Indicative changes to the National Electricity Rules

Note:

This document shows indicative changes to the relevant parts of the National Electricity Rules (NER) proposed to be made by the draft *National Electricity Amendment (Clarifying mandatory primary frequency response obligations for bi-directional plant) Rule 2024*. The changes are shown in a modified version of the NER that incorporates, where relevant, final rules made by 23 November 2023 which take effect as of 3 June 2024. This modified version of parts of the NER is provided for information only and should not be used for any other purpose. The Australian Energy Market Commission does not guarantee the accuracy, reliability or completeness of this version of the NER or the mark-up.

This document includes changes to the NER to be made by the following rule:

+ National Electricity Amendment (Integrating energy storage systems into the NEM) Rule 2021 (commences 3 June 2024)

4.4.2 Operational frequency control requirements

To assist in the effective control of *power system frequency* by *AEMO* the following provisions apply:

(a) *AEMO* may give *dispatch instructions* in respect of *scheduled resources* and *market ancillary services* pursuant to rule 4.9;

(b) each *Generator* and *Integrated Resource Provider* must ensure that all of its *generating units* and *bidirectional units* meet the technical requirements for *frequency* control in clause S5.2.5.11;

Note

This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(c) *AEMO* must use reasonable endeavours to arrange to be available and allocated to *regulating duty* such *generating units* or *bidirectional units* as *AEMO* considers appropriate for automatic control or direction by *AEMO* to ensure that all normal *load* variations do not result in *frequency* deviations outside the limitations specified in clause 4.2.2(a);

(c1) [to commence on 3 June 2024] subject to clause 4.4.2A(c) and any exemption or variation approved by *AEMO* under clause 4.4.2B, each *Scheduled Generator*, ~~and~~ *Semi-Scheduled Generator* and *Scheduled Integrated Resource Provider* that has received a *dispatch instruction* in accordance with clause 4.9.2 to generate a volume greater than zero MW must operate its ~~*generating system*~~ *scheduled generating unit, semi-scheduled generating unit* or *scheduled bidirectional unit* in accordance with the *Primary Frequency Response Requirements* as applicable to that ~~*generating system*~~unit;

Note

This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(c1) [to commence on 8 June 2025] subject to clause 4.4.2A(c) and any exemption or variation approved by *AEMO* under clause 4.4.2B, each:

(1) *Scheduled Generator*, *Semi-Scheduled Generator* and *Scheduled Integrated Resource Provider* that has received a *dispatch instruction* in accordance with clause 4.9.2 to generate a volume greater than zero MW or to consume electricity other than as an *auxiliary load*; and

(2) *Scheduled Integrated Resource Provider* that has received a *dispatch instruction* in accordance with clause 4.9.3A to provide a *regulation service*,

must operate its *scheduled generating unit, semi-scheduled generating unit* or *scheduled bidirectional unit* in accordance with the *Primary Frequency Response Requirements* as applicable to that unit;

Note

This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(d) *AEMO* must use reasonable endeavours to ensure that adequate *facilities* are available and under the direction of *AEMO* to allow the managed recovery of the *satisfactory operating state* of the *power system*.

4.4.2A Primary Frequency Response Requirements

(a) *AEMO* must develop, publish on its website and maintain, the *Primary Frequency Response Requirements* in accordance with the *Rules consultation procedures*.

