

20 April 2017

Mr John Pierce  
Chair  
Australian Energy Market Commission  
PO Box A2449  
Sydney South NSW 1235

## System Security Market Frameworks Review – response to Directions Paper

Dear Mr Pierce,

Thank you for the opportunity to contribute to the Australian Energy Market Commission's review into the regulatory frameworks that affect system security in the NEM. Reduced levels of synchronous generation in the power system are impacting the management of frequency and of system strength, making this review timely.

Energy Networks Australia is the national industry body representing businesses operating Australia's electricity transmission and distribution and gas distribution networks. Member businesses provide energy to virtually every household and business in Australia.

The Commission's proposed two staged implementation process, with networks having a central role in both the immediate and subsequent packages, is a pragmatic response to complex and escalating issues that are emerging across the NEM.

Our submission concentrates on the areas for further engagement with the Commission, particularly in regard to the tools and mechanisms that will allow the proposed approach to be implemented in the most efficient way. These areas include clarity of roles and expectations, appropriate cost recovery, incentive and pricing arrangements, and locational, jurisdiction-specific and transitional requirements.

Should you have any additional queries, please feel free to contact Norman Jip on (02) 6272 1521 or [njip@energynetworks.com.au](mailto:njip@energynetworks.com.au).

Yours sincerely,



**John Bradley**  
Chief Executive Officer

# System Security Markets Frameworks Review

Response to Directions Paper  
(April 2017)

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## Overview

Energy Networks Australia welcomes the opportunity to respond to the Australian Energy Market Commission's (the Commission) proposed approach to addressing current and future challenges in maintaining system security, published in the System Security Markets Frameworks Review Directions Paper.

A review of market frameworks is timely given recent events and the changing trends in generation sources across the National Electricity Market (NEM) toward non-synchronous technologies. These trends also highlight the importance of a more strongly connected NEM which is more actively managed at all voltage levels, as the energy transformation accelerates. In relation to high voltage, NEM system security, Energy Networks Australia considers Transmission Networks Service Providers (TNSPs) are well positioned to support better customer outcomes through:

- » assessing power system security issues at a range of different locations
- » evaluating how possible solutions can be provided through a range of sources – with a view to ensuring lowest cost outcomes for the required level of Inertia
- » providing Inertia and Fast Frequency Response services where it is technically feasible, efficient and economic for them to do so or alternatively, procure optimal solutions for power system security from other providers.

The Commission's proposed two staged implementation process, relying on a central role of networks in both the immediate and subsequent packages, is a pragmatic response to complex and escalating issues that are emerging across the NEM.

Energy Networks Australia therefore supports the high level direction to address system security issues in the immediate, short and long term and would like to work constructively with the Commission on the tools and mechanisms that allow this approach to occur in the most efficient way.

The Commission's proposed approach should formalise roles and obligations for TNSPs. This will include requiring networks to provide and procure services to manage the impact on frequency and system strength caused by reduced levels of synchronous generation. In order to achieve important system security outcomes for customers in an efficient way, the regulatory framework must deliver not only new roles and obligations but appropriate financial sustainability and incentives which are proportionate.

Energy Networks Australia supports appropriate rule changes to ensure:

- » **clear roles and expectations** for establishing, maintaining and reporting on required levels of Inertia, including:
  - **collaboration** between Transmission Network Service Providers (TNSPs) and AEMO on localised issues
  - **collaboration** with **Distribution networks** where there is evidence of system security issues beyond the transmission network, recognising the need for

distribution networks to increase their role and functionality in these circumstances.

- » **cost recovery and incentive arrangements** which:
  - recognise the new **role for TNSPs** in ensuring required levels of Inertia and system strength are provided in the network
  - **ensure TNSPs can fully recover the costs** of meeting these obligations and are not disadvantaged if the out-turn efficient cost of procuring or providing Inertia services are higher than forecast. (This is particularly important during the formative market environment in the Immediate Package)
  - ensure that the **incentives are proportionate to risk and opportunity so as to achieve intended customer outcomes** – particularly in relation to the procurement of Fast Frequency Response in the immediate package
  - provide TNSPs the **opportunity to procure or provide** increased levels of inertia or fast frequency response on a technology neutral basis where economic to do so.
- » Consideration of **additional transitional arrangements**:
  - in the immediate package where the market for procuring Inertia services is not sufficiently liquid
  - in the subsequent package, where the market for AEMO to procure Fast Frequency Response is not sufficiently liquid.
- » Ensuring the proposed allocation of the costs of providing these services through regulatory **pricing arrangements are clear and unambiguous.**

This submission expands on a number of matters requiring further consideration associated with the Directions Paper. We look forward to working further with the Commission to advance these issues.

