AEMC

RULE

Australian Energy Market Commission

DRAFT RULE DETERMINATION

NATIONAL ELECTRICITY AMENDMENT (SEMI-SCHEDULED GENERATOR DISPATCH OBLIGATIONS) RULE 2020

PROPONENT
AER

19 NOVEMBER 2020

INQUIRIES

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ABOUT THE AEMC

The AEMC reports to the Council of Australian Governments (COAG) through the COAG Energy Council. We have two functions. We make and amend the national electricity, gas and energy retail rules and conduct independent reviews for the COAG Energy Council.

SUMMARY

1 On 19 November 2020 the Australian Energy Markets Commission (AEMC or Commission) made a draft determination to amend the national electricity rules (NER or Rules) regarding semi-scheduled generator dispatch obligations. The rule addresses the issue of semi-scheduled generators curtailing generation in response to market prices without rebidding or waiting for an updated dispatch instruction from AEMO.

2 This rule change progresses one of the ESB's interim security measures that are designed to be more modest measures consistent with the current market design which will improve outcomes while more fundamental reforms are designed and implemented through the ESB's 2025 market design process, of which the AEMC is a part.

The rule change request

3 On 24 September 2020, The Australian Energy Regulator (AER) made a request to the AEMC to make a rule regarding semi-scheduled generator dispatch obligations. This rule change request proposed to amend and clarify obligations applying to semi-scheduled generators in the NEM. In particular, to clarify that the output of a semi-scheduled generating system must follow a MW dispatch target specified by AEMO during non semi-dispatch intervals and observe a cap in generation during semi-dispatch intervals both subject to resource availability.[1]

4 The AER's rule change request follows an observation by the ESB that some semi scheduled generators have been departing significantly from their dispatch instructions, to an extent far in excess of plausible variations in their resource, and unrelated to existing exceptions provided for in the rules. These generators have rapidly reduced their output to zero during negative price dispatch intervals without an instruction from AEMO or valid rebid.

5 The AER identified significant emerging system security implications from this behaviour and submitted the rule change on the basis that its proposal is in the long-term interest of consumers as it "enhances security of the supply of electricity and reducing the cost for services dispatched by AEMO to manage power system security, particularly as penetrations on intermittent generation in the NEM increase."

The draft rule

6 The Commission's draft determination is to make a more preferable draft rule as proposed by the AER. The draft rule's policy is aligned with the AER's rule change request, differences between the draft rule and AER's rule change request are limited to minor differences in the legal drafting that implement the policy. The draft rule made by the Commission is published with this draft determination.

7 The draft rule amends the Rules to specify that:

- a dispatch instruction to a semi-scheduled generator in a:

1 During a semi-dispatch interval AEMO constrains a semi-scheduled generator's output to be below its resource availability. A semi-dispatch interval occurs due to a binding constraint or where the offers made by a semi-scheduled generator make its dispatch uneconomic.

  - non semi-dispatch interval will be in the form of a megawatt (MW) target for the end of the dispatch interval
  - semi-dispatch interval will retain an output cap expressed in MW for the end of the dispatch interval
- semi scheduled generators will be expected to meet the target (for a non semi-dispatch interval) or cap (for a semi-dispatch interval) subject to variations in resource availability
- during non-semi dispatch intervals semi-scheduled generators would be able to generate above and below the target where the deviation is due to natural resource variability
- during a semi dispatch interval, the generator's output should be the lower of:
  - the generator's output cap specified by AEMO, and
  - the generator's output as determined by its resource availability in that dispatch interval.

8 The Commission's rule change would have the effect of requiring semi scheduled generators to follow their available resource except during semi dispatch interval, when output should be limited to the cap specified by AEMO. The Commission considers this change will restrict the potential for large and rapid deviations from dispatch instructions due to negative price curtailment, and make semi-scheduled generators behave more like scheduled generators. Semi-scheduled generators will be required to rebid and wait for an updated dispatch instruction from AEMO prior to curtailing generation in response to market prices as is the current requirement for scheduled generators.

9 The Commission was satisfied that the rule would contribute to the achievement of the national electricity objective (NEO) with respect to the efficient operation, investment, and use of, electricity services with respect to price, reliability and security of the national electricity system.

Background and rule change process

10 The AER submitted this rule change request following a request from the former COAG Energy Council to develop rule changes as part the Energy Security Board's (ESB) interim security measures. These aim to support system security and improve reliability in the national electricity market (NEM) by ensuring that semi-scheduled generators are obligated to follow their dispatch targets in a similar manner to scheduled generators. The interim security measures are considered to be needed within the next 12 to 18 months, prior to the large market reforms underway in the post market 2025 market design.

11 The AER conducted two rounds of formal consultation prior to submitting the rule change request. The AER consulted on the nature and content of the rule change proposal which included the publication of an issues paper and an update paper, as well as a public stakeholder workshop and bilateral meetings with stakeholders.

12 The rule change request is being fast-tracked as the AER consulted with the public on the nature and content of the rule change request before submitting it to the Commission, and the Commission is satisfied that their consultation was adequate. Under the fast track process, the Commission proceeds directly to the publication of a draft determination without publication of a consultation paper.

