

# Compliance update

## Provision of essential system services

System services such as frequency, inertia and system strength are critical to keep the electricity grid in a safe, stable, and secure operating state. Inertia and system strength services have traditionally been provided as intrinsic by-products by thermal generation as part of producing energy and reserves.

Over recent years, the National Electricity Market (**NEM**) generation mix has changed, with an emergence of new technologies and the retirement of some traditional generation types, the provision of system services as separate products to support the secure operation of the system becomes more critical.

The purpose of this compliance update is to provide guidance to Transmission Network Service Providers (**TNSPs**) on critical obligations in the provision of power system services under the National Electricity Rules (**NER**), with a focus on TNSPs meeting inertia shortfalls and system strength gaps as declared by the Australian Energy Market Operator (**AEMO**).

It is the AER's expectation that TNSPs maintain focus on these obligations when procuring the relevant system services. Participants should review their practices in light of the information set out in this compliance update and amend them as appropriate.

## Inertia Network Services

Inertia relates to the ability of a power system to withstand changes in generation output and load levels while maintaining stable system frequency. The power system has lots of large and fast spinning machinery, and inertia reflects how easy it is to simultaneously speed up or slow down all those fast-moving parts. Systems with low inertia are susceptible to high rates of change of frequency, which can mean that frequency management schemes and services have less time to operate to arrest frequency. Inertia is provided by generators with large spinning rotors, for example hydro, coal or gas plants. Large synchronous condensers with flywheels can also provide similar capability.

Under clause 5.20B.2 of the NER, AEMO must from time to time determine and publish the following inertia requirements for each inertia sub-network:

- the minimum threshold level of inertia, being the minimum level of inertia required to operate the inertia sub-network in a satisfactory operating state when the inertia sub-network is islanded; and
- the secure operating level of inertia, being the minimum level of inertia required to operate the inertia sub-network in a secure operating state when the inertia sub-network is islanded.

Under clause 5.20B.3 of the NER, following its determination of the inertia requirements, AEMO must also assess whether there is likely to be an inertia shortfall and forecast the period over which the shortfall will exist. This assessment must be published and a notice given to the relevant Inertia Service Provider (usually the TNSP for the relevant

sub-network)<sup>1</sup> including AEMO's specification of the date by which the Inertia Service Provider must make the relevant services available.<sup>2</sup>

If given such a notice by AEMO, under clause 5.20B.4 the Inertia Service Provider must:

- use reasonable endeavours to make the inertia network services available by the date specified in AEMO's notice;
- make a range and level of inertia network services available to address the inertia shortfall such that the relevant inertia network services when enabled are continuously available, taking into account planned outages and the risk of unplanned outages;
- ensure relevant inertia network services when enabled are qualifying services;<sup>3</sup>
- maintain the availability of those inertia network services until the obligation ceases as specified by AEMO;
- make available the least cost option or combination of options that will satisfy its obligation within the time referred to in AEMO's notice, for so long as the obligation to make the inertia network services available continues;
- prepare and publish relevant information to enable the development of non-network options;<sup>4</sup>
- provide information in its Transmission Annual Planning Report about activities undertaken to satisfy its obligation to make inertia network services available, any inertia support activities undertaken, and any proposed network investment for these purposes;<sup>5</sup> and
- meet relevant information and approval requirements under clauses 5.20B.5 and 5.20B.6.

If AEMO subsequently assesses an inertia shortfall has been or will be remedied, AEMO must also publish and give to the Inertia Service Provider a notice of that assessment, including the date from which the obligation to make services available ceases.

## System Strength Services

System strength relates to the ability of a power system to maintain and control the voltage waveform at any given location in the power system, both during steady state operation and following a disturbance. When system strength is high, any unexpected disturbances and faults to the grid will cause only a small change to the voltage waveforms, and the voltage waveform will recover quicker than if system strength was low. System strength is provided

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<sup>1</sup> Clause 5.20B.4(a) defines Inertia Service Provider as the TNSP for the relevant inertia sub-network or if more than one TNSP, the jurisdictional planning body for the participating jurisdiction where the region is located.

<sup>2</sup> Clause 5.20B.4(b) of the NER requires the Inertia Service Provider for the relevant inertia sub-network to make inertia network services available in accordance with clause 5.20B.4(c). Clause 5.20B.4(b) is classified as a tier 1 civil penalty provision.

<sup>3</sup> The requirements are prescribed under clauses 5.20B.4(d) and (e) of the NER.

<sup>4</sup> The relevant information is prescribed under clause 5.20B.4(g) of the NER.

<sup>5</sup> The relevant information is prescribed under clauses 5.20B.4(h) and (i) of the NER.

locally by sources such as traditional synchronous generators, transmission network lines and transformers, voltage control equipment and synchronous condensers.

Under clause 5.20C.1 of the NER, AEMO must from time to time determine and publish, applying the system strength requirements methodology, the following system strength requirements for each region:

- the fault level nodes in the region, being the location on the transmission network for which the three phase fault level must be maintained at or above the relevant level determined by AEMO; and
- for each fault level node, the minimum three phase fault level.

Under clause 5.20C.2 of the NER, AEMO must also make assessments on whether there is likely to be a fault level shortfall, determine the extent of the fault level shortfall and forecast the period over which the shortfall will exist. This assessment must be published and a notice given to the relevant System Strength Service Provider (usually the TNSP for the relevant region)<sup>6</sup> including AEMO's specification of the date by which the relevant services must be made available.<sup>7</sup>

If given such a notice by AEMO, under clause 5.20C.3 the System Strength Service Provider must:

- use reasonable endeavours to make the system strength services available by the date specified in AEMO's notice;
- make a range and level of system strength services available to address the system strength shortfall such that the relevant inertia network services when enabled are continuously available, taking into account planned outages and the risk of unplanned outages and the potential for the system strength services to impact typical patterns of dispatched generation in central dispatch;
- maintain the availability of those system strength services until the obligation ceases as specified by AEMO;
- make available the least cost option or combination of options that will satisfy its obligation within the time referred to in AEMO's notice, for so long as the obligation to make the system strength services available continues;
- prepare and publish relevant information to enable the development of non-network options;<sup>8</sup>

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<sup>6</sup> Clause 5.20C.3(a) defines System Strength Service Provider as the TNSP for the relevant region or if more than one TNSP, the jurisdictional planning body for the participating jurisdiction where the inertia sub-network is located.

