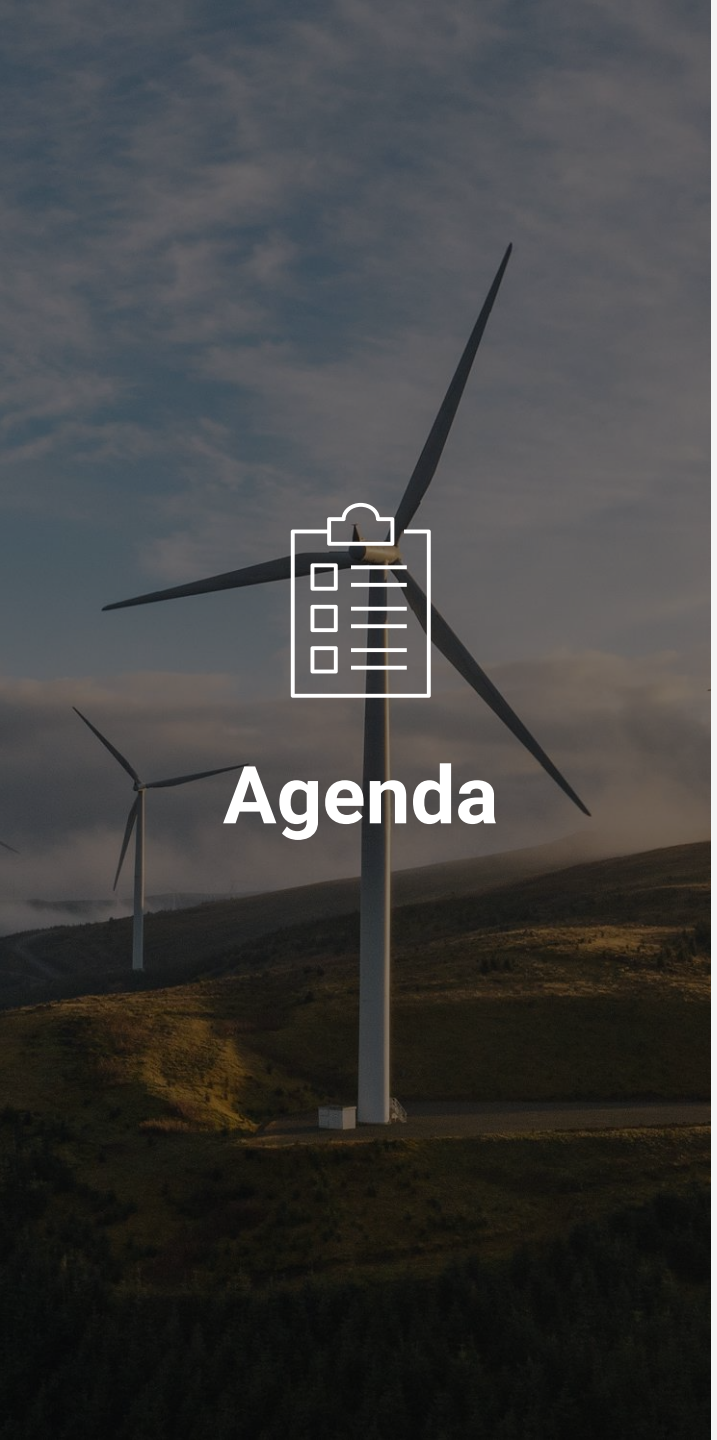
# Improving the NEM access standards – Package 1

ERC0393 - AEMC Workshop

27 March 2025

# Introduction

- We’re grateful for the valuable and encouraging feedback provided in the submissions on the AEMC’s draft determination.
- This pack describes our preliminary views on select priority issues to gather collective feedback.
- ***Note:*** **These are staff-level views that have NOT yet been discussed with the Commission. The Commission has the final say in all decision-making.**
- We welcome any further feedback until **3 April 2025**. Any feedback received will inform the Commission’s final determination to be published on **22 May 2025**.



# Agenda

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|---|---|---|
| **09:00** | Introduction | 10 min |
| **09:10** | Transitional arrangements | 20 min |
| **09:30** | Application of S5.2 and S5.3a to network assets | 10 min |
| **09:40** | S5.2.5.1 – Reactive power capability | 30 min |
| **10:10** | S5.2.5.10 – Detection and response to unstable operation | 15 min |
| **10:25** | ***Break*** | 10 min |
| **10:35** | S5.2.5.5 – Disturbance ride through capability | 20 min |
| **10:55** | S5.2.5.5A – Responses to disturbances following contingency events | 15 min |
| **11:10** | S5.2.5.13 – Voltage and reactive power control | 15 min |
| **11:25** | S5.2.5.4 – Response to voltage disturbances | 15 min |
| **11:40** | S5.2.5.7 – Partial load rejection | 15 min |
| **11:55** | Closing remarks | 5 min |

# We're considering changes to our draft transitional arrangements

## Our draft rule applies the new access standards to existing connection applications by default

**Old chapter 5 would apply if:**

- By the rule commencement date, an offer to connect has been received.
- If a connection application has been lodged and subsequently elects to apply the old chapter 5

**New chapter 5 would apply if:**

- By the rule commencement date, a connection enquiry has been submitted, or a connection application has been lodged.
- By the end of the transitional period, old access standards were not agreed upon (or some other conditions agreed between the applicant and the NSP were not fulfilled)

These transitional provisions were largely replicated from the 2018 *Generator technical performance standards* rule.

