

**Managing power system  
fault levels (ERC0211) and  
Managing the rate of  
change of frequency  
(ERC0214) and Draft  
Determination and Rules**

**Submission to AEMC – 11 August 2017**

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## Executive Summary

- » In assessing, power system fault levels, and system strength, the use of Short Circuit Ratios is a 'necessary' measure. However, it is not of itself a fulsome proxy or complete measure for, or of, system strength. A full examination of system strength involves assessing how the network physically and functionally operates and responds. This in turn requires assessment of: supply quality, protection systems' performance in clearing faults under different conditions, as well as fault ride through, and whether low 'system strength' outcomes could result in power system stability issues.
- » The AEMC must establish appropriate governance, regulatory and competitive protections under the National Electricity Rules (NER) for NSPs in addressing new risks that may arise in the procurement of any new system security market and service arrangements.
- » Connection process arrangements will need to be considered in establishing supporting frameworks as more parties engage and negotiate with NSPs at both a transmission and distribution level in the transforming energy sector.
- » Given the potential lead times in providing solutions and related consultations, the AEMC must adopt adequate transitional arrangements and timeframes. This includes Regulatory Investment Test processes (or preferably expedited economic assessment processes) with a more logical commencement date for the new services of 1 July 2019.
- » There may be ways to amend and streamline the Regulatory Investment Test - Transmission (RIT-T) and Regulatory Investment Test - Distribution (RIT-D) to address system strength and inertia/frequency issues. Similarly, a better understanding of the mechanisms to ensure that a new generator 'do no harm' concept can be practically implemented would be welcomed by stakeholders.
- » Conducting a tripartite workshop with the Australian Energy Market Operator (AEMO), the AEMC and Network Service Providers would be a useful way to assess the full range of issues on these matters, ahead of the finalisation of these crucial AEMC rule determinations.

Overall, Energy Networks Australia observes that the AEMC appears to have taken a longer-term focus on establishing a potential framework for these system strength and frequency/inertia issues. However, due regard to the immediate operational, technical and commercial practical implementation issues is just as important. This submission attempts to highlight some of these immediate concerns and the need for an adequate and reasonable set of transitional timeframes and implementation arrangements for the AEMC's due consideration.

Energy Networks Australia would also like to remind the AEMC that it is also imperative upon them to fully explain how these potential new arrangements are likely to impact consumers and pricing going forward.

# 1. System Strength and System Fault levels

Energy Networks Australia considers that the proposed Short Circuit Ratio (SCR) is a relatively simplistic approach to measuring 'system strength'. It is a worthwhile proxy, and a useful screening mechanism that should trigger more detailed analyses and modelling<sup>1</sup>, as it is likely to be quite a dynamic measure over-time. A full examination of system strength involves assessing how the network physically and functionally operates and responds, which in turn requires assessment of:

- » supply quality;
- » protection systems' performance in clearing faults under different conditions, and fault ride through; and
- » whether low 'system strength' outcomes could result in stability issues emerging, with areas of particular concern being:
  - 'synchronous' and 'non-synchronous' plant stability
  - whether there will be the correct operation of protection systems, and
  - voltage control issues

## Related concerns on System Strength/Fault Levels

**Service definitions** - What available machines/generators should be considered dispatched when assessing minimum system strength and under what circumstances should these be allowed to change or be accounted for?

Who is the **appropriate entity** to manage volume risk in the case where the service is over or under-utilised? Or impacted by potential gas supply shortfalls

What **payment structure options should be utilised**? Should pricing be dynamic or fixed?

Energy Networks Australia cautions that:

- Estimating and negotiating SCRs at every generator connection point amplifies the risk of over-investment in network and connection assets and equipment to address unproven system strength issues; and
- The likely framework needs to be as flexible as possible to accommodate changing market conditions.

An obligation to assess SCRs at every generation connection point is likely to be onerous and problematic. One option that the AEMC should consider is to require that NSPs maintain a workable minimum fault current level at major system nodes determined in conjunction with AEMO. Maintaining system strength is likely to require a combination of synchronous generator operation and network augmentation to efficiently optimise the thermal capacity of the network.