<sup>7</sup> Clause 5.20C.3(b) of the NER requires the System Strength Service Provider for the relevant region to make system strength services available in accordance with clause 5.20C.3(c). Clause 5.20C.3(b) is classified as a tier 1 civil penalty provision.

<sup>8</sup> The relevant information is prescribed under clause 5.20C.3(e) of the NER.

- provide information in its Transmission Annual Planning Report about activities undertaken to satisfy its obligation to make system strength services available and any proposed network investment for this purpose;<sup>9</sup> and
- meet relevant information and approval requirements under clause 5.20C.4.

If AEMO subsequently assesses a fault level shortfall has been or will be remedied, AEMO must also publish and give to the System Strength Service Provider a notice of that assessment, including the date from which the obligation under clause 5.20C.3(b) to make services available ceases.

## AER guidance

Given the unprecedented pace at which system conditions are evolving due to changes in generation mix, Inertia Service Providers and System Strength Service Providers (collectively, **System Service Providers**) must provide the relevant services as determined and notified by AEMO, to assist AEMO to maintain a safe, secure and reliable power system.

There are similarities in the participant obligations to provide inertia network services and system strength services. We encourage System Service Providers to consider the following guidance in their provision of these services:

- The NER requires System Service Providers to use reasonable endeavours to make the relevant services available by the date specified in AEMO's notice. Although the nature and extent of reasonable endeavours obligations are conditioned by what is reasonable in the circumstances, System Service Providers should not depart lightly from the requirement to make the services available by the date specified by AEMO.
- System Service Providers should take all reasonable steps to identify and make available a range of options to meet the relevant inertia or system strength shortfalls. This includes by preparing and publishing high quality information as required under clauses 5.20B.4(g) and 5.20C.3(e) of the NER to assist potential providers of inertia network services or system strength services to develop non-network options for the System Service Provider's consideration. System Service Providers should also be responsive to queries in relation to this published information to ensure potential providers of inertia network services or system strength services have a clear understanding of the requirements.
- When considering the range of options available to meet the relevant inertia or system strength shortfall, System Service Providers should consider and be prepared to report to the AER on:
  - the potential combinations of system service options that could be made available, such as short-term and longer-term services that together meet the requirements at a lower cost;
  - the timeframes for the commencement of relevant options;
  - the difference in cost of these options;
  - the reasonable steps taken to make these options available; and

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<sup>9</sup> The relevant information is prescribed under clause 5.20C.3(f) and (g) of the NER.

- details on the extent of the tender process undertaken to procure the relevant system services.<sup>10</sup>
- The requirements placed upon System Service Providers include making available the least cost option (or combination of options) and ensuring that the relevant option (or combination of options) will satisfy the System Service Provider's obligations within the required timeframe.
  - A low cost option, which cannot be delivered to satisfy the System Service Provider's obligation within the required timeframe, will not meet these requirements.
  - Additionally, the assessment of least cost should also involve an assessment of the economic cost of any delays, including in relation to costs incurred by the System Service Provider, as well as costs incurred by other market participants and customers.
- System Service Providers should have processes in place to ensure the timely reporting to AEMO and the AER of any potential delays and/or other issues in achieving the technical requirements associated with meeting (and continuing to meet) the relevant shortfall.
- System Service Providers should have processes in place to ensure the timely submission of any cost recovery applications relevant to the provision of system services. These applications must be submitted to the AER within 90 business days of when AEMO publishes and gives the System Service Provider a notice relating to a system strength gap or inertia shortfall.<sup>11</sup> The AER may extend this timeframe if it is satisfied that the difficulty of assessing or quantifying the effect of the relevant pass through event justifies the extension.<sup>12</sup> At times it may also be appropriate for System Service Providers to seek to recover efficient costs ex-post through the Network Support pass through mechanism.<sup>13</sup> The obligation to provide system services is not conditional upon a cost pass through application being approved.
- System Service Providers should not expect to rely on AEMO exercising its powers to issue directions to Registered Participants as an alternative to meeting system strength and inertia network service obligations. In certain circumstances, it may be appropriate for AEMO to issue directions to manage system services, including where a System Service Provider is unable to provide a compliant solution by the due date notwithstanding having taken all reasonable steps to provide the relevant system service. However, AEMO will only issue directions in accordance with the NER (for example, when necessary for the purposes of maintaining system security) and System Service Providers should not be dependent upon AEMO issuing directions in order to comply with their network service obligations.

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<sup>10</sup> This may include information such as the tender brief, the content tenders that were received, or whether there were any attempts to negotiate in relation to the tenders received.

<sup>11</sup> The relevant requirement is prescribed under clause 6A.7.3(c) of the NER.

<sup>12</sup> The relevant requirement is prescribed under clause 6A.7.3(k) of the NER.

<sup>13</sup> The relevant requirement is prescribed under clause 6A.7.2 of the NER.

## More information

Participants often contact the AER seeking clarification of relevant NER obligations. While the AER does not provide legal advice, we encourage participants to continue doing this as these communications, along with our ongoing monitoring and compliance work, will inform our policy position and assist us to determine whether further AER guidance may be appropriate.

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