## Stakeholders identified several limitations with our draft rule, highlighting a need for revision

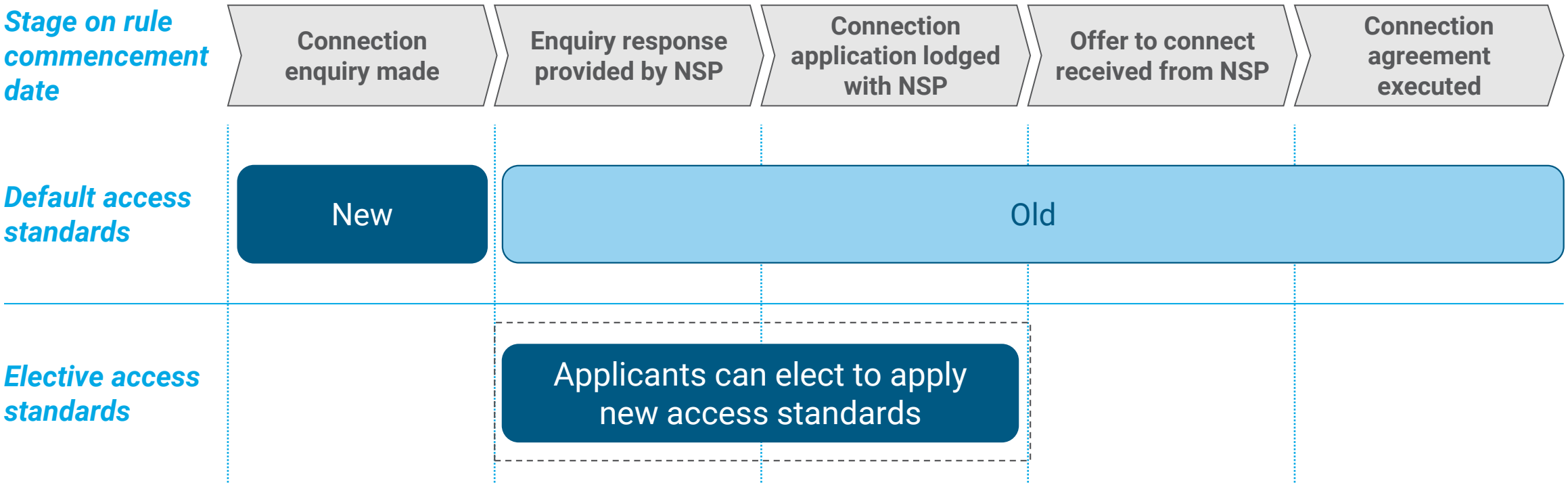
The draft transitional arrangements:

- Do not permit agreeing to a mix of old and new access standards.
- Might cause an unnecessary rush to agree to a set of access standards by the end of the transitional period, or else new access standards would apply if agreement was not reached.
- Do not allow connection applicants who have submitted a connection enquiry and are preparing a connection application to choose to use the old chapter 5.

**To maximise flexibility and address the stakeholder feedback above, we are considering changes to the transitional arrangements.**

# We’re considering applying old access standards by default for all applicants beyond the enquiry stage

We’re considering these arrangements for application of old or new access standards for connection processes already underway, depending on their **stage on rule commencement date** (indicatively 22 August 2025).



# Applicants may elect to use a mix of old or new access standards

**Enquiry response provided by NSP** → **Connection application lodged with NSP**

The connection applicant may elect to use some or all of the new access standards for their connection and must notify the NSP of their choice.

Within 30 business days, the NSP must (in consultation with AEMO for AEMO advisory matters) provide the details of the new access standards and any further information. NSPs may recover the costs of this additional information provision.

- Under the proposed arrangements outlined in the previous slide, after the rule commencement date, connection applicants who have received a connection enquiry response or who have already submitted a connection application would use the old rules by default.
- This would minimise costly rework that may otherwise be needed to comply with the new access standards.
- However, if the Connection Applicant wishes to use the new access standards (or only specific new access standards), they must inform the NSP of their choice.

## Rationale

- These proposed changes to the transitional provisions would maximise flexibility for connection applicants to determine which version of the access standards would minimise costly rework or redesign.
- There would be no ‘transitional period’ that would inadvertently act as a deadline to agree to access standards, minimising the need for undue rush.