## 1. Immediate Package

Energy Networks Australia supports the increased role of TNSPs in providing necessary system security support for the NEM. Placing additional obligations on TNSPs can leverage current transmission planning frameworks.

TNSPs are well positioned to assess a range of possible solutions for Inertia at different locations. A number of TNSPs currently own and operate assets such as synchronous condensers, which are currently providing both system strength and Inertia to the NEM. They are also well placed to procure or provide optimal solutions for power system security and stability in the medium and longer term with a view to ensuring lowest cost outcomes for the required level of Inertia.

The Commission recognises that solutions may include contracting with a synchronous generator to be online at certain times, or to run in synchronous

condenser<sup>1</sup> mode. However, it may extend to services from a grid scale battery storage facility, or provided from a fast frequency load-shedding scheme.

## Developing the regulatory frameworks to meet AEMC's direction

The Commission's proposed approach should formalise roles and responsibilities for TNSPs and AEMO in regards to assessing system security in the NEM, with additional obligations for managing the impact on frequency and system strength caused by reduced levels of synchronous generation. It is important that any new roles and responsibilities are clarified to mitigate against any potential overlap between parties.

In order to achieve important system security outcomes for customers in an efficient way, the regulatory framework must deliver not only new roles and obligations but appropriate financial sustainability and incentives which are proportionate.

These issues are discussed further below.

### Planning process to establish obligations for TNSPs

Energy Networks Australia supports the Commission's proposal to establish additional obligations on TNSPs to provide and maintain the required operating level of Inertia determined by AEMO through a process prescribed in the National Electricity Rules (the Rules).

It is important that the prescribed process, which AEMO must adopt, is clear in terms of accountabilities, methods and timeframes. For instance, it will necessarily impact on the planning and future operation of Transmission networks which will require careful consideration. The AEMO process will define the network areas (which may consist of a single NEM region or sub-regions) and the level of system Inertia required to maintain secure operation of each network area.

Clarification should be provided as to whether the proposed additional obligations on TNSPs are intended to apply to all TNSPs regardless of whether they are the Jurisdictional Planning Body for a particular jurisdiction. For instance:

- » AEMO is the Jurisdictional Planning Body in Victoria and other TNSPs in that jurisdiction do not perform Jurisdictional Planning Body functions
- » Transgrid is the primary Transmission Planning body in New South Wales even though transmission services are also provided by Ausgrid and the Directlink interconnector.

It is important that the prescribed process allows for necessary collaboration by AEMO with TNSPs, which have a detailed understanding of system security issues, particularly at the locational level. This should include (but not be limited to)

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<sup>1</sup> AEMC Directions Paper, p51

engaging the relevant TNSP in assessments of:

- » the network areas defined for the purposes of establishing required operating levels of Inertia
- » the generation mix, dispatch patterns, network conditions, potential contingency and tolerance to Rate of Change of Frequency that is used for modelled scenarios
- » the level of redundancy required in determining the required operating level of Inertia, as well as the number of Inertia service providers or plant
- » the scenarios related to protected events
- » the 'predetermined proportion of scenarios' which is to be used to determine the required operating level of Inertia.

Clearer detail will also be required on processes for identification and procurement of system security services, which could be identified in the next round of consultation. For example:

- » Energy Networks Australia assumes as part of these reforms, AEMO would undertake due diligence on the combination of Inertia and Fast Frequency Response to meet the Frequency Operating Standard; The Commission should also consider how the prescribed process for determining the required operating level of Inertia relates to the *timing* of:
  - the Transmission Annual Planning Report process
  - the establishment of the obligation
  - the RIT-T process
  - the final procurement or provision of the service.
- » Implementing appropriate timeframes to address immediate issues is particularly relevant to South Australia where there are clear and immediate challenges which must be addressed in a timely manner.

A workshop with relevant parties may assist in scoping and resolving such arrangements and Energy Networks Australia would be pleased to assist the Commission if useful.

## Meeting Transmission network obligations

More detail is also required on how TNSPs will be required to meet obligations to provide inertia services.

The Directions Paper sets out the following process by which TNSPs meet their obligations to provide the required operating level of Inertia<sup>2</sup>:

- » AEMO sets the required operating level of Inertia in the National Transmission Network Development Plan.
- » TNSPs set out a proposal to meet the required level of Inertia as part of its

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<sup>2</sup> AEMC Directions Paper, p44

Transmission Annual Planning Report. This could take the form of physically building assets or contracting services from third parties.

