an NSP on a negotiated access standard. On the other hand, a number of interested parties have strongly supported the proposed provision. The Commission notes that the parties that would be caught by this provision would be those that have the status of Connection Applicant or who have an executed Connection Agreement but have not had the performance standard contained in that Connection Agreement registered with NEMMCO.

NEMMCO does not provide an estimate of the number of parties who would be caught under this provision, nor an analysis of the impact of those parties if they were to continue with a performance standard under the old Chapter 5 provisions as compared to the new provisions. Without this information, the Commission is not able to form a view as to the nature of this problem raised by NEMMCO. NEMMCO has indicated that the impact of this provision is to cause a delay in the implementation of the new requirements of between 1 and 7 years, which is a wide ranging estimate and not able to be succinctly utilised by the Commission. This range is different from the range nominated by Pacific Hydro of 18 months to 3 years.

In forming a view on this matter, the Commission needs to consider the impact on investors and their right to regulatory certainty on the one hand, and the impact on consumers of any unfavourable implication regarding power system security and quality of supply. The Commission considers that the paragraph can remain unaltered in the knowledge that their ongoing contribution to improved power system security and quality of supply can be clearly demonstrated through interest in negotiating against the new Rule.

4.4 LATE SUBMISSION FROM NEMMCO

The Commission received a late submission NEMMCO on 20 February 2007, which the Commission published on its website. NEMMCO identified that some existing generators are having difficulty completing the necessary testing in relation to the registration of their performance standards in accordance with the new provisions in the Rules (namely rules 4.16 and 4.17). The Commission accepts that the drought is a key contributing factor to the difficulty being experienced by these generators.

The Commission has reviewed NEMMCO's submission and the draft wording for the new clause provided. Whilst components of the draft wording can be linked back to NEMMCO's original proposal on this Rule change, the Commission determined that those aspects of the proposal did not satisfy the NEM objective for the purposes of this Rule. Furthermore, the Commission is of the view that the proposed changes reflected in NEMMCO's submission are not merely minor or administrative in nature. The potential effects may include all performance standards and also connection agreements. For this reason, the Commission considers that this issue must be dealt with in a separate Rule change and invites NEMMCO or another interested party to submit a Rule change to the Commission for consideration.

4.5 Derogations

The Commission notes that as a result of amendments to schedule 5.2, derogations in the Rules may be affected. The Commission has identified some consequential changes required. These changes are primarily a result of the renumbering of provisions and not substantive in nature.

However, the Commission notes that Schedule 9A3(11) relates to a derogation for to specific generating units belonging to AGL Hydro Ltd (previously belonged to Southern Hydro) and located in Victoria in respect of the requirements to do with asynchronous operation under clause S5.2.5.10 of Schedule 5.2. Clause S5.2.5.10 as it exists in the current Rules has been deleted in accordance with NEMMCO's proposal from the Rule to be made and a new clause inserted relating to protections to trip

plant for unstable operation. The Commission noted the advice from AGL Hydro that this change was acceptable. However, on further reflection and a comprehensive analysis of clause S5.2.5.10 in the Rule to be made, the Commission identified the equivalent provision to what existed in the derogation. The Commission notes that NEMMCO and AGL Hydro have come to an agreement that the derogation does not apply to the Clover Power Station and notes this amendment may have no effect.

On further consideration of the derogations in Chapter 9, the Commission has also created certain savings and transitional arrangements for derogations relating to Queensland. Given the substantive nature of the amendments made to the derogation by the Rule to be made, the Commission has created provisions in Chapter 11 to ensure these specific derogations continue to apply the provisions in the current Chapter 5 and not the new provisions.

The Commission also notes that the participant derogation for Studland Bay Wind Farm Pty Ltd will expire at the commencement of the Rule to be made. The Commission will remove the Studland Bay Wind Farm Pty Ltd derogation at a later date.

4.6 Savings and transitional provisions and other consequential issues

The Commission is aware that the amendments to the Rules by this Rule require transitional arrangements to take into account those generating systems and units that developed their standards in accordance with the current Rules. Accordingly, the Commission has included in this Rule to be made (in rule 11.10) savings and transitional provisions to ensure that any generating system or generating unit that met an access standard under the existing Rules continues to apply that access standard.