# We're considering clarifying the application of S5.2 and S5.3a to network assets and transitional arrangements

## Feedback on draft rule

Support for consistent performance standards or synchronous condensers, regardless of owners or operators.

There was some misunderstanding about whether the draft rule and transitional arrangements apply to other network plant (e.g. STATCOMs/SVCs) – **it does not.**

Some NSPs were concerned that the draft transitional rule would have the effect of significantly modifying the design and increasing the cost of planned synchronous condensers that will form part of their network.

## AEMC's preliminary response

For existing synchronous condensers or HVDC links that already form part of an NSP's network, or form part of a ***considered project,*** we're considering that NSPs must:

- Document performance standards for those plant with reference to new Chapter 5, but only to the extent consistent with the actual capability of the plant
- Advise AEMO of the performance standards within 12 months
- Existing plant, or plant that is part of a considered project, **would not** need to meet the new minimum access standards.

## Rationale

- Applying the new access standards to synchronous condensers that are part of ***considered projects*** **(i.e. have passed the RIT-T)** may lead to significant cost increases and unacceptable delays, increasing costs for consumers.
- S5.1 would not apply to an NSP with respect to their synchronous condensers or HVDC links (see draft rule, clause S5.1.1(h)).
- Documenting performance standards for existing synchronous condensers and HVDC links that are not subject to a connection agreement and providing them to AEMO & the AER would promote better regulatory visibility.

Supporting | Seeking clarifications / proposing alternatives | Opposing

# S5.2.5.1

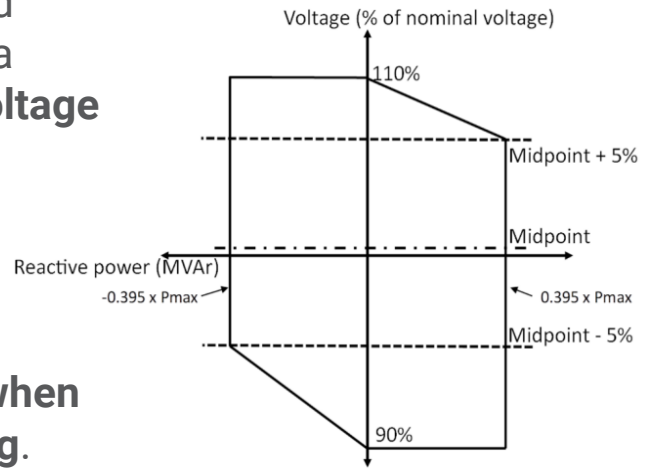
# Reactive power capability

## Issues with existing rules

- The existing S5.2.5.1 requires generators to provide full reactive power capability across the entire normal operating voltage band of 90% to 110% of nominal voltage.
- This includes capability to increase voltages when they are high and decrease voltages when they are low, which may be inefficient given generators are primarily responsible for regulating voltages at their connection point.
- Requiring reactive power injection to maintain voltage close to 110% of nominal may not be appropriate for a continuous plant performance standard.

## AEMC's draft rule

- Reduce the requirement for capability to increase voltages when they are high and decrease voltages when they are low to a **10% voltage band around a mid-point voltage set by the NSP** (as shown in the reactive power capability curve)
- For the AAS, **require no derating for temperatures below 50 degrees**
- For the AAS, **require no voltage impact when the plant is connected but not generating**. Reduce compliance obligations for operation in such a condition.




AAS - Automatic access standard

# We're considering retaining the voltage range in the draft rule, NSPs could be allowed to set mid-point voltage on forward-looking basis

## Feedback on draft rule

Supported by stakeholders on the basis that it promoted efficient investment that was aligned with generator voltage control responsibilities.

Several stakeholders requested additional clarity on how NSPs would set the mid-point voltage and whether it would need to change as network conditions change.

Concerns raised on reducing reactive power capability which NSPs could direct to support network voltages under certain circumstances.

Supporting | Seeking clarifications | Opposing

## AEMC's preliminary response

- Draft rule supports efficient investment by balancing costs and benefits for generators and NSPs, consistent with the shared benefits, shallow connection charging, and the primary generator and NSP roles and responsibilities.
- Allowing NSPs to set the mid-point voltage on an unconstrained forward-looking basis could support efficient outcomes as the mid-point voltage will apply over time as the power system changes.

## Rationale

- Under the draft rule Generators maintain their full reactive power capability to regulate connection point voltages, consistent with their primary voltage control responsibility.
- Generators would be required to provide limited capability to increase voltage when voltages are high and lower voltages when they are low. This capability is not used to regulate connection point voltages but may be directed by AEMO or the NSP. NSPs can bias this capability to support higher or lower voltages using the mid-point voltage.
- The mid-point voltage will not change over time as it will be a documented part of the standard.
- NSPs need to be able to set the 'mid-point' voltage on an unrestricted forward-looking basis that accounts for their best view of how their network may change over time.
- NSPs have information and incentives that best position them to set an appropriate mid-point voltage.