It is also important to have robust processes applied when identifying network

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<sup>1</sup> The AEMC should be mindful that such additional analysis should not be stymied by a restrictive and inconsistent Final Determination on AEMO's Generating System Model Guideline rule change proposal.

locations where SCR and system strength requirements are not being met. This is due to the dynamic characteristics that influence system strength (e.g. entry and exit of generation) and the extent to which the relevant section of the network is becoming more congested or constrained.

Consequently, AEMO's proposed SCR guidelines should be realistic and allow for regular periodic review. As the issues surrounding localised system strength are rapidly changing, the application of such guidelines should be expected to evolve over time. Similarly, the Rules should not be overly stringent while providing high-level principles. Having the key issues in a guideline would allow for the release of a timely AEMC Final Determination, but also allow more time for the AEMO SCR guideline to be produced, to achieve better outcomes following more fulsome consultation processes.

This approach would offer a quicker route to any necessary 'fit-for-purpose' amendments from time to time. This could be undertaken in a similar way to the scope that applies for variations in Negotiated Access Standard Frameworks contained in the NER.

The proposed system strength 'do no harm' obligations on new generating systems should be informed by detailed electromagnetic transient (EMT) analysis. The level of investment associated with remedial works warrants this additional analysis. Amongst other things, this approach mitigates the potential risk that generators may strategically attempt to negotiate higher minimum SCRs to discourage other generators from connecting in a particular area.

## **2. Appropriate governance, regulatory and competitive protections under the Rules for NSPs in addressing new system security related risks**

Both draft determinations establish new system operation obligations for transmission and distribution network service providers. It is important that appropriate arrangements are established, which support any new roles and responsibilities, created.

For TNSPs to meet the new minimum inertia requirement at least cost, it is advantageous if procurement is supported by provisions that ensure a level of genuine competitiveness and robust processes.

It is important for the AEMC determinations to establish appropriate arrangements, which support any new roles and responsibilities, created, including for (T)NSPs.

Specifically, the framework should enable efficient outcomes when TNSPs procure system security services in what may be a limited market for such services, by providing adequate protections and governance under the Rules.

Currently, there appears to be no explicit protections in the event that a TNSP procuring for new services faces a non-competitive tender response. This apparent gap is evident, when compared against NER sub-clauses of 3.11.5, which apply when AEMO tenders for network support and control ancillary services. These clauses provide for:

- » negotiating in good faith;
- » reasonable terms and conditions; and
- » access to a dispute adviser.

Energy Networks Australia suggests that a thorough examination of all the potential obligations on TNSPs and the manner in which they must be discharged is required. For example, in relation to each obligation, is it the AEMC's intention that the obligations are: absolute, on a reasonable endeavours basis, or conditional based on other factors within an NSP's control?

The AEMC's framework should put beyond doubt the legal context and explain what are the likely protections, limitations or immunities from liability that will apply in relation to the provision (or failure to provide) the new mandated service requirements. This will be particularly important compared to what is currently afforded to AEMO in its market-related functions under existing legislation.

#### **Competitive protections for inertia services procured from third parties**

- (a) If the option given to TNSPs under the Draft Inertia Rule to procure inertia services from third parties is to enable:
- (i) TNSPs to procure inertia services from third parties on a genuinely competitive, low cost basis; and
  - (ii) without exposing TNSPs to the risk of failing to meet their obligations in the timeframes required, then the following recommendation is made.

**Recommendation 1: The Final Rule should include additional provisions similar to those applicable to AEMO for its procurement of Network Support Control Ancillary Services under Rule 3.11.5.**

An important priority is for AEMO to formalise the completion of any tender or contracting process outcomes. AEMO may either formally accept or endorse these outcomes as addressing the specific needs and service requirements it has identified earlier.

This may require the adoption of a threshold 'economic test' or a set of unambiguous AEMO statement of principles that will need to be applied. Relatedly, NSPs also need some criteria or principles to determine the point at which a tender process is deemed to be uneconomic and should then revert to an AEMO procurer of last resort process and/or invoke directions, as is the case in the wholesale market, if such a tool is required. If this is not suitably addressed, the risks to TNSP's will rise, and there is the potential for less competitive outcomes, which will result in likely costs to customers.