In relation to performance standards still being negotiated at the commencement of this Rule, the Commission has also provided that those standards can continue to be negotiated as if the amending Rule had not commenced. However, they may be negotiated under the new Rules if the relevant NSP and generator agree.

The Commission also notes that as a result of the above savings and transitional arrangements, generating systems and units that complied with existing access standards will not be affected by the Commission's amendments in the Rule to be made.

The Commission has also taken into account that the amendments to clause 2.9.2 and has included a provision that any application that is currently being considered and is yet to be registered by NEMMCO will not be required to comply with the new information requirements. However, such applicant will be deemed to have satisfied the requirements of the Rules.

The Commission has also included aspects of NEMMCO's proposed Rule in this section of the Rule to be made as it more appropriately relates to transitional arrangements. NEMMCO proposed that any action taken by NEMMCO in relation to the Generating System Design Data Sheet, Generating System Setting Data Sheet or the Generating System Model Guidelines for the purposes of the new requirements

in relation to these sheets and guidelines is taken to comply with the equivalent actions under the Rules.

The Commission has also slightly amended the savings and transitional arrangements in the Rule to be made to create an efficient process around the existing requirements in schedule 5.5.1 and schedule 5.5.2. Until NEMMCO publishes the relevant data sheets and guidelines under S5.5.7, schedule 5.5.1 and schedule 5.5.2 are taken to be the relevant data sheets. In the Draft Rule, there was a requirement on NEMMCO to publish schedules 5.5.1 and 5.5.2 as the relevant data sheets. The Commission is of the view that the schedules in the current Rules provide sufficient guidance and allows NEMMCO to concentrate on developing the proper documents under S5.5.7.

As a result of renumbering clauses and the content of the technical standards changing, the Commission has included savings and transitional arrangements to preserve the status quo where the Commission could not identify an equivalent provision under the Rule to be made. For example, the transitional arrangements in place for existing generators under rules 4.16 and 4.17 refer to technical standards in S5.2.8 and S5.2.9. The Commission notes that the content of these standards have changed and as such has introduced a savings and transitional arrangement so that the existing technical standards continue to apply for the purposes of rules 4.16 and 4.17. The Commission has also introduced similar arrangements for certain Queensland jurisdictional derogations.

4.7 Summary of differences between NEMMCO's proposed Rule and the Rule to be made

This section briefly identifies and the modifications and enhancements that the Commission has made to the Rule proposed by NEMMCO. This section is not meant to be exhaustive. The Commission has redrafted various provisions of the NEMMCO proposed Rule to ease understanding of the Rules that are highly technical and complex. In particular, the Commission has included subheadings in Schedule 5.2 to separate automatic, minimum, negotiated and general access standards. The Commission has also taken the opportunity where appropriate to renumber clauses to improve readability of the Rules.

The Commission has made a number of minor and editorial amendments to the Rule to be made based on comments from submissions including requests for clarity. Where the Commission has not discussed an amendment in this Rule determination, the Commission has made the amendment with the view that the amendment assists in understanding and clarity of the complex subject matter.

The Commission has removed all references to NEMMCO's proposed clauses 5.3.7A, 5.10, 5.11 and 5.12 in light of the Commission's decision not to proceed with this part of NEMMCO's proposal.

The Commission made the following amendments to the proposed Rule and reflected in the Draft Rule. The Commission notes that these changes may have been amended between the Draft Rule and Rule to be made stages. The differences between the later stage are noted below.

Clause 2.9.2(b): The Commission modified the requirement that NEMMCO must be satisfied that a person intending to become a registered person will comply with the Rules. Instead, NEMMCO must be satisfied that the applicant has demonstrated a commitment to comply with the Rules.

Clause 3.13.3: The Commission redrafted this clause given its length. The Commission modified NEMMCO's proposal in relation to the information that NEMMCO can provide Registered Participants and other third parties so that the information that can be provided by NEMMCO will be information that is in a non-confidential form provided by the generator.

Clause 5.3.1: The Commission adopted NEMMCO's proposed changes to this clause with a slight modification. The Commission has retained NEMMCO's objective of this clause but retained voluntary compliance for non Registered Participants.