# We're considering amending the draft rule's proposed temperature-derating requirements

## Feedback on draft rule

Some stakeholders supported a requirement for no temperature derating below 50 degrees.

Some stakeholders proposed a lower de-rating threshold and sought clarification on the interpretation of proportional derating.

The proposal for no temperature de-rating below 50 degrees was not supported as it was considered unachievable for some technologies.

## AEMC's preliminary response

- The AEMC is considering removing the specific derating temperature threshold and proportional de-rating requirement.
- If we moved forward with this approach, a general requirement would be imposed that requires temperature derating to be recorded.

## Rationale

- We understand that a derating threshold of 50 degrees would make the AAS unachievable for some technology types, in particular wind.
- The draft rule could result in excessive requirements for negotiation imposing additional costs and time associated.
- High market prices during hot temperatures provide an incentive for investment in plants that don't excessively derate, limiting the rationale for a specific derating threshold.
- Recording derating characteristics is a requirement that ensures AEMO and NSPs understand information on plant performance with temperature.
- The approach we are considering could leave derating with NSPs that currently have existing approaches to handling derating that account for plant characteristics.

Supporting | Seeking clarifications / proposing alternatives | Opposing

# We're considering clarifying reactive power capability for integrated resource providers

## Feedback on draft rule

A stakeholder identified the potential for asymmetric reactive power capability requirement for IRPs given potential differences in active power capability and maximum demand capability.

## AEMC's preliminary response

We're considering clarifying that:

- Reactive power capability requirement for integrated resource providers (IRPs) for the purposes of S5.2.5.1 would be the higher of the maximum demand capability and the active power capability.
- At 0 MW, the reactive power capability requirement would be based on active power capability.

## Rationale

- We appreciate that some stakeholders thought that reactive power capability requirement in the draft rule was unclear with respect to the treatment of maximum active power for IRPs where there is a difference between maximum demand and active power capability.
- We heard that the draft rule created the potential for asymmetric reactive power capability from such plant depending on whether they are operating in load or generation mode.
- Requiring the greater of the maximum demand and active power capability could provide clarity and avoid potential asymmetric capability requirements.

Seeking clarifications

# We're considering clarifying the requirement for no voltage impact from plant who are connected but not generating

## Feedback on draft rule

Stakeholders considered clarification was required on the interpretation of out of service versus in service. Flexibility for plant to take operational measures when required by NSP to meet 0% voltage variation within 30 mins was also suggested.

Several stakeholders considered this obligation to be unachievable as some voltage impact is unavoidable when plant equipment is switched in and out.

Seeking clarifications / proposing alternatives

Opposing

## AEMC's preliminary response

We're considering clarifying the proposed requirement to exclude:

- Temporary connection point voltage impacts when the plant is connected to the power system, or there are internal plant switching events, and
- Circumstances where the reactive power compensating units are impacting the connection point voltage in response to connection point voltage conditions unrelated to the plant.

We're also considering including additional scope for operational measures when required by the NSP to meet 0% voltage variation as soon as reasonably practicable.

## Rationale

- The AAS contemplates either compensating the voltage impact by keeping some units in service to provide reactive power or disconnecting the system.
- Plant switching events could result in transient voltage impacts at the connection point. It may be unreasonable to require no voltage impact from such events.
- The reactive power compensation that is implemented to address plant voltage impacts may change the voltage at the connection point by responding to external voltage conditions according to their setpoint and droop settings.
- Addressing these circumstances doesn't lead to system security concerns but has a material impact on the ability to comply.

# S5.2.5.10

# Detection and response to unstable operation

## Issues with existing rules

- Automatic access standard requires plant to have a protection system that trips them for unstable operation.
- However, there is no requirement for plant to be capable of detecting instability at the connection point and determine their contribution to the instability.

## AEMC's draft rule

In the automatic access standard for asynchronous plant, require:

- **Facilities to detect instability** in voltage, reactive power and active power at the connection point.
- **Facilities capable of disconnecting units** for unstable behaviour, with configurable enablement conditions and settings agreed with the NSP and AEMO.
- Upon detection of an instability, **automatic and prompt execution of a configurable hierarchy of actions** agreed with the NSP and AEMO, based on the plant's contribution to the instability.

# We're considering excluding automatic disconnection requirement

## Feedback on draft rule

No in-principle objection to requiring facilities for instability detection. One stakeholder noted that they currently install such equipment at all their sites.

It was suggested that any implementation of tripping for instability in asynchronous generators should be considered with caution and should only be applied in cases of significant instability.

However, several stakeholders raised strong concerns with using instability detection data for automatic disconnection.

Supporting  Seeking clarifications  Opposing

## AEMC's preliminary response

It could be prudent to take a staged approach with this amendment.

