

20 April 2017



Mr John Pierce  
Chairman  
Australian Energy Market Commission  
PO Box A2449  
SYDNEY SOUTH NSW 1235

Dear Mr Pierce

**Directions Paper: System Security Market Frameworks Review**

Energy Queensland Limited (Energy Queensland) appreciates the opportunity to provide a submission to the Australian Energy Market Commission (AEMC) on its *Directions Paper: System Security Market Frameworks Review* (directions paper). The directions paper outlines the AEMC's proposed approach to addressing current and future system security challenges facing the National Electricity Market (NEM) as a result of the shift away from synchronous generation towards non-synchronous generation technologies.

Energy Queensland's comments with respect to the proposed approach to frequency control and system strength outlined in the directions paper are provided in the attached submission. While supportive of proposed measures that will allow greater levels of renewable non-synchronous generation in the NEM, Energy Queensland is concerned that the review's primary focus remains on the system security challenges faced by transmission networks. For reasons outlined in the attached submission, Energy Queensland considers that the review's scope should be broadened to also take into consideration the impacts of non-synchronous generation at the distribution network level.

Should you require additional information or wish to discuss any aspect of Energy Queensland's submission, please do not hesitate to contact either myself on (07) 3851 6416 or Trudy Fraser on (07) 3851 6787.

Yours Sincerely

A handwritten signature in black ink, appearing to read "Jenny Doyle".

Jenny Doyle  
General Manager Regulation and Pricing  
Telephone: (07) 3851 6416 or 0427 156 897  
Email: jenny.doyle@energyq.com.au

# Energy Queensland

## System Security Market Frameworks Review

Submission to the Australian Energy Market Commission's  
Directions Paper

Energy Queensland Limited  
20 April 2017



## Version Control

Version	Date	Description
1.0	20/04/2017	cm Initial

## Contact details

Energy Queensland Limited  
Jenny Doyle  
Phone: +61 (7) 3851 6416  
Email: [jenny.doyle@energyq.com.au](mailto:jenny.doyle@energyq.com.au)

PO Box 1090, Townsville QLD 4810  
Level 6, 420 Flinders Street, Townsville QLD 4810  
[www.energyq.com.au](http://www.energyq.com.au)

Energy Queensland Limited ABN 96 612 535 583

© Energy Queensland Limited 2016

This work is copyright. Material contained in this document may be reproduced for personal, in-house or non-commercial use, without formal permission or charge, provided there is due acknowledgement of Energy Queensland Limited as the source. Requests and enquiries concerning reproduction and rights for a purpose other than personal, in-house or non-commercial use, should be addressed to the General Manager Customer Strategy and Engagement, Energy Queensland, PO Box 1090, Townsville QLD 4810.

# Contents

- 1 Introduction..... 1
- 2 General comments ..... 2
- 3 Frequency control ..... 4
- 4 System Strength ..... 5

# 1 Introduction

In July 2016, the Australian Energy Market Commission (AEMC) initiated the System Security Market Frameworks Review (the review) to assess the impact of new technologies on system security in the National Electricity Market (NEM). Following publication of a consultation paper and interim report, the AEMC has now published its *Directions Paper: System Security Market Frameworks Review* (directions paper).

The directions paper outlines the AEMC's proposed approach to addressing current and future system security challenges facing the NEM as a result of the shift away from synchronous generation towards non-synchronous generation technologies. In the directions paper, the AEMC is consulting on the proposed approach to:

- **frequency control**, which involves the staged implementation of two packages of complementary measures; and
- **system strength**, which proposes amending the National Electricity Rules (the Rules) to clarify that it is the responsibility of Network Service Providers (NSPs) to maintain an agreed minimum short circuit ratio (SCR) to connected generators.

The AEMC has requested that interested parties should make submissions on the approaches proposed in the directions paper by 20 April 2017. Energy Queensland Limited's (Energy Queensland's) comments are provided in Sections 2, 3 and 4 of this submission.

Energy Queensland is available to discuss this submission or provide further detail regarding the issues raised.

## 2 General comments

Energy Queensland supports a framework that allows greater levels of renewable non-synchronous generation in the NEM and is generally supportive of the proposed approaches outlined in the AEMC's directions paper. However, while the proposed measures are designed to address frequency control and system strength challenges in the wholesale energy market, Energy Queensland remains of the view (as outlined in its submission on the AEMC's interim report) that the review should be broadened to include system security at the Distribution Network Service Provider (DNSP) level.

Energy Queensland considers that focussing on system security at the generation, Transmission Network Service Provider (TNSP) and Australian Energy Market Operator (AEMO) levels is too narrow for a number of reasons, including:

- Uptake of large scale embedded generation on distribution networks is, in many cases (but most particularly in Queensland), continuing at a rate and volume greater than that experienced by the corresponding TNSP; and
- The shift to a greater volume of generation existing as market exempt (i.e. generating systems with a nameplate rating of less than 5MW) and non-scheduled, in conjunction with the collective mass of household solar photovoltaic systems and battery storage, is not visible in real time to either the TNSP or AEMO and is also largely not visible to those parties in terms of planning.

This situation therefore elevates the role of the DNSP in system security, particularly in western Queensland where there is no transmission network. In Energy Queensland's view, as South Australia has become an indicator for the future of transmission networks, Queensland is likely to be the indicator for the future of distribution networks with mass Distributed Energy Resources (DER). Energy Queensland therefore recommends that the AEMC should give further consideration to the impacts of non-synchronous generation systems on distribution networks and their impact on the market as part of this review.

