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Sebastien Henry
Australian Energy Market Commission
PO Box A2449
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Dear Sebastien,

RES Australia Submission: EPR0053 Directions Paper

RES Australia welcomes the opportunity to provide a submission to the EPR0053 System Security Market Frameworks Review Directions Paper.

RES commends the work undertaken by the AEMC and its investigations into market frameworks underpinning the treatment of emerging system security issues. RES does however have a number of concerns with the Directions Paper. These are distilled to two key themes.

Firstly, RES opposes the proposal to place an obligation on Network Service Providers (NSPs) to maintain a defined operating level of inertia. RES is concerned that the proposal will result in unnecessary costs for consumers by biasing particular technical solutions. RES suggests that the Frequency Operations Standard (FOS) is amended to reflect the desired Rate of Change of Frequency (RoCoF) instead of requiring minimum operating levels of inertia.

And secondly, RES opposes the proposal to place an obligation on NSPs to maintain the Short Circuit Ratio (SCR) at each generating system's connection point. RES is concerned that the proposal will result in unnecessary costs for new generators and ultimately consumers. Explicit SCR requirements in the rules will create a bias towards synchronous generators and/or condensers over less costly technologies to maintain system security. Instead, RES believes there are existing mechanisms in place for NSPs to undertake RIT-T procurements based on identified needs particular to each case. In this way the optimal outcome for the individual need can be sourced considering network and non-network solutions.

RES invites the AEMC to engage with us to discuss our concerns raised in this submission and options available to assist with the fundamental issues regarding frequency control and system strength. More detailed feedback on the Directions Paper is provided below in a format that is consistent with the structure of the paper.

Yours Sincerely,

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Proposed approach to procuring inertia and fast frequency response services

Section of paper	RES Feedback
1.3.2 and 2.2.1	The Commission has noted in Appendix B that it has considered RES' feedback regarding FFR response times below 100ms. However, it is not clear that this has been incorporated because Figure 1.4 and Section 2.2.1 make references to response times of hundreds of milliseconds. We invite the Commission to discuss the performance of FFR technologies with RES.
4.2.1	RES does not support the proposal for TNSPs to be obliged to maintain a required operating level of inertia. RES is concerned that the proposal will result in unnecessary costs for consumers by biasing synchronous generators and condensers. RES suggests that the FOS is reviewed and amended to reflect RoCoF limitations, taking into account the RoCoF withstand capability of connected generators and the performance of UFLS relays and special protection systems. Ultimately, the framework should provide objective means for TNSPs and AEMO to procure solutions that manage frequency on a least cost basis, rather than mandating volumes of particular technologies. RES supports the use of the RIT-T process to identify the underlying issues and select efficient options to address those issues. There is currently no reference to inertia in the rules. The Commission is signaling a change to the rules to provide explicit guidance to AEMO on how to quantify the required operating level of inertia. TNSPs are then tasked with procuring any required inertia top up. The key issue at hand is the management of frequency and RoCoF. When an explicit requirement for inertia is made within the rules, there is limited opportunity for alternative technologies such as energy storage to participate in the underlying requirement to manage RoCoF and hence the FOS.
4.2.2	RES supports the proposal to allow TNSPs to contract with third parties to provide FFR services in the interim. RES considers that the current rules are likely to be sufficient to enable TNSPs to procure FFR services from third parties. ElectraNet are currently considering the procurement of FFR services as part of their South Australian energy Transformation RIT-T. As an example, FFR may be selected as a preferred option to meet RoCoF requirements. RES notes that the Network Loading Ancillary Service (NLAS) arrangement may be an appropriate existing procurement vehicle because it facilitates greater interconnector transfer. The existing RIT-T process supports the evaluation of other services such as voltage support and load shifting. RES supports the proposal to apply ring fencing requirements to FFR devices.
4.2.3	Regarding the Commission's consideration of requiring new non-synchronous generators to have the capability to provide FFR services, RES provides the following feedback: • There are currently only 50% of synchronous generators that are registered to provide fast contingency FCAS whereas the direction is to require all new non-