13 Submissions on the draft determination and draft rule are invited by **14 January 2021** via the AEMC website. A final determination is due on **25 February 2021.**

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1 THE RULE CHANGE REQUEST

1.1 The AER's rule change request

On 24 September 2020, The Australian Energy Regulator (AER) made a request to the Australian Energy Market Commission (AEMC or Commission) to make a rule regarding semi-scheduled generator dispatch obligations. This rule change request proposed to amend and clarify obligations applying to semi-scheduled generators in the NEM. In particular, to clarify that the output of a semi-scheduled generating system must follow its available resource; except during a semi-dispatch interval when a unit's output should be limited to the cap specified by AEMO.[2]

The AER submitted this rule change request following a request by the former COAG Energy Council to consider, and if required, develop two rule changes as part the Energy Security Board's (ESB) interim security measures. AEMO was to consider the other four recommendations. These were identified by the ESB as a range of potential interim steps to improve visibility of and confidence in resources leading to more accurate information that AEMO can rely upon to operate the power system. These interim measures were designed to be modest measures consistent with the current market design which will improve outcomes while more fundamental reforms are designed and implemented.[3]

This rule change relates to the fifth measure i.e. that semi-scheduled generators are to be obligated to follow their dispatch targets, in a similar manner to scheduled generator.

The second measure i.e. that semi-scheduled plant be required to continually inform AEMO of any restrictions on their available capacity due to physical factors, ambient weather conditions, and their market intentions will be progressed by the AER following this rule change. The AER consider the outcome of this rule change is required to inform any decision on the second potential rule change.[4]

This chapter presents:

- the AER's proposed change to the Rules
- the issues the AER identified with current arrangements, and
- how the AER considers their proposed rule change will address the identified issues.

1.1.1 The AER's proposes to changes to the rules

The AER's rule change request follows an observation by the ESB that some semi-scheduled generators have been departing significantly from their dispatch instructions, to an extent far in excess of plausible variations in their resource, and unrelated to existing exceptions provided for in the rules.[5]These generators have rapidly reduced their output to zero during negative price dispatch intervals without an instruction from AEMO or valid rebid.[6]

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2 AER, rule change request, p. 3.

3 For more information on the ESB's interim security measures see: http://www.coagenergycouncil.gov.au/interim-security-measures

4 AER, issues paper, p. 9.

5 An existing exception is provided in the clause 4.9.8(a1) of the NER for generators to deviate from their dispatch targets when operating in frequency response mode to adjust power system frequency in response to power system conditions.

The AER considers that the National Electricity Rules (NER or Rules) should be amended to prevent semi-scheduled generators deviating from the MW dispatch targets that AEMO issues for each dispatch interval (the MW dispatch target) for reasons other than natural resource availability.

The AER proposes the following changes to the Rules:[7]

- a dispatch instruction to a semi-scheduled generator to be in the form of a MW target for the end of the dispatch interval
- semi scheduled generators will be expected to meet this target subject to variations in resource availability
- during a non semi-dispatch interval the target will be based on the forecast resource availability for the end of the interval
- during a semi-dispatch interval,[8] the generator's output should be the lower of:
  - the generator's output cap specified by AEMO and
  - the generator's output as determined by its resource availability in that dispatch interval.

The AER consider the effect of these arrangements is, as far as possible, to: retain existing arrangements and flexibility to reflect the variable resource; clarify the intention for semi-scheduled generators to fully utilise their available resource unless limited by network conditions or, their offered availability; and restrict the raid controlled deviations from the resource capability.[9]

1.1.2 Rationale for the rule change request

The AER considers that, if made, their rule change proposal would improve AEMO's ability to manage the power system and build confidence in forecast price and market dispatch, now and into the future.[10]

The AER considers that the impact and incidence of negative price curtailment by semi-scheduled generators will grow as negative price events become more common and renewable penetration increases. The AER considers this behaviour undermines AEMO's price / dispatch forecast accuracy by operating at levels not reflected in the pre-dispatch or dispatch solution. Further, the AER considers, with substantial wind and solar development forecast, the identified behaviour may occur more frequently in the future, further compromising AEMO's ability to manage power system security.

The AER considers its proposed rule change will prevent semi-scheduled generators from rapidly reducing their output to zero during negative price dispatch intervals without

6 AER, rule change request, p. 1.
7 AER, rule change request, p. 3.
8 A semi-dispatch interval is triggered when a network constraint or a dispatch offer results in a semi scheduled generator receiving a dispatch target less than the forecast based on the available resource.
9 Ibid.
10 Ibid, p. 1 and p.7

rebidding and waiting for an updated dispatch target from AEMO (negative price curtailment).

The AER considers it timely to amend these provisions.[11] There was limited experience of the impact of resource variations on wind output and wind generation forecasting was immature when the semi scheduled classification was introduced in 2008. Also, there was little or no consideration of changes in market conditions that could lead semi-scheduled generators to rapidly reduce output in response to price without rebidding and waiting for an updated dispatch instruction from AEMO. The AER's rule change request notes that the rules for semi-scheduled generation have not been reviewed or materially changed since the classification was introduced.[12] The AER considers its rule change request would update the Rules to reflect enhanced semi-scheduled generator control capabilities and changed commercial incentives.

1.1.3 How the AER considers the rule change will address the identified issue

The AER identifies that the rules as currently drafted do not prevent a semi-scheduled generator from rapidly reducing their output to zero during negative price dispatch intervals without an instruction from AEMO or valid rebid.[13] Existing rule arrangements only require semi-scheduled generators to observe a cap in their generation during semi-dispatch intervals. Existing arrangements therefore do not prevent semi-scheduled generators from engaging in negative price curtailment at any time.

The AER's rule change would amend current arrangements to require semi-scheduled generators to achieve a dispatch target, based on forecast resource availability, at the end of each dispatch interval subject to variations in resource availability.[14] The AER consider this change would restrict the potential for large and rapid deviations from dispatch instructions due to negative price curtailment, and make semi-scheduled generators behave more like scheduled generators. The AER's proposal retains the current flexibility of intermittent semi scheduled generators to fully utilise their available resource where system conditions permit.[15]

1.1.4 The AER's claim against the NEO

The AER considers the proposed rule change is in the long-term interest of consumers since it "enhances security of the supply of electricity and reducing the cost for services dispatched by AEMO to manage power system security."[16] The AER also notes that the proposed change is an incremental response to an emerging but (not yet major) problem. The changes do not foreclose options for more extensive changes as the amount of intermittent generation

11 When the semi scheduled classification was introduced in 2008, the AER notes that semi scheduled generators were expected to be minor passive participants, not a dominant source in the future energy mix. The focus of the rules for semi scheduled generators at that time was to allow them to generate to the full extent of available wind resources.