(b) The *Primary Frequency Response Requirements* must include:

(1) ~~a requirement that *Scheduled Generators* and *Semi-Scheduled Generators* set their *generating systems* to operate in *frequency response mode* within~~ one or more performance parameters (which may be specific to different types of *plant*), which:

(i) must include maximum allowable deadbands which must not be narrower than the *primary frequency control band* outside of which ~~*Scheduled Generators* and *Semi-Scheduled Generators*~~ *a scheduled generating unit, semi-scheduled generating unit* or *scheduled bidirectional unit* must provide *primary frequency response*; and

(ii) may include (but are not limited to):

(A) droop; and

(B) response time,

(the *primary frequency response parameters*);

(2) subject to rule 4.4.2B, the conditions or criteria on which a *Scheduled Generator*, ~~or~~ *Semi-Scheduled Generator* or *Scheduled Integrated Resource Provider* may request, and *AEMO* may approve, a variation to, or exemption from, any *primary frequency response parameters* applicable to its *scheduled generating unit, semi-scheduled generating unit* or *scheduled bidirectional unit*~~*scheduled generating system* or *semi-scheduled generating system*~~;

(3) the process and timing for an application for a variation to, or exemption from, any *primary frequency response parameters* applicable to a *scheduled generating unit, semi-scheduled generating unit* or *scheduled bidirectional unit*~~*scheduled generating system* or *semi-scheduled generating system*~~, and the process for approval by *AEMO* of such variation or exemption; and

(4) details of the information to be provided by *Scheduled Generators* ~~and~~, *Semi-Scheduled Generators* and *Scheduled Integrated Resource Providers* to verify compliance with the *Primary Frequency Response Requirements* and any compliance audits or tests to be conducted by *AEMO*.

(c) The *Primary Frequency Response Requirements* must not require a *Scheduled Generator*, ~~or~~ *Semi-Scheduled Generator* or *Scheduled Integrated Resource Provider* to:

(1) maintain stored *energy* in its *generating system* or *integrated resource system* for the purposes of satisfying clause 4.4.2(c1); or

(2) install or modify monitoring equipment to monitor and record the *primary frequency response* of its *scheduled generating unit, semi-scheduled generating unit* or *scheduled bidirectional unit* ~~*generating system*~~ to changes in the *frequency* of the *power system* for the purpose of verifying ~~*the Scheduled Generator's or Semi-Scheduled Generator's*~~ compliance with clause 4.4.2(c1).

(d) *AEMO* must publish on its website and maintain, a register of *Scheduled Generators*, ~~and~~ *Semi-Scheduled Generators* and *Scheduled Integrated Resource Providers* who have been granted a variation or exemption from any *primary frequency response parameters* in the *Primary Frequency Response Requirements*.

(e) *AEMO* may make minor or administrative amendments to the *Primary Frequency Response Requirements* without complying with the *Rules consultation procedures.*

4.4.2B Approval of variations or exemptions

(a) In considering whether to approve an exemption from, or a variation to, any of the *primary frequency response parameters* applicable to a *scheduled generating unit, semi-scheduled generating unit* or *scheduled bidirectional unit*~~*Scheduled Generator's or Semi-Scheduled Generator's generating system*~~, *AEMO* must have regard to:

(1) the capability of the *scheduled generating unit, semi-scheduled generating unit* or *scheduled bidirectional unit* ~~*generating system*~~ to operate in *frequency response mode*;

(2) the stability of the *scheduled generating unit, semi-scheduled generating unit* or *scheduled bidirectional unit* ~~*generating system*~~ when operating in *frequency response mode,* and the potential impact this may have on *power system security*;

(3) any other physical characteristics of the *scheduled generating unit, semi-scheduled generating unit* or *scheduled bidirectional unit* ~~*generating system*~~ which may affect its ability to operate in *frequency response mode*, including (but not limited to) *dispatch inflexibility profile,* operating requirements, or *energy constraints; and*

(4) whether the *Scheduled Generator*, ~~or~~ *Semi-Scheduled Generator* or *Scheduled Integrated Resource Provider* has been able to establish to *AEMO's* reasonable satisfaction that the implementation of the *primary frequency response parameters* applicable to that *Scheduled Generator's* ~~or~~ *scheduled generating unit, Semi-Scheduled Generator's semi-scheduled generating unit*~~*system*~~ or *Scheduled Integrated Resource Provider's scheduled bidirectional unit* will be unreasonably onerous having regard to (among other things):