Energy Queensland also notes that there are a number of other related rule changes and projects currently underway and is participating in those consultation processes separately. In this regard, it is important that the AEMC should take into consideration stakeholder feedback provided in response to those consultation processes in order to ensure a holistic approach to market reform in the NEM. In particular:

- ***The Distribution Market Model project*** which will consider the future operation of electricity distribution networks and the potential need for a Distribution System Operator to manage the increasing complexities of the distribution network and its impact on the broader national market.

- ***The Generating System Model Guidelines rule change***, the aim of which is to provide AEMO and network service providers with access to more detailed modelling to allow all parties to more effectively assess how non-synchronous generators are likely to behave in a low power system strength environment, including how they may interact with other generators.
- ***The Non-scheduled Generation and Load in Central Dispatch rule change***, in response to which Queensland DNSPs have recommended that the classification of “non-scheduled” should be removed and that the “semi-scheduled / scheduled” limit should be reduced to 5MW.

Energy Queensland also considers it timely to undertake a comprehensive review of the process under the Rules for connecting and managing generators. The Rules should be updated to reflect the increased volume of generator connections across both transmission and distribution networks (but predominantly distribution networks) and new non-synchronous generation technologies which have become commonplace in the network and which must be managed accordingly.

### 3 Frequency control

Energy Queensland supports the establishment of inertia regions for management by TNSPs, but would make the following comments for consideration:

- Where a disparity exists between the type and volume of generation it will become increasingly important to localise the inertia requirements beyond a single state level. For example, north Queensland lacks any large-scale centralised synchronous generation and is instead supplied from south Queensland. However, north Queensland is experiencing the fastest growth in non-synchronous generation connection applications greater than 1 MW in the NEM and 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. Mechanisms to localise the inertia requirements in such instances will be critical to maintain the stability of the system.
- Given the lack of maturity in Fast Frequency Response (FFR) technology, Energy Queensland also suggests that consideration should be given to:
  - mechanisms to effectively share developments in FFR, both nationally and internationally; and
  - innovation funding mechanisms for research and development to assist in accelerating the maturity of FFR technology.



## 4 System Strength

Energy Queensland supports the proposed Rule amendments to address system strength issues, but would make the following comments for consideration:

- The importance of system strength in the distribution network is not insignificant in comparison to the transmission network. The ramifications are particularly extensive in the sub-transmission (132, 110, 66kV) network which extends up to a thousand kilometres west of Powerlink's east coast transmission network in Queensland.
- The requirement for NSPs to maintain a minimum SCR is not currently funded and, in line with the proposed "causer-pays" approach, should be recovered from the connecting generator. However, where a generator retirement causes a drop in SCR below the minimum level necessitating the NSP to perform rectification work, the means of cost recovery are more complicated.

The directions paper proposes that works to maintain SCR on generator retirement should be undertaken by NSPs as a prescribed service and hence ultimately be funded by consumers. However, NSPs forecast and obtain approval for future expenditure as part of their regulatory submission process and knowledge of the pending retirement of the generator/s may not have been known at the time of submission, in which case there would be no budget to cover works. The ability to forecast generator retirements and/or advanced notification of pending retirement with minimum notice periods may therefore need to be considered.

- The SCR value on which future generator connection applications are assessed needs to be clearly defined. There may be instances where a synchronous generator retirement is known but a non-synchronous generator is looking to connect prior to the retirement date. Energy Queensland would recommend that as soon as a generator makes its pending retirement known to the market, the resultant SCR should be used for managing new connection applications.
- The SCR minimum value will impact the size of generator that can be connected without impact and this size will vary across the NEM. The transmission network may be able to accommodate a large non-synchronous generator connection with a minimal impact, but further from the TNSP backbone in the outer extremities of the sub-transmission network the connection may be limited to less than 5MW. Consequently, this rule has the potential to affect semi-scheduled, non-scheduled and exempt generators and have bearing on Chapters 2, 5 and 5A of the Rules.

In regional areas, Ergon Energy has over 100 zone substations with a fault level lower than 50 MVA. Such low fault levels will require system strength to be analysed using Electromagnetic Transient-type modelling. Based on a hypothetical SCR limit of 10% of fault rating, Ergon Energy currently has 12 projects (of 114 connection enquiries) which would require remediation to increase system strength to maintain minimum SCR levels.

- The SCR within the distribution network will also be affected by new or retirement generator connections in the transmission network. While the minimum SCR may be met in the transmission network, the SCR in the distribution network may be adversely affected or further connections to the distribution network may be inhibited. Information sharing should be expanded to provide greater visibility of transmission connections to DNSPs in order to achieve effective management of system strength and appropriate recovery of associated costs.
- The directions paper proposes a number of framework changes to address the impacts of reduced system strength. One of these changes is real-time management of system strength by AEMO (section 5.5.3) which could involve constraining the output of an affected generating system. Such a constraint may be possible for semi-scheduled and scheduled generators but this approach may not be effective where the generator is non-scheduled or exempt and AEMO lacks visibility and control. It is important that this issue is addressed as non-scheduled and exempt generators increasingly comprise a larger proportion of the overall generating mix. This issue also reinforces the Queensland distributors' view that the classification of "non-scheduled" should be removed and that the "semi-scheduled/scheduled" limit should be reduced to 5MW to partially address such concerns.