12 Ibid, p. 4.

13 AER, rule change request, p. 8.

14 Ibid, p. 4.

15 Ibid, p. 1.

16 AER, rule change request, p. 28.

increases and holistic reform of the design of the NEM progresses under the post-2025 market design work of the ESB. The AER therefore considers the proposed changes to be proportionate to the problem at hand in terms of being minimally disruptive and low cost, further enhancing the long-term interests of consumers.[17]

1.2 The rule making process

On 15 October 2020, the Commission published a notice advising of its intention to commence the rule making process in respect of the rule change request.[18] The Commission decided to fast-track this rule change request. This is because it concluded that the consultation carried out by the AER was adequate having regard to the nature and content of the request and the kind of consultation conducted by the AER.[19] Accordingly, the AEMC did not publish a consultation paper upon initiation of the rule change process and there has not yet been formal consultation carried out by the Commission to date on this rule change proposal.

1.2.1 AER Consultation process

The AER has undertaken consultation on the issues being addressed by its rule change proposal and potential solutions.

On 24 June 2020, the AER published an issues paper. It canvassed options to amend dispatch obligations for semi-scheduled generators to align more closely with that of scheduled generation. In particular, the paper examined ways to limit the potential for negative price curtailment by semi-scheduled generators (without re-bidding or waiting for an updated dispatch instruction).[20] The paper (and subsequent consultation with stakeholders) also discussed the development of a rule change proposal with a view to satisfying the requirements for the AEMC to progress the rule change as a fast-track rule under the national electricity law (NEL).

The AER consulted on a range of options presented including: abolition of the semi-scheduled category altogether; alternative amendments to the definition of dispatch instructions to semi-scheduled generators; changes to the design of the causer pays cost allocation for frequency control ancillary services (FCAS); and changes to prohibit market participants from the behaviour that triggered consideration of this rule change. The AER received 30 written submissions in response containing feedback on the options.

On 24 August 2020, based on this feedback and consultation, the AER published an update paper which set out a rule change proposal and invited further comment from stakeholders.[21] The AER then conducted a second round of consultation, and received five written

17 Ibid.

18 This notice was published under s 95 of the National Electricity Law (NEL).

19 The decision to fast-track the rule change request was made under s. 96A(1)(a) of the NEL.

20 AER, Issues paper - semi scheduled generator rule changes, June 2020. For further information see: https://www.aer.gov.au/publications/reviews/semi-scheduled-generators-proposed-rule-changes.

21 Ibid.

submissions. The AER's updated proposal reflects the solution proposed in its rule change request.

On the basis of the consultation it had conducted on the issue and proposed solution, the AER requested that its rule change request be progressed as a 'fast track' rule change.[22]

1.2.2 AEMC assessment of AER consultation for the purpose of rule fast tracking

The requirements for fast track consideration of a rule change request are:

1. An electricity market regulatory body has made a rule change request and has consulted with the public on the nature and content of the request; and
2. The AEMC is of the opinion that the consultation was adequate, having regard to the nature and content of that request and the kind of consultation conducted by the electricity market regulatory body.

The Commission determined to progress the AER's rule change as a fast track rule change as:

- The AER conducted two rounds of formal consultation on the nature and content of the rule change proposal, including the publication of an issues paper and an update paper, as well as a public stakeholder workshop and bilateral meetings with stakeholders.
- Through these consultation processes, the AER sought feedback on a range of key elements of the proposal which will need to be addressed in the rule change request.
- The AER's proposal has been informed and refined by feedback provided by participants throughout their consultation process, with stakeholders given an additional opportunity to provide feedback on the latest version of the proposal through the publication of an update paper in August.

1.3 Consultation on draft rule determination

The Commission invites submissions on this draft rule determination by **14 January 2021**.[23]

Any person or body may request that the Commission hold a hearing in relation to the draft rule determination. Any request for a hearing must be made in writing and must be received by the Commission no later than **26 November 2020**.

Submissions and requests for a hearing should quote project number ERC0313 and may be lodged online at www.aemc.gov.au.

22 AER, rule change request, p. 1.

23 Please note that the Commission has allowed for an 8 week consultation period to account for the Christmas shutdown period.

2 BACKGROUND

This chapter describes the semi-scheduled generator category and existing arrangements applying to semi-scheduled generators.

2.1 The semi-scheduled generation registration category

The semi-scheduled generator registration category was implemented in the Commission's central dispatch and integration of wind and other intermittent generation rule (Semi-scheduled rule change) made in 2008.[24] The Commission made the semi-scheduled rule in response to emerging system security challenges from increasing penetrations of wind generation in the NEM, chiefly in South Australia.[25] In making the rule, the Commission identified the challenges wind farms were beginning to create for network congestion and AEMO's (then NEMMCO) efficient management of a secure power system.[26]

All of the pre -2005 wind farms installed in the NEM were non-scheduled and were therefore not integrated into central dispatch. In 2005, in response to increasing penetrations of large non-scheduled wind farms in South Australia, the South Australian Essential Services Commission mandated, amongst other things, registration as scheduled generators so AEMO could effectively control network flows within secure operating limits.[27]