Clause 5.3.4: Although NEMMCO proposed no changes to this clause, the Commission included a paragraph that NEMMCO proposed to include in clause 5.3.2 relating to the connection enquiry regarding other projects that could affect a connection applicant. The Commission considers that the proposed paragraph relates more to the connection application and therefore is more appropriately located in this clause.

Clause 5.3.4A: The Commission modified this clause as it considers that the appropriate role of NEMMCO in relation to access standards is an advisory role. The Commission considered that NEMMCO being able to advise on all matters relating to its functions under the NEL will ensure NEMMCO provides the necessary advice in the negotiations of negotiated access standards. The Commission considered that requiring the NSP to accept NEMMCO's advice in particular circumstances relating to system security and reliability more accurately reflects NEMMCO's role in relation to the connection agreement.

Clause 5.3.8: The Commission adopted NEMMCO's proposed Rule with a modification. The modification relates to information the NSP may provide to a connection applicant as the Commission considers that the information that should be provided should be non confidential in nature. The Commission also considered that information that can be provided to third parties under rule 5.3 should be in aggregate form.

Clause S5.2.4: The Commission adopted NEMMCO's proposed information requirements in this clause. However, given that this clause as proposed by NEMMCO is referenced throughout the proposed Rule in relation to information that can be disclosed, the Commission included an additional paragraph that requires the person providing the information to also provide a non confidential version to the recipient. This non confidential version is then the version that NEMMCO and the NSP can release to other parties under clauses 3.13.3 and 5.3.4.

Clause S5.2.5.3: This clause relates to the generating unit response to frequency disturbances and includes new defined terms suggested by NEMMCO in its submission to its proposed Rule. The diagrams in this clause have also been included as notes to the clause.

Clause S5.2.5.6: This clause is a new clause that the Commission included in accordance with a submission by VENCorp. It relates to the quality of electricity generated and continuous uninterrupted operation.

Clause S5.2.5.7: This clause is the existing clause S5.2.5.4 relating to partial load rejection. NEMMCO proposed to delete this clause, however, the Commission is of the view that the clause still serves a purpose under the Rule to be made. The Commission has made one modification to the clause relating to the meaning of minimum load as it cross references schedule 5.5.1 which has been deleted in the Rule to be made.

Clause S5.5.7: The Commission adopted NEMMCO's proposal to develop data sheets and guidelines in accordance with the Rules consultation procedures. The Commission enhanced this clause to include a regime for NEMMCO to make amendments to the data sheets and guidelines in accordance with the Rules consultation procedures. Any person can request a change to NEMMCO and NEMMCO does not have to conduct the Rules consultation procedures for changes that are minor or administrative in nature. Provisions proposed by NEMMCO related to deeming the first sheets and guidelines compliant with the Rules consultation procedures have been moved to the savings and transitional rules. Similarly, provisions exempting NEMMCO from the requirement from conducting the Rules consultation procedures if the sheets are substantially similar to S5.5.1 and S5.5.2 were relocated in the savings and transitional section.

Clause 8.6.2: This clause was slightly modified from NEMMCO's proposed Rule to exclude certain information that can be provided to a connection applicant. This information relates to the confidential information provided by the generator under S5.2.4 to NEMMCO. The Commission accepted that certain information is needed for modelling objectives but considers the information in S5.2.4(a) and (b)(4) to be commercially sensitive and should not be released.

Definition of "considered project": The Commission made minor enhancements to this clause to ensure the clause is consistent with requirements in the Rule to be made in relation to considered projects particularly in relation to clause 5.3.4.

Definition of "performance standard": The Commission did not adopt NEMMCO's proposed definition given the performance standards regime has not been amended in accordance with NEMMCO's proposal.

Use of the definition of "generating system": Consistent with the Commission's decision in this Rule determination, the Commission substituted the term "generating system" for "generating unit" in relation to certain standards in schedule 5.2 and relevant provisions in the Rule to be made.

Clause 11.10.1: This clause includes certain defined terms for the purposes of the savings and transitional rules.

Clause 11.10.2: This clause intends to ensure that any application for registration that is currently being considered at the time this Rule is made is not required to comply with the additional information requirements of this Rule.