(i) the likely costs of modifying the *scheduled generating unit, semi-scheduled generating unit* or *scheduled bidirectional unit* ~~*generating system*~~ to be able to operate in *frequency response mode*; and

(ii) the likely operation and maintenance costs of operating the *scheduled generating unit, semi-scheduled generating unit* or *scheduled bidirectional unit* ~~*generating system*~~ in *frequency response mode*,

relative to the revenue earned from the provision of *energy* and *market ancillary services* by the *scheduled generating unit, semi-scheduled generating unit* or *scheduled bidirectional unit* ~~*generating system*~~ in relation to its operation in the *NEM* during the 12 months prior to the date of the application for exemption or variation, as applicable.

(b) A dispute between *AEMO* and a *Scheduled Generator*, ~~or~~ *Semi-Scheduled Generator* or *Scheduled Integrated Resource Provider* relating to a variation or exemption from any of the *primary frequency response parameters* applicable to ~~a~~ the *Scheduled Generator's scheduled generating unit,* ~~or~~ *Semi-Scheduled Generator's semi-scheduled generating* ~~*system*~~ *unit* or *Scheduled Integrated Resource Provider's scheduled bidirectional unit* may be determined under rule 8.2.

(c) Information provided to *AEMO* by a *Scheduled Generator*, ~~or~~ *Semi-Scheduled Generator* or *Scheduled Integrated Resource Provider* as part of an application for variation or exemption under clause 4.4.2B(a)(4) is *confidential information*.

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4.9.4 Dispatch related limitations on Scheduled Generators, Semi-Scheduled Generators and Scheduled Integrated Resource Providers

A *Scheduled Generator*, *Semi-Scheduled Generator* or *Scheduled Integrated Resource Provider* (as the case may be) must not, unless in the *Generator's* or *Integrated Resource Provider's* reasonable opinion, public safety would otherwise be threatened or there would be a material risk of damaging equipment or the environment:

(a) send out any *energy* from a *generating unit* or *bidirectional unit*, except:

(1) in accordance with a *dispatch instruction*;

(2) in response to remote control signals given by *AEMO* or its agent;

(3) in connection with a test conducted in accordance with the requirements of this Chapter or Chapter 5; or

(3A) as a consequence of its operation in *frequency response mode* in order to adjust *power system frequency* in response to *power system* conditions; or

(4) in the case of a *scheduled generating unit*, in accordance with the *self-commitment* process specified in clause 4.9.6 up to the *self-dispatch level*;

Note

This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(b) adjust the *transformer tap position* or *excitation control system voltage* set-point of a *scheduled generating unit*, *scheduled bidirectional unit* or *semi-scheduled generating unit* except:

(1) in accordance with a *dispatch instruction*;

(2) in response to remote control signals given by *AEMO* or its agent;

(3) if, in the *Generator's* or *Integrated Resource Provider's* reasonable opinion, the adjustment is urgently required to prevent material damage to the *Generator's* or *Integrated Resource Provider's plant* or associated equipment, or in the interests of safety; or

(4) in connection with a test conducted in accordance with the requirements of rule 5.7;

Note

This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(c) *energise* a *connection point* in relation to a *generating unit* or *bidirectional unit* without obtaining approval from *AEMO* immediately prior to *energisation*;

Note

This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(d) *synchronise* or *de-synchronise* a *scheduled generating unit* with a *nameplate rating* of 30MW or more, without prior approval from *AEMO* or other than in response to a *dispatch instruction* except:

(1) *de-synchronisation* as a consequence of the operation of automatic protection equipment; or

(2) where such action is urgently required to prevent material damage to *plant* or equipment or in the interests of safety;

Note

This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(e) change the *frequency response mode* of a *scheduled generating unit*, *semi-scheduled generating unit* or *scheduled bidirectional unit* without the prior approval of *AEMO*; or

Note

This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

(f) remove from service or interfere with the operation of any *power system* stabilising equipment installed on that *generating unit* or *bidirectional unit*.