**Retain**

- Require facilities capable of instability detection and disconnection
- Upon detection of an instability, execute a configurable hierarchy of actions agreed with the NSP and AEMO

**Withdraw**

- Automatic and prompt execution of actions, including disconnection, based on a plant's contribution to instability (in both S5.2 and S5.3a)

## Rationale

Instability detection technologies are still maturing and disconnecting the wrong plant could exacerbate instabilities. Hence, automatic disconnection may need greater certainty.

Nevertheless, requiring facilities capable of instability detection and disconnection (including the ability to send/receive data remotely) could:

- Allow AEMO and NSPs to conduct controlled field trials and develop better strategies to manage instabilities in a coordinated manner.
- Enable additional studies to determine plant contribution to instability and mitigate system security risks from automatic disconnection.

# S5.2.5.5

# Disturbance ride through capability

## Issues with existing rules

- Don’t specify a minimum three phase fault level for plant tuning, potentially resulting in a tuning range that sub-optimally utilises available plant performance range.
- Don’t consider that multiple faults could reduce the fault level at the connection point below the level for which a plant was tuned, adding unnecessary obligations on plant performance

## AEMC’s draft rule

Require the NSP to specify the minimum three phase fault level for plant tuning to be the higher of:

i. the three phase fault level derived from the agreed short circuit ratio value recorded in the performance standard for clause S5.2.5.15; and

ii. the minimum three phase fault level at the electrically closest system strength node, in combination with the single network element outage that would cause the greatest reduction in the three phase fault level at the connection point.

Exclude plant from remaining in continuous uninterrupted operation if the three phase fault level at the connection point falls below tuning minimum

# We're considering revising the minimum fault levels for tuning

## Feedback on draft rule

We received no in principle objection to specifying a minimum three phase fault level for plant tuning.

Stakeholders noted that control system settings to demonstrate compliance with S5.2.5.15 can be different from other S5.2.5 clauses, hence the short circuit ratio recorded in S5.2.5.15 should not be used for plant tuning.

Suggestion to set the fault level to the minimum level for which the plant can operate stably and remain connected.

Suggestion to allow NSPs and connecting parties to negotiate minimum fault levels based on actual fault level and capability of the existing plant.

Concern with allowing a full exemption and suggestion to require plant to operate stably and remain connected until the lowest fault level that the plant has capability to do so.

Supporting | Seeking clarifications / proposing alternatives | Opposing

## AEMC's preliminary response

We're considering removing the reference to S5.2.5.15 and aligning the minimum three phase fault level for plant tuning with the maximum system impedance (or fault level) value specified by the NSP in S5.2.5.13, unless agreed otherwise with the NSP or AEMO.

## Rationale

This would:

- Apply a consistent range for plant tuning across all relevant access standards
- Allow flexibility to NSPs to suggest a more optimal tuning level considering plant capability and locational factors
- Not rely on S5.2.5.15 which only applies for asynchronous plant and could have different settings for compliance

We also consider that determining the lowest fault level at which a plant can operate stably and remain connected for multiple fault ride through could require a lot more analysis, and still leave a high degree of regulatory risk for the proponent.

# S5.2.5.5A

# Responses to disturbances following contingency events

AAS - Automatic access standard
MAS - Minimum access standard

## Issues with existing rules

Existing reactive response requirements for asynchronous plants are insufficiently applicable to real-world voltage disturbances, making assessment of ongoing compliance challenging.

- Adequately damped, settling time and rise time requirements are assessed with respect to voltage step changes, not real-world voltage disturbances
- Existing initiating condition thresholds for reactive current commencement are inconsistent with best plant performance.
- Post-disturbance active power recovery isn't sufficiently linked to voltage recovery
- There is insufficiently clear treatment of unbalanced fault response

## AEMC's draft rule

The draft rule aims to address the issues above by:

- Linking the requirement for active power recovery to voltage recovery
- Adding a response 'commencement time' to the AAS, as previously added to the MAS, but with a higher performance requirement to align with best power system performance
- Removing the settling time requirement from the AAS
- Defining the term 'adequately controlled', which is used in the MAS without an explanation, and using it to replace 'adequately damped'
- Defining a 'control objective' for balanced and unbalanced faults and transient over-voltages, to minimise the deviation of voltage on each phase from pre disturbance values, while maintaining stable control

# We're considering retaining removal of settling time requirement

## Feedback on draft rule

Most stakeholder responses supported removing settling time.

It was suggested that settling time could be retained but qualified as applying to 'step-like' voltages, as is proposed for the rise time.

Concerns raised given settling time is a standardised, well-understood control parameter.

## AEMC's preliminary response

- The AEMC is considering retaining the draft rule to remove the asynchronous generator settling time requirement.
- This would be consistent with the 2023 Efficient reactive current access standards rule change, which removed settling time from the minimum access standard to prioritise reactive response requirements that are most relevant to real-world voltage disturbances and that best support ongoing compliance.