It was identified in 2008 that a requirement for large wind farms to register as scheduled generators was inappropriate as they were not practically able to comply with rule requirements such as following a dispatch targets due to the intermittency of their natural energy resource.[28] The semi-scheduled rule change therefore imposed a set of obligations for intermittent generators to participate in the central dispatch, and to limit their output at times when that output would violate secure network limits or be uneconomic to dispatch. The rule thereby allowed AEMO to integrate intermittent generation by controlling network flows within secure limits through the action of constraints in the central dispatch process without creating inefficient barriers to their integration in the NEM by requiring them to register as scheduled generators.[29]

The 2008 semi-scheduled rule reflected semi-scheduled generator capabilities and market circumstances at that time. In making the 2008 semi-scheduled rule, the Commission used current obligations applying to non-scheduled generators as a starting point and added obligations that applied at that time to scheduled generators only where necessary for semi-scheduled generators to participate in the market.[30] There have been no material amendments to arrangements applying to semi-scheduled generators since the semi-scheduled rule was made.

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24 AEMC, central dispatch and integration of wind and other intermittent generation rule - final determination, 1 May 2008. Further information available at: https://www.aemc.gov.au/rule-changes/central-dispatch-and-integration-of-wind-and-other.

25 In 2008 approximately 550 MW of wind capacity was connected in the NEM of which 386 MW was installed in South Australia.

26 AEMC, semi-scheduled rule change - final determination, p. vi.

27 AEMC, semi-scheduled rule change - final determination, p. 13.

28 Ibid, p. 1.

29 Ibid.

30 AEMC, semi-scheduled rule change - final determination, p. 25.

In making the semi-scheduled rule change in 2008, the Commission considered that the rule would enhance the efficient use of, and efficient investment in, electrical services through by improving AEMO's ability to securely integrate higher penetrations intermittent generation in the NEM. The Commission made the rule on the basis that it promoted the long-term interests of consumers of electricity through lower prices for energy, market ancillary service and network charges, and higher levels of reliability and security of the national electricity system. These benefits relate to the improved efficiency of the dispatch process and the improved certainty to investors in NEM.[31]

2.2 Existing arrangements applying to the semi-scheduled registration category

Currently, arrangements for semi-scheduled generators in the NEM include a set of obligations requiring them to:

- make offers and participate in central dispatch
- limit their output at times when that output would violate secure network limits or be uneconomic to dispatch
- participate in causer pays arrangements (as an incentive for them to minimise their adverse effect on power system frequency)

Arrangements in each of these areas are introduced below as background and context to this determination's assessment of the AER's rule change request.

Requirement to make offers and participate in central dispatch

In contrast to non-scheduled generators, semi-scheduled generators are required to participate in the central dispatch process, including submitting offers and, under certain circumstances, responding to dispatch instructions from AEMO.[32] Existing arrangements require semi-scheduled generators to provide price and availability offers in 10 bands for each dispatch interval in the same manner as scheduled generators.[33] Semi scheduled offer requirements also include ramp rate limits.[34]

The requirement to make offers and participate in central dispatch allows AEMO to economically schedule both scheduled and semi-scheduled generators, as well as manage semi-scheduled generator output when binding constraints apply.

Compliance with dispatch instructions during semi and non semi-dispatch intervals

Compliance with dispatch instructions is a strict obligation for scheduled generators, except where compliance would, in the generator's reasonable opinion, be a hazard to public safety or materially risk damaging equipment.[35] However, the rules impose more limited obligations

31 Ibid, p. 20.
32 Clause 4.9.2(a) of the NER.
33 Clause 3.8.6(g) of the NER.
34 Clause 4.9.5(a) of the NER.
35 Clause 4.9.8 of the NER.

for semi-scheduled generators; they only impose a cap on their output if AEMO determines that a dispatch interval is a 'semi-dispatch' interval.[36]

AEMO declares a semi-dispatch interval when either one of the following conditions apply:[37]

- a network constraint would be violated if the semi-scheduled generating unit's generation were to exceed the dispatch level specified in the related dispatch instruction at the end of the dispatch interval, or
- the dispatch level specified in that dispatch instruction is less than the unconstrained intermittent generation forecast at the end of the dispatch interval,

and which is notified by AEMO in that dispatch instruction to be a semi-dispatch interval.

During a semi-dispatch interval AEMO's dispatch instruction includes a dispatch level that specifies the maximum level of a semi-scheduled generating unit's MW generation. The semi-scheduled generating unit is free to generate at any level up to the dispatch level but not to exceed it.

There is no restriction under current arrangements on deviations below the cap during semi-dispatch intervals. A semi-scheduled generating unit is also permitted to disregard the dispatch level and generate at any level during non-semi-dispatch intervals.[38]

Unconstrained intermittent generation forecast (UGIF)

Existing arrangements require AEMO to calculate an unconstrained intermittent generation forecast (UGIF).[39] Unlike scheduled generating units, a semi-scheduled generating unit's plant availability for operation does not necessarily equal its available capacity for dispatch. It is the role of the UIGF to take the plant availability data from the semi-scheduled generator and compute the available capacity for dispatch given solar and wind conditions at the applicable generation site.[40]

Forecasts of semi-scheduled generation through the UGIF is the basis on which AEMO determines the MW capacity available for dispatch, pre-dispatch, and PASA for semi-scheduled generating units. Semi-scheduled generators still offer their capacity into the market in the same way as a scheduled generator, in 10 price-volume bands, but AEMO determines their maximum available capacity for dispatch through the UGIF.

Semi-scheduled generators also provide AEMO with information on the availability of the individual units making up the generating system. This information is necessary for AEMO's wind forecasting system to produce accurate UIGF forecasts.

Provisions for rebidding

36 Glossary - Chapter 10 of the NER, definition of semi-dispatch interval and dispatch level; clause 4.9.5(a)(6) of the NER.

