

24 February 2017

Mr Adam Wilson
Chief Executive Officer
Essential Services Commission of South Australia
Level 1, 151 Pirie St
Adelaide SA 5000

Level 9
99 Gawler Place
Adelaide SA 5000

Postal Address:
GPO Box 2010
Adelaide SA 5001
T 1300 858 724

Dear Mr Wilson *Adam*

Interim advice on licencing recommendations

The purpose of this letter is to provide interim advice on the recommendations AEMO is considering on generator licence conditions in South Australia, as part of ESCOSA's current review process.

AEMO is currently working with ESCOSA to review technical licence conditions for inverter-connected generation in South Australia and provided a preliminary report on this matter to ESCOSA in September of 2016. ESCOSA released an Issues Paper in December 2016 and was accepting submissions from interested parties on this until late January 2017. AEMO is set to provide a final report on recommended technical licence conditions to ESCOSA in the coming months.

Licence conditions under consideration

The high proportion of non-synchronous, intermittent generation in South Australia means that the impact of this type of generation technology on the power system is significantly greater than in the remainder of the NEM. AEMO considers this warrants additional or tighter technical standards than those that currently apply under the National Electricity Rules (NER). AEMO is of the view that all future generation licences approved by ESCOSA will need to be subject to additional conditions over and above the current set of licence conditions, in order to provide greater ability to manage the technical changes affecting the South Australian power system.

Suitably specified generation plant with the capability to provide a broad range of services and the ability to continue operating in the NEM under a spectrum of power system conditions can act to reduce risks to power system security and resilience affecting the South Australian region.

AEMO's review is considering the following principles:

- Protection of the long term interests of South Australian consumers with respect to the price, quality and reliability of essential services;
- Ensuring essential system services will be available under various plausible future dispatch scenarios; and
- Considering which of these essential services can be reasonably obtained from the generation fleet in future.

We also are giving consideration to:

- Technology neutrality – where possible, obligations should be uniform across all generation technologies; and
- Consistent national frameworks should be applied where possible.

Based on these principles, the range of potential additional or enhanced licence conditions AEMO is currently considering for ESCOSA's review include:

1. Frequency control capabilities, including:
 - a. mandatory provision of frequency control *capability*¹ for new generators connecting in South Australia (regulation and contingency services) throughout the operational frequency tolerance band and the extreme frequency excursion tolerance limit; and
 - b. the ability to receive and respond to automatic generation control (AGC) based on 4 second signals.
2. Ramp rate controls, including:
 - a. the *capability* to limit the rate of change of active power within each dispatch interval.
3. Voltage and frequency disturbance ride-through capabilities, including:
 - a. a requirement to meet both the NEM automatic standard (a high rate of change of frequency for a short period) and minimum standard (a lower rate of change of frequency for a longer period) with regard to the rate of change of frequency the generator must be able to withstand;
 - b. obligations for generators to ride through a specified total duration of voltage disturbances, e.g. 1-2 seconds, within specified periods, e.g. five minutes, regardless of each individual disturbance type or duration²;
 - c. the ability to recover active power output after the fault clearance as fast as possible without compromising voltage recovery;
 - d. a requirement to supply or absorb fast acting reactive power during, and after the disturbance (if necessary), depending on whether the disturbance causes low voltages or high voltages; and
 - e. a requirement for enhanced high voltage ride-through capability beyond that specified in NER Figure S5.1a.1 to mitigate the risk of system collapse following loss of synchronous connection between South Australia and the rest of the NEM.
4. Other capabilities, including:
 - a. the ability to *assist*³ in system restoration following a black system event.

¹ AEMO is not proposing that generators be required to bid in the ancillary service markets.

² AEMO is currently consulting on this requirement with all major wind turbine and solar inverter manufacturers.

³ Non-synchronous generating units are currently unable to provide system restart ancillary services capability. However, their contribution to voltage and reactive power control could be important provided that a number of synchronous machines are already restarted that can provide the minimum

As these essential services will be required regardless of the generation mix in future dispatch intervals, AEMO's advice will be directed at all new generators, regardless of technology, rather than just wind and other non-synchronous generators.

Related activities

Two essential system services that are not being considered under potential future licence conditions are inertia and fault current (for system strength). As noted in AEMO's recent submission to the Australian Energy Market Commission's (AEMC) System Security Market Frameworks Review,⁴ while these services have historically been provided predominantly by synchronous generators, it may be more efficient to procure these services by alternative means in future. ESCOSA may wish to consider whether the procurement of these services for South Australia could be expedited through appropriate licence conditions for network service providers.

As the independent power system and market operator for the National Electricity Market, AEMO supports consistent national frameworks wherever possible. Accordingly, AEMO is currently working with the AEMC to support proposed Rule changes that would provide for:

- A new regime to implement Emergency Frequency Control Schemes which would manage the system frequency when it is in the extreme band.
- A risk assessment process to determine a class of network contingencies which should be managed as 'protected events'.
- New market or regulatory arrangements to procure inertia and fast frequency response services.
- Additional provisions to manage system strength.

AEMO considers that the technical generator performance standards in the NER require updating as soon as practicable, and intends to submit a Rule change to the AEMC requesting appropriate revisions. We expect that the standards set in South Australia through ESCOSA's process would be a key consideration in determining the appropriate changes. Ideally, any new licence conditions imposed by ESCOSA would be transitional arrangements that are eventually superseded by the NER.

AEMO has received feedback from stakeholders raising concerns about current FCAS markets. As part of its Future Power System Security (FPSS) program, AEMO has been exploring challenges around frequency control and system strength. This work has now been consolidated into a broader review of future ancillary services to maintain a holistic approach to meeting future power system security challenges. Through its approach, this technical review seeks to:

- Determine the technical needs of the power system now and into the future in terms of key ancillary services.
- Assess whether current frameworks are fit-for-purpose to meet these future needs (including technical and/or regulatory barriers, or practicality and market efficiency).

fault level required for stable operation of non-synchronous generating units/dynamic reactive support plant/battery storage units.

⁴ AEMO submission to AEMC SSMFR - <http://www.aemc.gov.au/getattachment/94177d01-4833-413e-b012-99ba52113452/AEMO.aspx>

- Assess the capabilities of new technologies and/or business models (such as aggregators of distributed energy resources⁵) in providing ancillary services.
- Assess whether market efficiencies can be gained by considering the capabilities of emerging technologies.
- Provide a basis to inform technical, regulatory or policy solutions.

AEMO will be seeking to engage with stakeholders as this process formally commences over the coming months.

Interim recommendation

AEMO appreciates the importance of clarity on technical performance standards to intending NEM participants who may be looking to invest in South Australia.

On this basis, ESCOSA may wish to consider how proponents applying for a generation licence prior to the determination of new licence conditions will demonstrate the ability to meet the current demands of operating in South Australia, having regard to the areas being considered for new licence conditions as outlined in this letter.

For example, both contingency and regulation FCAS services are critical to the secure operation of the power system, particularly in regions where online synchronous inertia is relatively low. Sufficient control over power system frequency must be maintained as the generation mix continues to change, and on that basis future generation would need to demonstrate the capability to provide those services.

Should you wish to discuss any of the above, please don't hesitate to contact me or our Manager, Strategy and Coordination, Chris Davies on 1300 858 724.

Yours sincerely



David Swift
Executive General Manager- Corporate Development

⁵ Distributed energy resources include technologies as rooftop solar photovoltaics and battery storage systems installed throughout the Distribution Network.