- » The Transmission business would use the RIT-T process to determine the most economically efficient option for meeting the required operating level of Inertia for example by comparing expressions of interest from third party providers against the option of physically constructing the required assets.
- » Under the RIT-T process TNSPs seek submissions from registered participants, AEMO and interested parties on the credible options considered as part of their investment test. TNSPs must also consider all feasible network and non-network options.

When implementing the Commission's proposed approach into more formal changes to the Rules, further consideration will need to be given to:

*i. the nature and extent of the obligation placed on TNSPs*

The Directions Paper is unclear about the nature of the obligation placed on a TNSP to provide the required level of Inertia beyond the process described above. Understanding the consequences of failing to provide the required operating level of Inertia will be an important consideration for TNSPs in managing associated risks and costs in developing contractual arrangements to meet obligations.

*ii. the methodology to be followed in assessing the adequacy of procured inertia and FFR services or their combination*

There is a likelihood that, in many circumstances, the inertia procurement process will not be straight forward. For example, the interaction of these arrangements with AEMO's dispatch systems still need to be worked through. The AEMC and Engie note the complexity in entering into contracts with synchronous generators, suggesting the potential for multiple third party contracts to be required to make sure that the required level can be met at any given time<sup>3</sup>. Mindful of AEMO's role, more clarity could be provided on how the two services (ie. Inertia and Fast Frequency Response and services to the energy market) will be co-optimised.

*iii. whether the regulatory approach based on the existing RIT-T process is fit for purpose*

The RIT-T processes allows for proponents to propose options to address Inertia limitations in different locations. It is expected that the combination of the number of potential proponents and the complexity involved may result in the assessment of all options by potential proponents taking some time to complete. With this in mind, the Commission may wish to ensure the RIT-T process is fit for purpose for the type and timing of Inertia service provision.

Regulatory arrangements should also cater for potential circumstances where

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<sup>3</sup> AEMC Directions Paper, p32



TNSPs incur costs in meeting obligations to provide Inertia, and where required operating levels of Inertia change.

*iv. implications for the provision of the service where the Inertia and Fast Frequency Response market is limited and TNSPs are not able to physically construct assets to provide the service within an appropriate time.*

There may be circumstances, particularly in the immediate term where there is a limited market for Inertia services – such as areas with limited synchronous generation – and the ability for TNSPs to provide an alternative solution is not available (or is delayed due to RIT-T arrangements).

In instances where TNSPs may not be able to procure the necessary operating level of Inertia, or alternatively where the cost of procurement appears to be excessive due to the limited market, some form of transitional arrangement may be necessary. The AEMC may also wish to consider how arrangements currently applying to AEMO could be applied to Transmission networks when discharging similar obligations under the Rules. In many circumstances, the Rules afford AEMO necessary powers and/or reliefs from liability to ensure it is protected when meeting its obligations. Alternatively, the AEMC will need to consider how TNSPs price risk when determining the service response to meet obligations.

The Commission may wish to consider alternative arrangements to ensure intended outcomes can be achieved at the lowest cost, for example in relation to high impact, low probability (HILP) events.

## **Service Delivery, Cost recovery and Pricing**

We support obligations for the providing Inertia being classified as prescribed services. However, regulatory arrangements will need to cater for the overlap between the prescribed service for Inertia services, system strength, procurement of alternatives to Inertia and market arrangements for Fast Frequency Response.

The Commission proposes the appropriate economic regulatory approach is through the ex-ante incentive framework for capital and operating expenditure, with the availability of cost pass-through arrangements for costs incurred to provide additional Inertia service within period.

In our view however, other cost recovery arrangements which better reflect the nature of the obligation and the service provided should be considered. Energy Networks Australia has the following concerns with the application of the current regulatory framework for these new arrangements for TNSPs:

- » These new obligations to provide system security for the NEM are important to customer outcomes and should be resourced by the Transmission business appropriately. However, limitations of cost pass through arrangements mean that TNSPs absorb additional costs of providing Inertia and system strength services unless they fall above the 1% annual revenue requirement materiality threshold.

- » The AEMC has introduced mechanisms requiring TNSPs to compare different options for procurement of inertia services which will result in the most efficient solution being selected. However, under the ex ante expenditure incentive framework, TNSPs will not recover the costs of the most efficient solution if it is higher than the revenue allowance set by the AER through the regulatory determination process.

A more appropriate mechanism for cost recovery would be consistent with existing provisions for network support pass through (refer Clause 6A.6.7) which would ensure TNSPs can pass through the costs they incur. This should be adopted as the basis for the initial framework, rather the approach currently proposed. However, we would also like to work with the Commission on other options to allow cost recovery that reflects the obligation placed on TNSPs to provide Inertia and system strength services over the longer term.