	synchronous generators to be FFR enabled. • Mechanisms for providing FFR are likely to significantly influence market outcomes, for example: - In South Australia, the requirement for RoCoF support is likely to be influenced by low renewable generation (i.e. still winter night) where there is significant interconnector flow. Consequently, availability of FFR should be considered in procurement exercises or market mechanisms. - The delivery of generator based raise FFR services can be supplied by withholding export capacity. In this situation, there is an opportunity cost that is significantly higher than current FCAS raise markets. - Where FFR services are provided by wind turbines, wind turbines may not be able to meet their performance standards under *S5.2.5*. The generator performance standards in the rules should be reviewed in conjunction with the introduction of the requirement for FFR enablement.
4.3.1	RES does not support the proposal for TNSPs to be obliged to maintain a required operating level of inertia. The development of a TNSP incentive framework should be structured to support the procurement of solutions that manage frequency on a least cost basis, rather than incentivising increased volumes of particular technologies. RES agrees that an incentive framework should be designed to allow TNSPs to share economic benefits that are accrued through contracts with third party providers. A scheme similar to the Demand Management Incentive Scheme (DMIS) for DNSPs could be considered.

Proposed approach to system strength

Section of paper	RES Feedback
5.1.1	RES agrees that system strength relates to the sensitivity of voltage to changes in load or generation at a connection point.
5.1.2	RES agrees that system strength is dependent on the following factors: • The size and characteristics of generating units online • The impedances of the transmission and/or distribution networks
5.1.3	RES agrees that the fault level at a connection point can provide an indication of system strength. However, the normalisation of system strength through the use of the SCR metric can introduce some significant issues. For example, if a number of generators with separate connection points are connected in the same part of the transmission network, a complicated SCR rationing approach may be required. RES does not support the explicit use of the SCR metric within the NER.
5.1.6	RES supports the view that low system strength is an emerging issue relating to the retirement of synchronous generation. In addition, the lowest cost of energy locations for new generation projects are often geographically diverse from the existing load and generation centers. These locations are typically connected via weak transmission networks that were originally constructed to supply relatively small amounts of load.
5.2.1	RES agrees with the Commission's description of the ability of protection systems to operate correctly with reduced system strength.
5.2.2	For widespread protection issues, RES notes that there may be more economic ways to ensure that protection systems can operate correctly. Increasing fault level is not the only way to ensure that protection devices operate correctly. The use of power electronics devices embedded within future wind farms, solar farms and energy storage plants may be able to ensure the correct operation of protection devices more efficiently than installing new synchronous condensers.
5.2.3	RES supports the Commission's proposed approach to not make a change to the NER in relation to the management of network protection systems during periods of lower system strength. Although the existing rules appear to be sufficient, RES notes that TNSPs and DNSPs must be sufficiently resourced to manage these emerging risks.
5.3.1	RES agrees with the Commission's description of the ability to manage network voltages with decreased system strength.
5.3.2	In addition to the potential technical solutions outlined in the paper, RES notes that power electronics devices embedded within existing and future wind farms, solar farms

	and energy storage plants can offer dynamic voltage control. For example, inverter suppliers for solar farms and energy storage plants are now offering the capability to provide leading or lagging power to control local or remote voltages. This service can even be provided in the absence of fuel source, similar to an SVC or STATCOM. RES is currently investigating a number of opportunities to provide this service to NSPs at a lower cost than traditional network options.
5.3.3	RES supports the Commission's approach of not amending the NER to alter the current allocation of responsibilities in relation to voltage management during periods of lower system strength. Although the existing rules appear to be sufficient, RES notes that TNSPs and DNSPs must be sufficiently resourced to identify and manage these emerging risks. RES also supports the view that more sophisticated engineering analysis may be required to assess and manage network voltages for diminishing network strength.
5.4.1	RES notes that the ability of generators to meet their performance standards may be impacted by other generators potentially hundreds of kilometers away. RES does not consider the SCR metric to be an appropriate measure of system strength in these circumstances.
5.4.2	RES notes that there are more efficient and economic solutions to maintaining system security when new generators are connected to the network. The following alternatives should be explored to ensure that the most efficient and economical solution is found: • Detailed engineering analysis to examine the performance of the existing and proposed generators • Potential for NSPs to re-negotiate lower performance standards with existing generators with the objective of maintaining system security whilst minimising total costs • The ability of power electronics devices embedded within existing and future wind farms, solar farms and energy storage plants to help ensure system security In addition, RES notes that increasing fault levels is not the only technical solution to ensure that generators can meet their performance standards and preserve system security. Any new rule that requires the explicit maintenance or increase of fault levels is likely to introduce unnecessary costs to consumers either through increased generation or network costs. RES also raises the issue that the automatic access standard for generator response to contingency events *S5.2.5 (b)(2)(iii)* requires 95% active power recovery 100 milliseconds after the clearance of a fault. In weak grid scenarios, slower active power recovery can assist the connecting generator and neighbouring generators ride through the fault. The Commission should consider reviewing S5.2.5 with the objective of ensuring that the negotiation of access standards does not unnecessarily increase costs