## Rationale

- The draft rule that imposes a commencement time requirement to bring the AAS in line with the MAS changes imposed in the 2023 Efficient reactive current access rule.
- The AEMC acknowledges that settling time is a standard and well-understood control system response parameter. The settling time requirement is, however, hard to measure and interpret for real faults.
- This is because the settling time requirement is only a valid measure of the adequacy of the reactive current response for a clean voltage step.
- A settling time requirement is not suited to more complex, unbalanced faults, and where the power system response is inconsistent with a single machine infinite bus.

Supporting | Seeking clarifications / proposing alternatives | Opposing

# We're considering retaining and clarifying the commencement time requirement

## Feedback on draft rule

Several stakeholders requested greater clarity on a definition of commencement time. One stakeholder suggested applying the definition of rise time, except the trigger to start the rise time calculation is not 10% of the final, but the time voltage at the connection point drops below 0.9 pu.

Another stakeholder suggested that reactive current to be considered as having commenced the current must be 'consistently' opposing the voltage disturbance

Seeking clarifications / proposing alternatives

## AEMC's preliminary response

- The AEMC is considering retaining a 10 ms reactive response commencement time as a means of incentivising a fast response.
- The AEMC is considering clarifying that the commencement time must be in respect of a sustained reactive response that 'consistently' opposes the voltage disturbance.

## Rationale

- The draft rule that imposes a commencement time requirement to bring the AAS in line with the MAS changes imposed in the 2023 Efficient reactive current access rule.
- Requiring a short commencement time together with, a longer rise time, and deleting the settling time requirement will ensure a fast and stable response.
- We consider the current requirement to provide a response within 10ms of initiating conditions being met to provide sufficient clarity given S5.2.5.5A(g).
- We consider additional clarity that the response must be sustained, and consistently opposing the voltage disturbance would assist in the interpretation of the requirement.

# S5.2.5.13

# Voltage and reactive power control

## Issues with existing rules

- Currently, S5.2.5.13 does not specify a fault level (or system impedance) range to which the plant must be tuned.
- In areas of the NEM that may have a very large fault level range, this could lead to improper tuning of plant control systems, increasing the risk of instability.

## AEMC's draft rule

- The NSP must nominate both the **highest and typical system impedance** that the S5.2 plant must be tuned to for the purpose of clause S5.2.5.13.
- The **highest system impedance** must be consistent with the system impedance at voltage close to nominal for a typical dispatch pattern and network configuration that corresponds to the minimum fault level at the closest system strength node, in conjunction with a network outage that causes the largest reduction of fault level at the connection point.
- The **typical system impedance** must be representative of a typical network configuration with typical levels of S5.2 plant in service.

# We are considering maintaining the range of fault level to which plant must be tuned (typical to maximum system impedance)

## Feedback on draft rule

General stakeholder support for the various changes in S5.2.5.13, such as:

- Prioritising stability over speed throughout S5.2.5.13
- Removing impediments to unit-level voltage control
- Adding materiality thresholds on settling time error bands
- Clarifying requirements for multiple modes of operation

- Some stakeholders sought clarification or greater transparency on how NSPs would calculate and nominate the typical system impedance.
- There were many helpful suggestions on improving the clarity of the drafting and the tables, which we're working through.

A few stakeholders questioned the need for NSPs to nominate a typical system impedance, citing potential variability in nearby generation and future network changes.

Supporting

Seeking clarifications / proposing alternatives

Opposing

## AEMC's preliminary response

- We're considering retaining the range (typical to maximum system impedance) for which plant must be tuned to.
- We consider the typical system impedance that an NSP would nominate should be reasonably consistent with 'system normal' OPDMS snapshots and the range of conditions that a plant would encounter during commissioning.

## Rationale

We consider that:

- Extra work that NSPs may need to do to determine typical system impedances would be outweighed by the power system benefits associated with ensuring that plant is appropriately tuned to conditions it will most likely experience when operating.
- Any further prescription on calculation of typical system impedances would not be appropriate in the NER – that could be left to guidelines. A prescriptive method in the NER is not likely to be suitable for all possible situations and network configurations.

# We're seeking feedback on expressing the range as three phase fault levels instead of system impedances

## Feedback on draft rule

Some stakeholders questioned whether the NSP-nominated system impedances in S5.2.5.13(m) would be expressed as an impedance value, a three phase fault level value, or an equivalent short-circuit ratio (SCR).

## AEMC's preliminary response

- The draft rule's intent was that NSPs would nominate system impedances as impedances (that is, a complex number in Ohms).
- However, from a compliance perspective, after a power system incident has occurred, it may be easier to determine fault levels at the connection point of a particular plant, rather than the impedance.
- Additionally, clauses in S5.2.5.5 and S5.2.5.15 refer to *three phase fault levels* rather than system impedances. Coupled with the proposal to align the minimum fault level in S5.2.5.5 to corresponding fault level in S5.2.5.13, it could be prudent to align the terminology.
- **We seek feedback** on any particular preference to retain the draft rule's wording (system impedances) versus referring to *three phase fault levels*.
- We do not consider that it should be expressed as an equivalent SCR, as the NER definition of *short circuit ratio* uses synchronous *three phase fault level*.