Clause 11.10.3: This clause intends to ensure that any access standards that applied to generating units and generating systems under the existing rules continues to apply to those systems and units as if the new Rule had not been made.

Clause 11.10.4: This clause deals with transitional arrangements for generators who have proposed to modify plant and are currently negotiating the access standards. This clause preserves those negotiations as if this Rule had not been made.

Clause 11.10.5: This relates to transitional issues arising from NEMMCO commencing consultation on the data sheets and guidelines prior to the Rule commencing operation. This clause ensures that any action taken by NEMMCO in this regard is to be taken to be the equivalent action under the Rules. It also exempts NEMMCO from the Rules consultation procedures if it develops the data sheets to be substantially similar to schedules 5.5.1 and 5.5.2 (that were in force before this Rule).

In addition, the Commission made further amendments of the Draft Rule that are reflected in the Rule to be made. Whilst most amendments involved enhancements and modifications to the substance in the Draft Rule (and are noted where relevant throughout the determination), the key amendments relate to decisions the Commission made in relation to the policy position on certain issues including:

- removing the requirements in the Draft Rule that confidential information generated or made available as part of the access negotiations should be made available to third parties in a non-confidential form; and
- the removal of the requirement on NEMMCO to advise on reliability of supply in negotiating access standards and the corresponding references to that obligation.

The Commission also made a few consequential amendments to derogations and to the savings and transitional arrangements.

5 Assessment of the Rule to be made — the Rule making test and the NEM objective

5.1 Factors that the Commission may consider in interpreting the NEM Objective

Under s.88 of the NEL, the Commission may only make a Rule if:

“It is satisfied that the Rule will or is likely to contribute to the achievement of the national electricity market objective.”

The NEM objective, as set out in s.7 of the NEL, is to:

“Promote efficient investment in, and efficient use of, electricity services for the long term interests of consumers of electricity with respect to price, quality, reliability and security of supply of electricity and the reliability, safety and security of the national electricity system.”

In Section 4 of this determination, the Commission considered the likely advantages and disadvantages of the proposal in contributing to more economically efficient operation and performance of the NEM based on the analysis and the quantitative modelling the Commission has undertaken. This Section presents the main conclusions of that analysis and provides the Commission’s assessment of the extent to which NEMMCO’s proposal promotes the NEM objective and satisfies the Rule making test.

5.2 Assessment of the proposal against the NEM objective

On the basis of its analysis, the Commission has decided to approve, subject to a number of amendments, the majority of the changes requested in the Rule proposal. For the reasons given below the Commission is satisfied that the proposal as amended will promote improvements in competition and efficiency in the NEM compared to maintaining the status quo. That is, the proposal will be in the long term interests of consumers of electricity services.

The Commission’s considerations with respect to the NEM objective in relation to each of the three main areas of NEMMCO’s proposal are discussed below.

Technical standards

Efficient investment in electricity

The Commission notes that the changes to the technical standards are likely to generate a number of benefits to investors in the NEM, namely:

- more transparency in the processes by which performance standards are settled as part of the access negotiation process;
- more certainty in the processes for managing the impact of generating units on the national electricity system and therefore reducing the risk of being constrained off or directed by the NSP or NEMMCO in day to day operations;

- in meeting the technical requirements, being able to use alternative, potentially less expensive, solutions to those currently permitted; and
- potentially removing the need for more restrictive jurisdictionally-imposed requirements, moratoriums or limits on the amount of intermittent generation on the market (for example, the Essential Services Commission of South Australia (ESCOSA's) current licensing requirements).

Under the current NEM arrangements, a significant increase in the number of alternative energy sources such as wind generation would see network capability steadily degrade. At some point, it would become necessary to augment the network so that reliability and security of supply and the level of competition in the NEM could be maintained. The proposed Rule as amended and reflected in the Rule to be made would benefit network users by maintaining the capability of the network, potentially deferring network augmentations that would otherwise be needed.

The Commission notes that the technical standards proposed to be imposed on asynchronous generation are likely to require additional control, monitoring and communications equipment that is likely to increase the cost of building wind farms. As noted by NEMMCO in its proposal, the most significant costs are expected to be in the areas of fault ride through capability, voltage control and reactive power capability and communications facilities for the provision of real-time data to NSP and NEMMCO's control centres. The changes may also have a cost impact on generators constructed with other technologies although this appears unlikely to be to the same degree as with wind farms. The proposal provided a high level indication of the potential costs in relation to one aspect (reactive power capability) of the proposed changes.