	for future generators.
5.4.3	RES does not support the view that there is a need to allocate responsibility to one or more parties to maintain SCR for existing generator connections. Introducing the requirement to maintain SCR for generator connections will result in unnecessary expenditure. The key issue is the ability of generators to continue to meet their performance standards. The rules should recognise this issue and not use SCR as a simplified proxy. For scenarios where a synchronous generator retirement impacts the ability of other generators to meet their performance standards, RES considers that the NSP should be responsible for measures to ensure that existing generators can continue to meet their performance standards. RES also notes that there may be a significant level of uncertainty and ambiguity if a large synchronous generator commits to retirement when a proposed asynchronous generator is undergoing the connection application process. The existing RIT-T and RIT-D are likely to provide suitable frameworks for identifying and selecting options to manage system strength under these scenarios. For scenarios where the connection of a new generator impacts an existing generator, the current rules require NSPs to ensure that the existing generator can continue to meet its performance standards. These costs can be passed onto the connecting generator. If the installation of plant is required to ensure that performance standards can be met, it is usually cheaper to install this plant within a new greenfield substation as part of the generator connection, as opposed to brownfield construction within an existing NSP substation. Therefore, it will be essential that the rules provide sufficient opportunities for connecting generators to manage their own risks and costs, rather than allowing NSPs to select the preferred solution and pass through the associated costs.
5.5.1	RES raises the following concerns with the Commission's proposal to place an obligation on NSPs to maintain SCR at each generating system's connection point above a registered value: • By introducing SCR requirements, synchronous condensers are favoured over less costly alternative technology. • The registered SCR should be based on the technical ability of the generator to meet its performance standard, rather than the assumed SCR at the time of connection. • There is typically a mismatch in design life between generating assets and network assets. For example, a connecting generator with a design life of 25 years should not be required to fund a network asset with a design life of 45 years. • A connecting generator only needs to ensure that its performance standards can be met. If a synchronous condenser is installed, it may only be necessary for the synchronous condenser to be online when the generator output is above a

	threshold. • SCR is the ratio of fault level and generator capacity. It can be argued that SCR varies with generator output. It can subsequently be argued that any top up of SCR should be procured by the connecting generator. • The Directions Paper has not outlined a cost sharing methodology for SCR augmentations. • The Directions Paper has not made clear how the cost of SCR augmentations would be regulated in the instance that a connecting generator is required to fund the augmentation. RES is concerned that NSPs would be open to pass on unreasonable costs to new generators with limited options for contestability. RES also notes that appropriate measures should be put in place to ensure that NSPs are not incentivised to install synchronous condensers and pass costs through to generators or consumers.
5.5.2	RES does not support the following statement: *"When the connecting generator would be unable to meet its performance standards at the minimum system strength specified by the NSP, the generator would need to negotiate with the NSP so that either it installs its own synchronous condenser or the NSP increases the system strength. In either case, the costs would be recovered from the connecting generator."* This statement highlights why RES is opposed to the explicit use of the SCR metric in the rules. RES considers that there are currently a range of options available to generators connecting to weak networks. These may include special protection systems and power electronics devices. By introducing SCR requirements, synchronous condensers are favoured over alternative technology.
5.5.4	RES does not support the explicit use of the SCR metric in the rules.