## Liability protections, limitations or immunities

The Draft Rules impose upon both NSPs and AEMO a fundamentally important new set of new system security related functions and obligations, to address significant system security needs in the NEM. Yet there is no provision made for, nor any discussion of the possibility of appropriate liability immunities, protections, or limitations for NSPs in connection with the performance of these functions.

The clear legislative intent of sections 119(2) & (3) NEL and clause 13(2) of the NEL Regulations is to ensure that NSPs are afforded the same reasonable level of statutory protection from liability in negligence, for performing key system security related obligations imposed on them under the NER, which is afforded to AEMO under sections 119(1) & (3).

There is a possibility of extending the existing statutory civil liability protections (by simple amendment to clause 13(2) of the NEL Regulations) to also cover these new system security obligations being imposed on NSPs under the Draft Rule changes.

**Recommendation 2 (a): The AEMC seek from the South Australian Government an amendment to clause 13 of the NE Regulations, so as to extend the existing section 119 NEL(2) statutory limitation on liability for NSPs undertaking system security related functions so as to cover the new obligations placed on them under these Draft Rule Changes<sup>2</sup>.**

**Recommendation 2 (b) The commencement of the Draft Rule Changes coincide with the commencement of that amending regulation or (alternatively) that transitional liability limitation provisions to the same effect be included as transitional Rule changes in NER Chapter 11.**

## Suitability of Cost Recovery Mechanisms

» The AEMC must address the material cost recovery and cash flow issues under the Rules to avoid exposing TNSPs to unmanageable risks.

Despite TNSPs:

- (b) not being required to apply a RIT-T where inertia services are procured from a third party service provider; and
- (c) being entitled to pass thorough inertia service payments to third parties as network support payments under Rule 6A.7.2,

TNSPs are nevertheless still required to comply with the new overall obligation to procure the **least cost option** to satisfy their minimum inertia availability obligations. As a matter of practicality, particularly given the lack of a robust framework to ensure a competitive third party services tendering process, it will be difficult to demonstrate that TNSPs have satisfied the least cost obligation in the absence of undertaking a RIT-T.

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<sup>2</sup> Refer to accompanying Annexure as provided by Ashurst Australia.

At this stage, members have reservations as to how these arrangements may negatively impact cash flows. There are no specific network support allowances in place at present for the new services or regulatory allowances. TNSPs should be entitled to full and timely pass through of those costs to be efficiently incurred in meeting the new service obligations, consistent with the revenue and pricing principles under the National Electricity Law. To this end the AEMC, should:

- » Confirm that contract service payments for both system strength and inertia should fully qualify for cost recovery as network support pass through; and
- » Address through appropriate mechanisms, the material cash flow risks of unfunded network support payments for up to two years at a time. Options for consideration include the provision to seek pass through of forecast costs (for e.g. linked to one of the existing cost pass through provisions under the Rules) or another appropriate revenue and pricing adjustment.

It is proposed that potential amendments to the Draft 'Inertia' Rule would have the following effect:

**Recommendation 3 (a): A TNSP will be taken to have satisfied its obligation to procure the least cost option to satisfy its minimum inertia availability obligations, in respect of any inertia services payments made by a TNSP under an inertia services agreement with a service provider following completion of a competitive tender process.**

**Recommendation 3 (b): That a TNSP have the ability to pass through contract payments on a timely basis under the Rules, recognising the two-year delay in recovery of network support payments for what could be significant amounts that are also completely unfunded under current NSP Revenue or Pricing Determinations.**

**Recommendation 3 (c): The AEMC should determine whether there should be a similar approach in adopting a revised 'network support' definition for system strength, as currently envisaged by the AEMC for inertia and frequency purposes.**

- » Give further consideration to appropriate commercial incentives based on a risk-weighted return for NSPs to pursue non-network solutions.
- » Specify that AEMO is responsible for the enablement and dispatch of contracted system security services. This is a natural extension of its market operator functions and that it is the party best placed to make all unit commitment and dispatch decisions for contracted scheduled units on the basis of 'prioritised costs' that are advised by NSPs.

In relation to addressing investment certainty, we are concerned as to how AEMO's ability to amend or remove a regional inertia requirement (with 12 months' notice) may impact upon investment certainty requirements. At face, this could lead to the potential for contract premium uplifts for a particular inertia service from a small number of potential service providers.