37 Chapter 10 of the NER, Glossary definition of semi-dispatch interval.

38 AEMC, semi-scheduled rule change - final determination, p. 50.

39 Clause 3.7.1(c)(2) NER.

40 AEMO calculates the UGIF using the Australian Wind Energy Forecasting System (AWEFS) and, Australian Solar Energy Forecasting System (ASEFS) as well as generator self forecasts.

Rebidding allows participants to adjust bids in response to new information as it becomes available. This could include changes in weather, consumer demand, generator performance, network constraints or bids of other participants.

Semi-scheduled generators are able to rebid capacity between price bands in the same manner as scheduled generators.[41] As semi-scheduled generators submit changes to availability through the UIGF, they only need to make rebids when moving capacity between price bands. Generators in the NEM are able to rebid up to the next five-minute dispatch interval.

Rebidding by participants, including rebids made very close to the time of dispatch, is a central design component of the NEM's wholesale market. Rebidding provides generators with the flexibility to adjust their position to accommodate changes in market conditions. Rebidding is the mechanism through which semi-scheduled generators should respond to negative prices. The AER's rule change is motivated by negative price curtailment by semi-scheduled generators without re-bidding and waiting for an updated dispatch target.

Causer pays

Semi-scheduled generators are included in causer pays arrangements. "Causer pays" provides a disincentive for generators in the NEM to deviate from their dispatch targets. It does this by allocating to generators a share of the costs of procuring regulation FCAS required to address that frequency deviation.[42]

Specifically, causer pays provisions under clause 3.15.6A incentivise a semi-scheduled generator to ramp (increase or decrease) its actual generation at a uniform rate. Any deviations from a uniform rate of change that contribute to frequency deviation will add to the regulation FCAS causer pays factors for that generating unit, thereby increasing the proportion of regulation FCAS costs attributable to that generating unit.[43]

Existing arrangements allow AEMO to determine regulation FCAS causer pays factors for semi-scheduled generators.

Making semi-scheduled generators responsible for the full cost of the regulation FCAS that they create incentivises each generator to minimise their contribution to frequency deviation. Options include investing in more advanced active power control technology, and providing their most accurate information available to AEMO for the UIGF.

41 Clauses 3.8.22 and 3.8.22A of the NER.
42 Clause 3.15.6A of the NER.
43 Clause 3.15.6A(k)(5) of the NER.

3 DRAFT RULE DETERMINATION

This chapter sets out the Commission's draft determination, including:

- the Commission's draft rule determination
- the rule making test
- assessment framework
- summary of reasons, and
- transitional arrangements.

Chapters four and five detail the Commission's considerations in making the draft determination

3.1 The Commission's draft rule determination

The Commission has determined to make a more preferable draft rule that reflects the AER's proposed rule. The Commission has made some drafting changes to the rule suggested by the AER in order to improve the clarity of the policy intent, but in substance is the same as that proposed by the AER.

The key features of the Commission's draft determination are set out below. A summary of reasons is provided in section 3.4.

The effect of the draft rule is to require semi-scheduled generating units to follow their available resource except during a semi dispatch interval, when output should be limited to the cap specified by AEMO. The draft rule amends the Rules to specify that:

- a dispatch instruction to a semi-scheduled generator in a:
  - non semi-dispatch interval will be in the form of a MW target for the end of the dispatch interval
  - semi-dispatch interval will retain an output cap expressed in MW for the end of the dispatch interval
- semi scheduled generators will be expected to meet the target (for a non semi-dispatch interval) or cap (for a semi-dispatch interval) subject to variations in resource availability
- during non-semi dispatch intervals semi-scheduled generators would be able to generate above and below the target where the deviation is due to natural resource variability
- during a semi dispatch interval, the generator's output should be the lower of:
  - the generator's output cap specified by AEMO, and
  - the generator's output as determined by its resource availability in that dispatch interval.

A new glossary definition of "resource" has also been included to provide clarity on the interpretation of that terms applying to semi-scheduled generators.

Table 3.1 sets out the specific amendments to the draft rule to implement the Commission's draft determination.

In its review of rule requirements applying to semi-scheduled generators, the Commission identified an oversight in the Chapter 10 definition of inflexible, inflexibility.[44] The existing definition did not include semi-scheduled generators in the list of registration categories that were eligible to be considered inflexible. This is inconsistent with existing clause 3.8.19(a1) which provides for semi-scheduled generators to bid inflexible. The Commission has therefore elected to correct this oversight in the existing rules. This is a 'housekeeping' change that does not impact or influence the policy intent of the rule.

Table 3.1: **Elements of the draft rule**

RULE CLAUSE	DRAFT RULE PROVISION
Dispatch instructions for semi-scheduled generators (**Clause 4.9.2(a) of the NER)**	To implement central dispatch AEMO may give dispatch instructions nominating: • in the case of a semi-scheduled generating unit, the dispatch level, to be supplied by the generating unit over the specified period.
Definition of dispatch level **(Chapter 10 of the NER - Glossary)**	Dispatch level means: • for a semi-dispatch interval, the amount of electricity specified in a dispatch instruction as the semi-scheduled generating unit's maximum permissible active power at the end of the dispatch interval specified in the dispatch instruction; and • for a non semi-dispatch interval, the amount of electricity specified in a dispatch instruction as the target active power at the end of the dispatch interval specified in the dispatch instruction.
General responsibilities of registered participants **(Clause 4.8.9 of the NER)**	A semi-scheduled generator is not taken to have failed to comply with a dispatch instruction as a consequence of: • (1) in a semi-dispatch interval, the level of power supplied by the generating unit being less than the dispatch level nominated in the dispatch instruction, to the extent that the shortfall is the result of resource availability; or • (2) in a non semi-dispatch interval, the level of power supplied by the generating unit either exceeding or being less than the level nominated in the dispatch instruction, to the extent that the excess or shortfall (as applicable) is the result of resource availability.