Seeking clarifications / proposing alternatives

# S5.2.5.4

# Response to voltage disturbances

## Issues with existing rules

- The existing automatic access standard (AAS) requirement for plant to remain continuous uninterrupted operation for overvoltages above 130% was potentially unbounded.
- An unbounded requirement would not be achievable by plant.
- Relatedly, there is no explicit requirement in the NER for NSPs or plant to avoid causing recurring switching surges, which can lead to the overvoltages referred to above.
- The interpretation of continuous uninterrupted operation (CUO) in the 90% - 110% nominal voltage range is currently being interpreted in different ways across the NEM. This inconsistency can lead to significant cost increases for connecting plant.

## AEMC's draft rule

- In the automatic access standard, for overvoltages at least marginally exceeding 130%, plant must remain in continuous uninterrupted operation for at least 20 milliseconds.
- There would be an obligation on S5.2 Participants and NSPs to ensure that their equipment and plant do not cause other Network Users or the network to experience recurring slow front overvoltages – see clauses S5.1.4A and S5.2.4(b)(4A) of the draft rule.
- Clarifications to CUO were made for voltage variations within the range of 90 – 110% (see clause S5.2.5.4(e2) and (e3)).

# We're considering amending overvoltage requirements to specify an explicit upper limit and clarifications to switching surge obligations

## Feedback on draft rule

The phrase 'marginally exceeding' was generally supported.

However, several stakeholders asked for an explicit upper limit for the overvoltage requirement above 130% (such as 130.1%, 131% or 135%).

A few stakeholders considered that the dual obligation on NSPs and S5.2 plant to minimise recurring switching surges is either:

- Already handled by the NER and other standards
- May lead to unnecessary requests from the NSPs to demonstrate compliance

## AEMC's preliminary response

- In the automatic access standard, for overvoltages over 130% up to and including 131%, plant must remain in CUO for 20 milliseconds. This could replace the 'marginally exceeding 130%' language used in the draft rule.
- We are considering changes to the dual obligation on NSPs and S5.2 plant to make clear that switching surges (caused by any party) should not:
  - Involve overvoltages greater than what was coordinated between the NSP and the Schedule 5.2 participant under S5.2.3 (e.g. insulation coordination)
  - Cause undue aging and additional maintenance above what would otherwise be necessary, considering *good electricity industry practice*.
- We welcome feedback on how the obligation could clarified to ensure that compliance with this clause would not significantly change the existing good electricity industry practices of NSPs and plant operators.

## Rationale

- A clear upper boundary of 131% would be a clear bounded obligation (i.e., a plant needs only to remain in CUO for 20 ms at 131% and no higher).
- Currently there is no explicit NER obligation on parties to minimise recurring switching surges that may damage plant.
- This obligation could provide a clear hook for NER 5.7.2 testing or assessment requests, if a party deems that switching surges are damaging their plant or network equipment.

Supporting | Seeking clarifications / proposing alternatives | Opposing

# We are considering clarifying the CUO requirements for voltage variations > 10% in the range of 90-110% of nominal voltage

## Feedback on draft rule

Several stakeholders supported the clarifications in draft rule S5.2.5.4(e1)-(e3):

- permitting on-load tap-changing transformers (OLTC) use
- disregarding transient responses to voltage disturbances or tap changes & expected plant responses
- temporary reductions in P and Q are permitted to the extent reasonably attributed to energy source availability, losses and other factors agreed to with the NSP and AEMO.

The draft rule was potentially unclear on the expected behaviour for plant without an on-load tap-changing transformer for voltage variations > 10% within the range of 90-110%.

Some NSPs did not support the draft rule permitting reliance on OLTCs to achieve CUO for voltage variations < 10%.

Supporting

Seeking clarifications / proposing alternatives

Opposing

## AEMC's preliminary response

- We currently intend to largely retain the intent of the clarifications at S5.2.5.4(e1)-(e3).
- We are considering changes to the wording of S5.2.5.4(e3) to clarify that for voltage variations > 10%, reasonable temporary reductions in P and Q are permitted, where those reductions are corrected by OLTC action or other operational arrangements as agreed with the NSP and AEMO.

## Rationale

- Allowing OLTC action does not change the requirement to remain in CUO. If the OLTC response is inadequate or too slow, then the plant may not remain in CUO and this would not be permitted.
- For plant connected to distribution networks, as the point of application can now be applied at the closest 66kV point (under the NAS), meeting the requirement to remain in CUO for voltage variations > 10% should be easier – but any operational arrangements should be agreed upon with the NSP and AEMO.