Note

This paragraph is classified as a tier 1 civil penalty provision under the National Electricity (South Australia) Regulations. (See clause 6(1) and Schedule 1 of the National Electricity (South Australia) Regulations.)

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5.3.9 Alteration of a generating system or integrated resource system

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(a1) This clause 5.3.9 does not apply in relation to any modifications made to a *scheduled generating unit, semi-scheduled generating unit* or *scheduled bidirectional unit* ~~*generating system*~~ by a *Scheduled Generator*, ~~or~~ *Semi-Scheduled Generator* or *Scheduled Integrated Resource Provider* in order to comply with the *Primary Frequency Response Requirements* as applicable to that ~~*generating system*~~unit.

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S5.2.6 Monitoring and control requirements

S5.2.6.1 Remote Monitoring

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(b) The remote monitoring quantities referred to under paragraph (a) that *AEMO* may request include:

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(8) the mode of operation of the *generating unit*, *generating system*, *bidirectional unit* or *integrated resource system* including the status of the frequency controller, turbine control limits, or other information required to reasonably predict the *active power* response of the *generating system* or *integrated resource system* to a change in *power system frequency* at the *connection point*; and

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S5.2.5.11 Frequency control

(a) For the purpose of this clause S5.2.5.11:

droop means, in relation to *frequency response mode*, the percentage change in *power system frequency* as measured at the *connection point*, divided by the percentage change in *power transfer* of the *generating system* or *integrated resource system*, to the extent it comprises *production units*, expressed as a percentage of the maximum operating level of the *generating system* or *integrated resource system*. Droop must be measured

at *frequencies* that are outside the deadband and within the limits of *power transfer*.

maximum operating level means in relation to:

(1) a *non-scheduled generating unit* or *non-scheduled bidirectional unit*, the maximum *sent out generation* consistent with its *nameplate rating*;

(2) a *scheduled generating unit*, *scheduled bidirectional unit* or *semi-scheduled generating unit*, the maximum *generation* to which it may be *dispatched* and as provided to *AEMO* in the most recent *bid validation data*;

(3) a *non-scheduled generating system* or *non-scheduled integrated resource system*, the combined maximum *sent out generation* consistent with the *nameplate ratings* of its in-service *production units* (if any);

(4) a *scheduled generating system* or *semi-scheduled generating system*, the combined maximum *generation* to which its in-service *generating units* may be *dispatched* and as provided to *AEMO* in the most recent *bid validation data*; and

(5) a *scheduled integrated resource system*, the combined maximum *sent out generation* to which its in-service *production units* and in-service *generating units* may be *dispatched* and as provided to *AEMO* in the most recent *bid validation data*.

minimum operating level means in relation to:

(1) a *non-scheduled generating unit*, its minimum *sent out generation* for continuous stable operation;

(2) a *scheduled generating unit* or *semi-scheduled generating unit*, its minimum *sent out generation* for continuous stable operation;

(2A) a *scheduled bidirectional unit* or *non-scheduled bidirectional unit*, its minimum *active power* level for continuous stable operation;

(3) a *non-scheduled generating system*, the combined *minimum operating level* of its in-service *generating units*;

(4) a *scheduled generating system* or *semi-scheduled generating system*, the combined minimum *sent out generation* of its in-service *generating units*; and

(5) a *scheduled integrated resource system* or a *non-scheduled integrated resource system* the combined minimum operating level of its in-service *production units*.