44 In respect of a *scheduled generating unit*, *semi-scheduled generating unit*, *scheduled load* or *scheduled network service* for a *trading interval* means that the *scheduled generating unit*, *semi-scheduled generating unit*, *scheduled load* or *scheduled network service* is only able to be *dispatched* in the *trading interval* at a fixed *loading level* specified in accordance with clause 3.8.19(a).

RULE CLAUSE	DRAFT RULE PROVISION
Definition of resource **(Chapter 10 of the NER - Glossary)**	For a semi-scheduled generator, means the intermittent energy source (such as wind or solar radiation) that is converted by the semi-scheduled generating unit into electrical output.
Dispatch of inflexible,inflexibility **(Clause 3.8.19 of the NER)**	Add semi-scheduled generator to the list of registration categories for which the definition of inflexible, inflexibility applies.
Definition of resource **(Chapter 10 of the NER - Glossary)**	Inclusion of a new glossary term to define the term "resource" - the intermittent energy source (such as wind or solar radiation) that is converted by a semi-scheduled generating unit into energy.

Source: AEMC

3.2 Rule making test

3.2.1 Achieving the NEO

Under the NEL the Commission may only make a rule if it is satisfied that the rule will, or is likely to, contribute to the achievement of the national electricity objective(NEO).[45] This is the decision making framework that the Commission must apply.

The NEO is:[46]

> to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to:
>
> (a) price, quality, safety, reliability and security of supply of electricity; and
>
> (b) the reliability, safety and security of the national electricity system.

The Commission has identified that the relevant aspects of the NEO are the efficient operation and use of, electricity services with respect to price, reliability and security of the national electricity system. This is because negative price curtailment behaviour by semi-scheduled generation without rebidding and waiting for an updated dispatch instruction reduces:

- AEMO's ability to maintain power system security, increasing the risk of supply interruptions
- the efficiency of AEMO's market dispatch solution leading to higher prices than would otherwise be the case
- the accuracy of AEMO's price and operational forecasts thereby reducing the ability of participants to formulate efficient operational and investment strategies, and

45 Section 88 of the NEL.
46 Section 7 of thence.

- reliability of supply by reducing the level of intermittent generation capacity that can be securely integrated in the NEM.

3.2.2 Making a more preferable rule

Under s. 91A of the NEL, the Commission may make a rule that is different (including materially different) to a proposed rule (a more preferable rule) if it is satisfied that, having regard to the issue or issues raised in the rule change request, the more preferable rule will or is likely to better contribute to the achievement of the NEO. In this instance, the Commission has made a more preferable rule.

3.2.3 Making a differential rule

Under the Northern Territory legislation adopting the NEL, the Commission may make a differential rule if, having regard to any relevant MCE statement of policy principles, a different rule will, or is likely to, better contribute to the achievement of the NEO than a uniform rule. A differential rule is a rule that:

- varies in its term as between:
  - the national electricity system, and
  - one or more, or all, of the local electricity systems, or
- does not have effect with respect to one or more of those systems

but is not a jurisdictional derogation, participant derogation or rule that has effect with respect to an adoptive jurisdiction for the purpose of s. 91(8) of the NEL. As the rule relates to parts of the NER that currently do not apply in the Northern Territory, the Commission has not assessed the rule against the additional elements required by the Northern Territory legislation.

3.3 Assessment framework

The Commission has considered the following five principles in assessing the rule change request against the NEO:

- **Promoting a secure power system at lowest cost** – the extent to which the rule change is the lowest cost option to enhance AEMO's ability to maintain the system in a secure state.
- **Market efficiency** – the extent to which the rule change enhances market efficiency and improves the accuracy of information available to stakeholders to optimise their participation in the market.
- **Technology neutrality** – whether the rule change promotes a level playing field between scheduled and semi-scheduled generators to the extent possible given technology characteristics.
- **Regulatory certainty/clarity** – regulatory intent should be clearly articulated in the rules, and provide a clear basis for the assessment of compliance.
- **Proportionality** – the rule change, and costs imposed on participants, should be proportionate to the issue being addressed.

3.4 Summary of reasons

The Commission has determined to make a draft rule that reflects the AER's proposed rule. The Commission has made some drafting changes to the rule suggested by the AER in order to improve the clarity of the policy intent, but in substance is the same as that proposed by the AER. The draft rule made by the Commission is attached to and published with this draft rule determination.

The Commission's reasons for the approach adopted in the draft rule are summarised below and discussed in more detail in chapters four and five.

Having regard to the issues raised in the rule change request, the Commission is satisfied that the draft rule will, or is likely to, contribute to the achievement of the NEO for the following reasons:

- **Promoting a secure power system at lowest cost** – The Commission considers the draft rule will contribute to the achievement of the NEO by enhancing power system security by:
  - Increasing AEMO's visibility of changes in semi-scheduled generation levels thereby improving their ability to maintain the power system in a secure state for the set of all credible contingency events.
  - Retaining contingency FCAS as available to manage contingency events rather than using it to respond to deviations in frequency due to the negative price curtailment behaviour by semi-scheduled generation.
- **Market efficiency** – The Commission considers the draft rule will contribute to the achievement of the NEO by enhancing market efficiency by:
  - Allowing less constrained market operation. The rule change will allow AEMO to set operating margins and interconnector limits less conservatively. This will allow the dispatch of lower cost generation leading to lower market prices relative to what would have otherwise been the case.
  - Improving the accuracy of AEMO's price and operational forecasts. More accurate information will enhance market participant confidence and their ability to formulate efficient operating and investment strategies.
  - Reducing the cost of FCAS that need to be procured by AEMO. Lower FCAS requirements will reduce costs borne by consumers relative to what would have otherwise been the case.
- **Technology neutrality** – The Commission considers the draft rule will contribute to the achievement of the NEO by providing consistency in the obligations faced by different types of generators to the extent possible given technology characteristics. Existing arrangements, which do not prohibit negative price curtailment, confer an advantage on semi-scheduled generators relative to scheduled generators that is not justified by fundamental technology characteristics.
- **Regulatory certainty/clarity** – The Commission considers the draft rule will contribute to the achievement of the NEO by clearly articulating to the market the performance characteristics and compliance expected from semi-scheduled generators. This will

provide improved certainty to market participants when developing operating and investment strategies. The clear articulation of expectations in the rules will also enhance the AER's ability to effectively assess compliance, strengthening the effectiveness of the regulatory framework.

- **Proportionality –** The Commission considers the draft rule will contribute to the NEO as the rule change, and costs imposed on participants are proportionate to the issue being addressed. The draft rule amends existing arrangements with minimal process and system changes, and minimal regulatory change. The rule change effectively specifies the intent of the Commission's 2008 semi-scheduled rule.

3.5 Implementation

The Commission considers the draft rule only affects the negative price curtailment behaviour by semi-scheduled generators.

The draft rule does not require AEMO or affected semi-scheduled generators to implement new systems. The most significant change will be for those semi-scheduled generators that utilise systems and procedures enabling negative price curtailment, to disable those systems such that they no longer curtail generation in response to price without an updated dispatch instruction from AEMO.

The Commission's draft rule therefore commences 30 days after publication of the rule, to allow for affected semi-scheduled generators to make relevant changes. The Commission considers this sufficient for affected semi-scheduled generators to rewrite generator operating procedures, brief operating staff, and disable any automated systems that enable negative price curtailment behaviour. The Commission however is interested in stakeholder feedback on the practicalities of this implementation timeframe.

4 MATERIALITY OF THE ISSUE

This chapter considers whether a draft rule change should be made to address the issue identified by the AER. It sets out the Commission's consideration on whether the issue identified in the AER's rule change request, being negative price curtailment by semi-scheduled generators without rebidding and waiting for an updated dispatch instruction from AEMO, is a material issue best addressed through a rule change.

This chapter includes the following:

- the AER's assessment of materiality
- the options considered by the AER that did not require rule changes
- stakeholder views provided to the AER on whether a rule change is required to address the issue, and
- the Commission's considerations on:
  - whether the economic and security impacts of the identified issue are material
  - potential non-rule options for addressing the issue, and
  - interaction with other regulatory reform processes.

BOX 1: COMMISSION'S DRAFT DETERMINATION

The Commission's draft determination is that:

- the issue of negative price curtailment by semi-scheduled generators without rebidding and waiting for an updated target from AEMO is material to the achievement of outcomes in the NEM, and so the NEO, specifically to security and market efficiency, and
- that a rule change to address this issue would best promote the NEO.

4.1 The AER's claim of materiality

This section sets out the AER's assessment of the issue's materiality.

4.1.1 AER's description of the issue

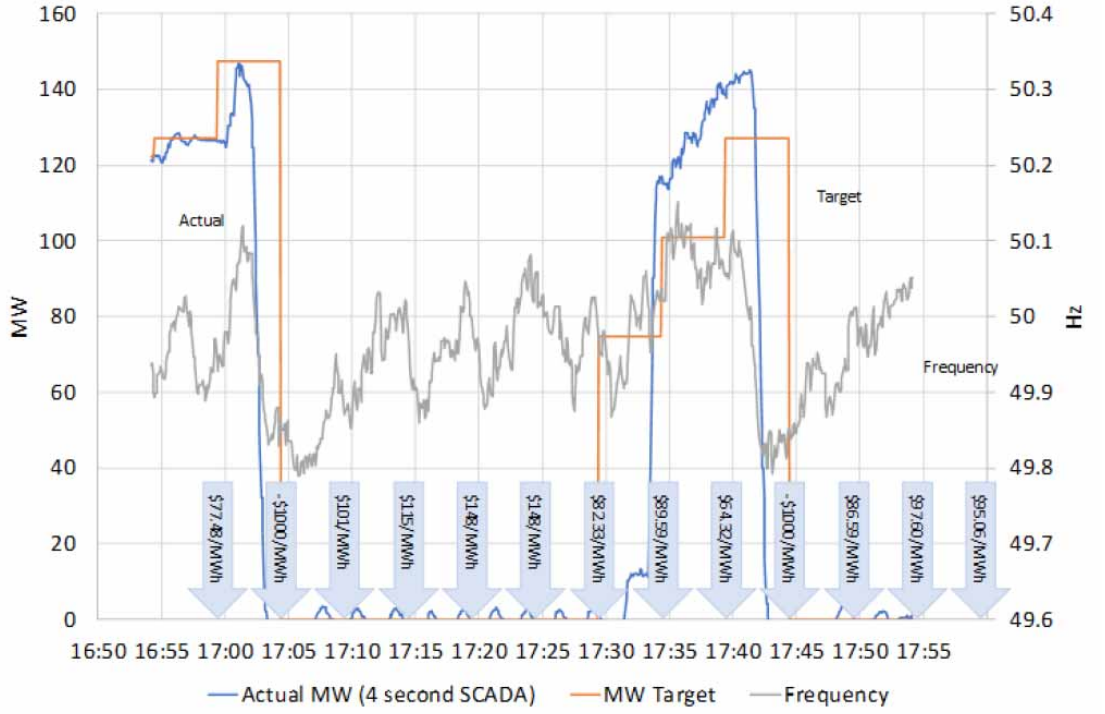
The AER's rule change request identifies negative implications for power system security and market efficiency from recent practice, by some semi scheduled generators, to depart significantly from their dispatch instructions without rebidding and waiting for an updated dispatch target from AEMO. The AER considers these deviations from semi-scheduled generators' dispatch instructions are far in excess of plausible variation in their resource, and is a response to negative market prices (this behaviour will be referred to as negative price curtailment).[47]