Given these substantive challenges, adequate transitional arrangements (such as an expedited economic assessment processes) and revised timeframes are likely to be

required. Given the lead times involved (including the implications for RIT-T processes), the AEMC should consider adopting a commencement date for all the new system security services of 1 July 2019. This may also allow for any developments from the potential establishment of an inertia ancillary services market as proposed by AGL to be established concurrently.

### 3. Connection process arrangements

NSPs ensure an open access regime and a stable power system under credible and protected contingencies. It is important for NSPs to minimise connection costs, which can be as key barrier for generators connecting to the network.

Ultimately, NSPs try to inform connecting parties of what the NER require from them during the negotiation process. In doing so, they can provide:

- » A better understanding of what the problems are;
- » What a connecting parties contributions are during protection events and their responsibilities; and
- » What additional works may need to be potentially undertaken to ensure connecting generators are able to remain technically stable and not affect other plant.

Members face a pipeline of potential connecting parties and instances of multiple applications being received in close succession or almost simultaneously. The importance of sharing models and information amongst proponents and between them and NSPs and AEMO is becoming more critical due to the rapid change in the energy and generation mix connecting to the system.

Energy Networks Australia considers having access to such models and data will help to underpin and address potential clusters or Renewable Energy Zones as recommended in the Independent Review into the Future Security of the National Electricity Market (Finkel) Final Report of June 2017. Conceivably, if there is more than one potential connecting party, it might be more economic and optimal for the development of the network to consider these applications together (with one solution). Such an approach would be heavily reliant on the willingness or obligation of potential connecting parties to participate and collaborate.

Whilst we understand that the AEMC has attempted to progress its thinking based on existing processes, there may be a need to examine the issues of 'queueing' and 'open-season' processes that has been functioning in other jurisdictions and sectors for connecting parties. This could be addressed either in this rule change or in a subsequent process. A key step in examining this 'queueing' issue, would involve some potential guidance and understanding of a consistent set of criteria where a mechanism could be triggered to allow an NSP to cluster or undertake a combined analyses of connection applications.

The existing NER confidentiality related clauses prohibit the disclosure of what is

happening between the parties. A significant issue is getting first movers to share models at the appropriate time so that businesses and AEMO can better assess, plan and connect the cluster/zone options.

Energy Networks Australia acknowledges that consistency across different jurisdictions has been an issue for some parties. Energy Networks Australia is developing new, and refreshing superseded, connection guidelines over the next year.

## **4. Adequate transition arrangements and timeframes**

At this stage of the consultation process, Energy Networks Australia considers there is insufficient clarity as to how key aspects of the regulatory framework will work in practice. A key concern is the unresolved uncertainty that risks leading to inefficient solutions for addressing potential localised system strength and inertia needs. Such risks apply whether the solution relies on non-network or network options.

As the AEMC is aware, the existing procedures and consultation processes for conducting a RIT-T are lengthy and it is unlikely a full RIT-T could be completed within 12 months. Current processes are also likely to prolong the optimal installation of a synchronous condenser to be constructed and commissioned.

Energy Networks Australia considers that each alternative should be subject to the similar level of economic evaluation. This concern could be addressed by either reducing the steps for a RIT-T, for example, following an AEMO statement of need so that it is practically achievable within 12 months or lengthening the minimum time for a response to a notice from AEMO to allow for the most efficient solution to be delivered following the completion of a RIT-T process, particularly for inertia and frequency/inertia requirements.

Other scenarios where a full RIT-T or RIT-D would be problematic include where there is either a lack of options through a competitive procurement process, or as a result of a retirement of a generator within say six months leaving insufficient time to run a thorough RIT process. Generator retirements with minimal notice have been seen recently in South Australia and Victoria (and are recommended to be addressed by the Finkel Review).

It may be prudent to align the commencement dates, so new arrangements could commence on 1 July 2019, to allow for a fulsome new guideline and adequate thinking to evolve around the frameworks for system strength that are reasonable, proportionate and practical to implement. This is particularly in relation to the TNSP obligations to maintain minimum inertia and system strength standards.

It may also be appropriate for the AEMC to consider the merits of a revisit of the new arrangements say two to three years after the effective introduction of the new rule.