# S5.2.5.7

# Partial load rejection

## Issues with existing rules

- S5.2.5.7 requires all generating and integrated resource systems to remain in continuous uninterrupted operation (CUO) for a partial load rejection occurring in less than 10 seconds.
- However, asynchronous plant and batteries are inherently able to remain connected during load rejection events, questioning the need for them to explicitly prove compliance with this requirement.

## AEMC's draft rule

Restrict S5.2.5.7 to **synchronous plant** only.

# We're considering retaining our draft rule to exclude asynchronous plant from this requirement

## Feedback on draft rule

**Strongly supported by multiple stakeholders** since it would reduce the compliance burden on asynchronous plant and batteries.

**Some NSPs raised concerns**, noting that:

- Partial load rejection can lead to simultaneous voltage and frequency disturbances, which are not adequately tested elsewhere
- Islanded operation of grid-forming plant is critical
- Compliance burden and associated costs would be minimal

Supporting  Opposing

## AEMC's preliminary response

We are considering retaining our draft rule to limit the partial load rejection requirement to synchronous plant only.

## Rationale

- Partial load rejection is most likely to affect synchronous plant only.
- Proving compliance requires considerable time and resources in certain jurisdictions, with weaker benefits for asynchronous plant.
- Applicable voltage and frequency standards both still apply for simultaneous voltage and frequency disturbances, which are easier to test than S5.2.5.7.
- AEMO is currently reviewing grid-forming inverter standards, which could potentially include developing requirements for islanded operation.

# Thank you for your time and attention.

We welcome any further feedback by **Thursday, 3 April 2025.**

Contact: Project Leader

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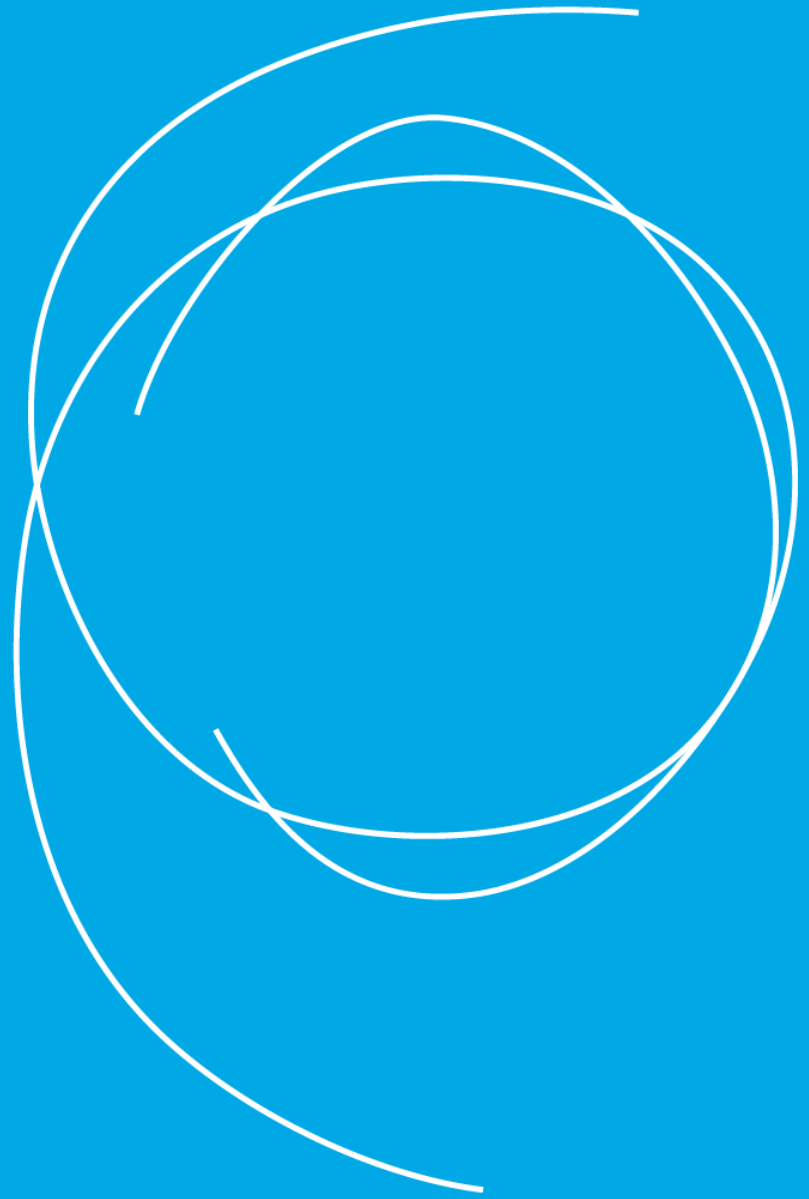
Sydney NSW 2000



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