Automatic access standard

(b) The *automatic access standard* is:

(1) *power transfer* to the *power system* from a *generating system* or, to the extent it comprises *production units*, an *integrated resource system* must not:

(i) increase in response to a rise in the *frequency* of the *power system* as measured at the *connection point*; or

(ii) decrease in response to a fall in the *frequency* of the *power system* as measured at the *connection point*;

(2) a *generating system* must be capable of operating in *frequency response mode* such that it automatically provides a proportional:

(i) decrease in *power transfer* to the *power system* in response to a rise in the *frequency* of the *power system* as measured at the *connection point*; and

(ii) increase in *power transfer* to the *power system* in response to a fall in the *frequency* of the *power system* as measured at the *connection point*,

sufficiently rapidly and sustained for a sufficient period for the *Generator* or *Integrated Resource Provider* (as relevant) to be in a position to offer measurable amounts of all *market ancillary services* for the provision of *power system frequency* control; and

(3) an *integrated resource system*, to the extent it comprises *production units*, must be capable of operating in *frequency response mode* such that it automatically provides a proportional:

(i) decrease in *power transfer* to the *power system*, with a continuous shift from one to the other mode, in response to a rise in the *frequency* of the *power system* as measured at the *connection point* accompanied by a smooth change in *bidirectional unit* operating mode between production and consumption; and

(ii) increase in *power transfer* to the *power system* in response to a fall in the *frequency* of the *power system* as measured at the *connection point* accompanied by a smooth change in *bidirectional unit* operating mode between production and consumption,

sufficiently rapidly and sustained for a sufficient period for the *Integrated Resource Provider* (as relevant) to be in a position to offer measurable amounts of all *market ancillary services* for the provision of *power system frequency* control.

Note

Clause 4.4.2(b) of the *Rules* sets out the obligations on *Generators* and *Integrated Resource Providers* in relation to compliance with the technical requirements in clause S5.2.5.11, including being capable of operating in *frequency response mode*. Clause 4.4.2(c1) of the *Rules* sets out the obligations on *Scheduled* and *Semi-Scheduled Generators* and *Integrated Resource Providers* in relation to the operation of their *scheduled generating units, semi-scheduled generating units* and *scheduled bidirectional units* ~~*generating systems*~~ in accordance with the *Primary Frequency Response Requirements*.

Minimum access standard

(c) The *minimum access standard* is:

(1) for a *generating system* or, to the extent it comprises *production units*, an *integrated resource system* under relatively stable input energy, *power transfer* to the *power system* must not:

(i) increase in response to a rise in the *frequency* of the *power system* as measured at the *connection point*; and

(ii) decrease more than 2% per Hz in response to a fall in the *frequency* of the *power system* as measured at the *connection point*;

(2) a *generating system* must be capable of operating in *frequency response mode* such that, subject to energy source availability, it automatically provides:

(i) a decrease in *power transfer* to the *power system* in response to a rise in the *frequency* of the *power system* as measured at the *connection point*; or

(ii) an increase in *power transfer* to the *power system* in response to a fall in the *frequency* of the *power system* as measured at the *connection point*,

where the change in *active power* is either proportional or otherwise as agreed with *AEMO* and the *Network Service Provider*; and

(3) an *integrated resource system*, to the extent it comprises *production units*, must be capable of operating in *frequency response mode* such that, subject to energy source availability, it automatically provides:

(i) a decrease in *power transfer* to the *power system*, in response to a rise in the *frequency* of the *power system* as measured at the *connection point*; and

(ii) an increase in *power transfer* to the *power system* in response to a fall in the *frequency* of the *power system* as measured at the *connection point*,

where the change in *active power* is either proportional or otherwise as agreed with *AEMO* and the *Network Service Provider.*

Note

Clause 4.4.2(b) of the *Rules* sets out the obligations on *Generators* and *Integrated Resource Providers* in relation to compliance with the technical requirements in clause S5.2.5.11, including being capable of operating in *frequency response mode*. Clause 4.4.2(c1) of the *Rules* sets out the obligations on *Scheduled* and *Semi-Scheduled Generators* and *Integrated Resource Providers* in relation to the operation of their *scheduled generating units, semi-scheduled generating units* and *scheduled bidirectional units* ~~*generating systems*~~ in accordance with the *Primary Frequency Response Requirements*.