### *Proposal as to how the Regulatory Investment Tests could be amended*

Energy Networks Australia is also proposing that the AEMC consider amending clauses in the Rules dealing with the RIT-T. This is particularly pertinent if the system strength or inertia need has been identified independently by AEMO and a potential network solution needs to be assessed in a more streamlined manner to address the identified minimum inertia or system strength need in a short time-frame.

In these circumstances, it may be appropriate to codify in the NER, any exemptions from the RIT-T (e.g. for shortfalls in system security services declared by AEMO) or alternative streamlined assessment processes that should apply to such requirements. Such an approach could be treated on a similar basis to existing NER RIT-T provisions for identified needs relating to: reliability corrections; or an urgent and unforeseen *network issue*.

In particular, such an approach might be applied to specifically address inertia or system strength requirements, which, if not addressed, could *materially adversely affect the transmission network*.

Such an option may be an efficient and flexible approach to address these matters.

## 5. Further clarification of the “Do No Harm” obligation

Energy Networks Australia seeks further clarity as to how the generator “do no harm” obligation would be interpreted under a range of different examples and scenarios.

Energy Networks Australia does not want to see an outcome where any new system strength ‘do no harm’ obligation may result in significant additional costs for new non-synchronous generators (both for non-scheduled and semi-scheduled), which could be avoided by larger, solutions that exhibit economies of scale.

Energy Networks Australia would also highlight that the ‘do no harm’ provisions will need to be cognisant of the Open Access nature of the NEM. Often, system strength shortfalls can be (and are) effectively managed in the NEM despatch process. Energy Networks Australia understands that this a difficult process and can complicate assessments as to whether the system is secure or not. Nevertheless, it is important that the ‘do no harm’ principles in any proposed system strength arrangements are amenable to the existing intent of the Open Access regime underpinning the NEM. For example, there may be situations where it is most efficient for transient system strength issues to be managed in the existing NEM despatch processes through constraint equations.

If implemented appropriately, the arrangements would correctly allocate to new generators the management of the risks and costs of any impact caused by their project, and the proposed framework provides a strong locational signal, encouraging generators to connect in stronger, uncongested parts of the network. This should drive the efficient use of network assets that would suitably meet the National

Electricity Objective.

It is also considered important for DNSPs that an appropriate and realistic threshold/limit on the size of Distributed Energy Resources should be applied. For example, we understand that this would not be feasible for household photovoltaic systems. Such an obligation may require more detailed assessment of the following matters:

- » fault ride through under credible fault conditions
- » contribution to fault levels at a particular node
- » impact on protection performance and whether generator needs to take action to resolve, and
- » does the new generator interact with other scheduled generation operating in the proximate zone/region at that time to determine “do no harm”.

There are a number of generating plants that are marginally below the 30 MW threshold for scheduled generator registration. It will be crucial for the AEMC to clearly recognise the growing number of semi-scheduled generators’ significant impact on system strength at this level. There could be the scope for an expert technical assessment to determine an appropriate solution.

It may be plausible for the AEMC to commence the new generator connection ‘do no harm’ requirements of the rule changes to say 1 July 2018 or whatever date the AEMC considers best aligns with any new arrangements that arise from its Final Determination on AEMO’s Generating System Model Guidelines rule change proposal.

## 6. Next Steps

Energy Networks Australia is concerned that the AEMC envisages implementation of new arrangements under an untested framework within short timeframes with its Final Determinations proposed for 19 September 2017. Members consider further discussion amongst participants (including AEMO, the AEMC and NSPs) is necessary before any new arrangements are finalised.

Given the need to holistically understand the complexities and technical factors, caution is advised. Greater industry agreement on final definitions, technical and design specifications, assessment processes, operationalisation, deployment arrangements underpinned by appropriate governance and regulatory frameworks would be important.

Consequently, the AEMC should conduct workshops with interested stakeholders ahead of its Final Determinations, applying a similar approach to that taken by the AEMC to the recent Council of Australian Government Energy Council’s Transmission Connections and Planning Arrangements rule change proposal applied in the first Quarter of 2017. This approach was also applied to the Metering replacement rule change proposal (albeit in that case, the additional engagement process was conducted ahead of the release of the AEMC’s Draft Determination).