Energy Networks Australia suggests the AEMC should also explore with participants different pricing mechanism options, noting that pricing arrangements for prescribed services would need to reflect any approach adopted. The issue of how (or by whom) costs are recovered will be important for customers and other stakeholders to clearly understand as the immediate and subsequent packages develop. The impact of pricing changes, including the consistency between immediate and subsequent packages will need to be considered.

Specific jurisdictional issues may also need to be considered. For example, in Tasmania, cost recovery arrangements based on the 'causer pays' principle discussed in Sections 4.2 and 5.4 of the Directions Paper could equally apply to certain large loads or interconnector flows.

## **Incentives for Procurement of Fast Frequency Response**

The Commission proposes to introduce interim measures which allow TNSPs to contract with third party providers of Fast Frequency Response services, as it would:

- » provide a basis for AEMO to develop specifications in relation to the service.
- » allow for a more efficient transition to a market sourcing approach for the provision of Fast Frequency Response services in the longer term.

TNSPs have reviewed the interim approach. Based on the uncertainties, complexities and risks involved in TNSPs substituting Fast Frequency Response with required operating levels of Inertia, it is not entirely clear whether there are balanced incentives for Fast Frequency Response and Inertia in the immediate package. Other options should be considered in the immediate package which would increase the capability for TNSPs to procure Fast Frequency Response services.

## **Generator Obligations**

To support system security outcomes in the new framework, Energy Networks Australia supports greater information sharing about the technical capability of

existing generators and arrangements to improve reporting of ROCOF tolerance.

It is essential that generator planning processes, modelling tools and system studies be developed to assess the impact of variable renewable energy (VRE) on the system under all expected system conditions, prior to approval being given to the connection of any additional source of generation. In our recent submission to the AEMC's Rule change proposal on Generating System Model Guidelines, Energy Networks Australia supported more detailed model data to enable more effective power system studies by AEMO and NSPs, noting that

“...such arrangements would allow AEMO and TNSPs to perform the necessary modelling to understand the minimum system strength issues and TNSP/generator obligations proposed in the AEMC's System Security Frameworks Review Directions Paper”<sup>4</sup>.

Energy Networks Australia recently submitted to the Review of NEM Security<sup>5</sup>, that there was also a need for retirement or disconnection of existing generator assets should be subject to some form of regulation to ensure that adequate notice is provided to ensure that the NEM is able to appropriately respond. It is not only essential that alternative sources of generation are available to replace the retiring generator, but alternative system security services can be made available if a synchronous generator is disconnecting from the NEM.

## Other issues

### Implications for Distribution Network businesses

While the focus of the Commission's review to date has been in respect of the Transmission Network, system security issues will increasingly need to be actively addressed beyond the transmission network. Joint planning between transmission and distribution networks is likely to identify solutions which may provide the most efficient investment for increasing inertia and system strength.

A more specific role may need to be identified for the distribution network to address system security, at least in some jurisdictions in the near future. For instance, Energy Queensland has identified the following drivers in regional Queensland which require management of system security in the distribution network:

- » North Queensland is experiencing the fastest growth in non-synchronous generation connection applications >1MW in the NEM.
- » This subregion will likely reach a point before 2025 where the installed capacity of this non-synchronous generation will be equivalent to the peak load of the region.
- » Much of the uptake in applications is for embedded generation connecting to the

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<sup>4</sup> Energy Networks Australia: “Generating System Model Guidelines Rule Change Proposal – Submission”, April 2017, p4

<sup>5</sup> Energy Networks Australia: “Response to Preliminary Report of the NEM Security Review – Submission”, March 2017, p.36

Ergon Energy Distribution Network.

- » Large parts of regional Queensland are supported by the Ergon Energy sub transmission network.

In circumstances such as these, it will be important that distribution networks, who are likely to be impacted by increased non-synchronous generation are not precluded from participating in the planning and management of system security. Issues with generation connection and “causer pays” must also be equally considered for such distribution networks.

With the increased proliferation of generation into the low voltage networks resulting in increased levels of bidirectional power flows within these networks, the generator performance standards may need to be reviewed and revised.