The Commission is concerned that, given the breadth and probable impact of the proposed changes, NEMMCO did not provide more detailed information as to the likely cost implications on investors as part of its proposal. The Commission also notes that comments made in submissions in relation to costs were qualitative rather than quantitative. Therefore, on balance the Commission is satisfied that the overall benefits of the proposal are likely to exceed the costs, including those to investors.

Efficient use of electricity

Making the technical standards more technology-neutral encourages lower cost forms of generation to enter the market and to displace higher cost forms of generation in meeting the demands of customers for electricity. This is provided that the minimum requirements for those lower cost technologies are not excessive and that the system impact that such generation causes does not impose higher costs on other market participants. The Commission is satisfied that the technical standards proposed, including the mechanisms for addressing the risks to power system security, local quality of supply are likely to result in a net lower cost outcome for electricity consumers.

Provision of information

Efficient investment in electricity

The proposals on provision of information will require manufacturers of all types of generating technology to develop and provide dynamic models of their plant. The

Commission understands that the cost of doing so is not expected to be significant and will reduce as experience is gained with the development of the models. The new requirements for testing arising from those models will impose costs on new developments. However, as noted below, the reduction to the system risk profile that results from those tests is likely to be greater as the tests will be based on more accurate information.

Investors in wind farms will benefit from the changes by being able to optimise the cost of meeting the technical requirements through having access to current and accurate models of plant connected to the power system. Similarly, by making information available on proposed considered projects, investors will not need to make onerous assumptions about the interaction of their projects and other concurrently proposed projects.

The Commission notes that the exact size of the net benefits depends upon NEMMCO and stakeholders being able to reach effective outcomes concerning the detailed content of the information requirements and the degree to which the non-confidential versions of that material contain information suitable to address the needs of relevant third parties. The process to be used should provide a means of ensuring that the detailed information requirements are not excessive and the amendments to the proposal in the Rule to be made which have removed access by third parties to confidential information, ensure that investors do not face increased costs in protecting commercially sensitive information.

Efficient use of electricity

The benefits of the proposed Rules concerning provision and disclosure of information arising from maintaining the capability of the existing network by reducing the reliance on operating margins on the network to ensure power system security and quality of supply. These benefits are similar in nature to those discussed above in relation to the proposed technical standards.

Access negotiation and compliance

Efficient investment in electricity

Including reliability of supply considerations in access negotiations can be expected to increase the cost of a proportion of new generation projects that might be required to modify a proposed connection or accept the prospect of being constrained off. In the draft Rule determination, the Commission took the preliminary view that when this is balanced against the benefit in reliability of supply to electricity consumers, the Commission is satisfied that there are likely to be overall benefits to the proposed solution.

However, on further reflection, the Commission considers that without an economic test being undertaken in relation to this role, there is no guarantee that the lower cost outcome for electricity customers will be attained. On this basis, the Commission considers that not giving this better role to NEMMCO and removing the requirement from the Rule to be made better promotes the achievement of the NEM objective. Further discussion on the Commission's decision in relation to reliability of supply is in section 4.3 of this Determination.

Generally, the clarification and improvements to the process of negotiating access are likely to result in more consistent and less costly negotiations. This should ultimately lead to reduced costs being passed through to consumers. The Commission has not accepted the proposed changes in relation to the process for determining performance standards for existing plant on the basis that, as the changes propose to reinstate a previous process already known to be flawed, they would not contribute to the NEM objective.

Efficient use of electricity

The proposed changes to the access negotiation arrangements will improve the quality and accuracy of the resulting negotiated performance standards. This is likely to lead to the more effective and efficient management of power system security, reliability and local quality of supply as those bodies responsible for operation of the system (NEMMCO and the NSPs) and the organisation responsible for monitoring compliance and enforcement of the technical standards (the AER) will have more accurate and up-to-date information on plant performance.

Appendix 1 Rule to be made

See separate attached Rule to be made.