## Jurisdictional Arrangements

The Commission acknowledges that influence on control system frequency is dependent on the location of synchronous devices connected to the network. Energy Networks Australia expects that additional jurisdictional issues will also need to be considered. For example:

- as noted above, the configuration of loads in Tasmania means that Inertia is just as important in over frequency as under frequency
- the transmission arrangements in Victoria - which are different to other jurisdictions in the NEM - will also need specific consideration

## 2. Subsequent Package

### Transitioning between initial and subsequent package

As noted above, we support the Commission’s two-stage implementation as a pragmatic approach to dealing with system security issues within the NEM. We expect, as part of further consultation, the AEMC will provide further information on how TNSPs, AEMO and other market participants transition from the immediate package to the subsequent package.

The transitional arrangements will be important to clarify, particularly if the obligations for providing services, or the required level of those services, can change over time. Energy Networks Australia looks forward to ongoing engagement and consultation with the Commission to clarify how the market sourcing approach would inter-relate with regulatory obligations, incentives and other market functions and arrangements.

### Proposed Incentive Arrangements

Energy Networks Australia supports incentive frameworks which encourage service providers to achieve required outcomes at lowest cost. There is not enough detail at

this stage on the extent to which the Commission's proposed framework will deliver an appropriate balance between obligations, risks (including potential liability), and incentives.

While Energy Networks Australia is generally comfortable with the Commission's direction in terms of Fast Frequency Response procurement and arrangements for delivering Inertia services in excess of the required operating level, it would be important to understand further how the arrangements would provide positive incentives to deliver efficient outcomes.

It is essential that the Commission considers:

- scenarios where the Fast Frequency Response market is not sufficiently ready or established within the 3 year timeframe currently estimated as the end of the Immediate Package
- the need for sufficient notice in relation to adjustments to transitional frameworks from one regime to the other.

### 3. System Strength

Energy Networks Australia supports the increased role of TNSPs in maintaining an agreed minimum system strength to connected generators. We agree that declining levels of system strength can affect the ability of generators to meet their technical performance standards, increasing the risk of cascading outages leading to major supply disruptions.

We also agree that managing Inertia and system strength are highly complementary activities, as using additional synchronous generators or condensers can resolve both issues. However, transitional arrangements may be required to address areas where system strength is already an existing challenge.

#### Defining System Strength

In developing the regulatory framework, it will be important to ensure system strength and its relationship with short circuit ratio is clearly defined.

The Directions Paper briefly mentions fault level as a measure of system strength<sup>6</sup> but then moves on to exclusively focus on short circuit ratio as the system strength measure. Energy Networks Australia would welcome the opportunity to engage with the Commission to determine:

- » what the most appropriate measure/s should be
- » how it should be interpreted, calculated and influenced.

For instance, the concept of a weighted short circuit ratio (WSCR), as used by AEMO

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<sup>6</sup> AEMC directions paper, p65

in National Transmission Development Planning, may be one option to consider.<sup>7</sup>

The AEMC should also consider how the minimum value of system strength will be determined, including whether and how other neighbouring generators and controlled dynamic plant (e.g. SVCs & STATCOMs) are accounted for. Ideally, the Rules should specify an absolute minimum system strength value. It is likely to be more efficient and effective if the process avoids the need for all minimum short circuit ratio values to be determined from first principles. It may for instance, mitigate the risk of potentially protracted negotiations between networks, generators and AEMO on the required minimum circuit ratio, without compromising customer security outcomes.

## System Strength beyond Transmission Networks

As noted above, there may be a need to consider system strength issues beyond the transmission network. Energy Queensland advises that generator connections on the transmission network can affect the short circuit ratio on the distribution network. As noted above, the increasing levels of generation connected to distribution or sub-transmission networks means that system strength issues in distribution networks are not insignificant in comparison to transmission networks. For instance, non-scheduled or exempt generators connected to Ergon Energy's distribution network increasingly comprise a larger proportion of the overall generating mix. Under existing regulatory arrangements, real-time management of these generators with a view to addressing system strength may not be feasible.

Finally, Energy Networks Australia supports arrangements which allow networks to recover costs through pricing arrangements that are clear and unambiguous and deliver efficient outcomes for customers in the long term. As noted above, an appropriate mechanism for cost recovery would be consistent with existing provisions for network support pass through (refer Clause 6A.6.7) which would ensure TNSPs can pass through the costs they incur. This should be adopted as the basis for the initial framework, rather the approach currently proposed. However, we would also like to work with the Commission on other options to allow cost recovery that reflects the obligation placed on TNSPs to provide Inertia and system strength services over the longer term.

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<sup>7</sup> See for instance, the overview of a Weighted Short Circuit Ratio when multiple generators utilising power electronic converters are expected to be connected in close proximity, in AEMO's *2016 NTNDP Methodology and Assumptions*, p. 24.