Example of negative price curtailment

47 AER, rule change request, p. 1.

The AER's rule change request provided details of a recent case to illustrate negative price curtailment behaviour. This case, shown in Figure 4.1, involves a wind farm rapidly ceasing production during a dispatch interval in response to a negative market price in that interval.[48]

Figure 4.1: Example of semi-scheduled negative price shutdown



Source: AER rule change request, p. 5

The orange line in Figure 4.1 shows the MW target for the unit, that is, the dispatch instruction. The blue line shows the unit's MW output. The grey line shows the power system frequency during that time (referenced against the right-hand axis), and the light blue arrows showing the regional dispatch price, and when it was published in pre-dispatch for the subsequent dispatch interval.

The AER's example includes the following details:[49]

- From 17.00hrs the output from the unit initially climbs towards the higher dispatch target based on wind forecasts and the generator's offer. From 17.02 the output starts to sharply reduce, reaching zero well before the end of the dispatch interval at 17.05. The reduction appears to have been prompted by the -$1,000/MWh price for the next dispatch interval forecast in pre-dispatch. The participant also submitted a rebid at 17.02, moving all its capacity from -$1,000/MWh to more than $12 500/MWh, however it only became effective for the 17.10 dispatch interval.

48 AER rule change request, p. 5.

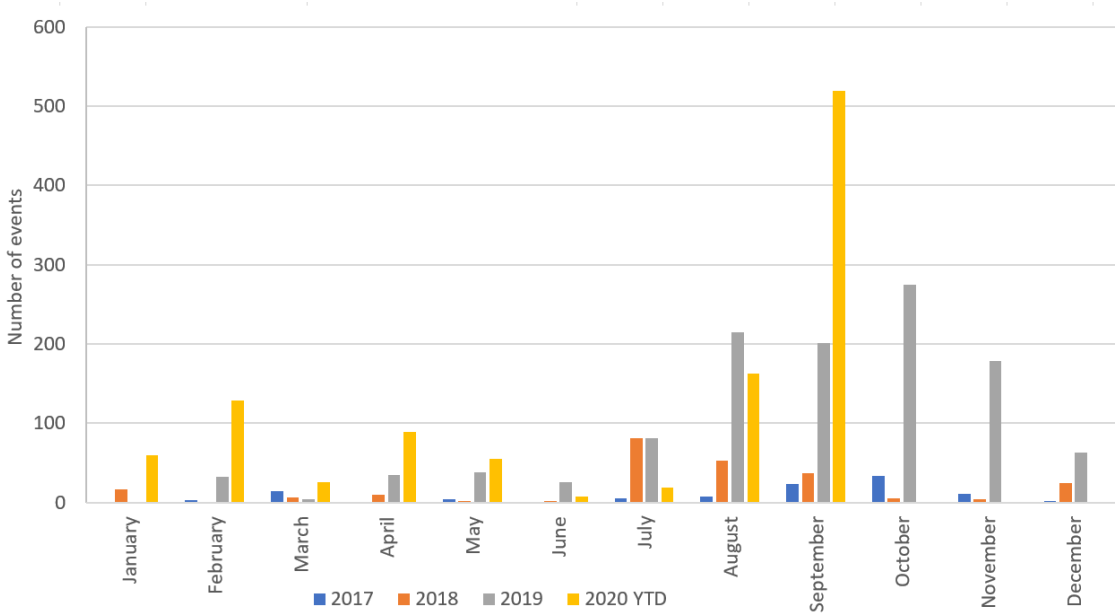
49 AER, rule change request, p. 6.

- In this example, the early rapid reduction to 0 MW, before a corresponding dispatch instruction was issued with a 0 MW target, appears unrelated to resource availability or technical limitations. SCADA data indicates the number of turbines available remained relatively constant and the wind speed fell only slightly.
- During the 17.45 dispatch interval, for which the dispatch target was in excess of 120 MW, at 17.42 the participant again started to rapidly reduce output. At the same time, the participant also submitted a rebid for the remainder of the trading interval, moving all their capacity from -$1000/MWh to more than $12 500/MWh. However, this rebid did not become effective until the 17.50 dispatch interval. The spot price for the 18.00 trading interval was -$94.47/MWh.
- This example also shows the impact of this behaviour power system frequency, which is a barometer of the supply demand balance. As the generator reduced its capacity and deviated from AEMO's forecast target, power system frequency (grey line) fell outside the normal operating frequency band (of between 49.85 and 50.15 Hz, right-hand axis). The AER notes that the impact would have been more substantial if multiple generators concurrently operated in this way.

The AER's issues paper also identified an increase in the frequency of large deviations by semi-scheduled generators during negative price events. Figure 4.2 shows the number of events where semi-scheduled generators deviated more than 20 MW below their dispatch target when the dispatch price was negative, in each month over the last three years in South Australia. The AER chose the 20 MW threshold since it considered it was a large enough deviation from a generator's dispatch target that it would not normally be explained by a sudden change in the resource, beyond the change predicted in the forecasting systems.[50] While the results shown in Figure 4.2 also capture the effect of other factors that can lead to large deviations from dispatch targets during negative price intervals, the significant increase in the frequency of such events in the last two years across almost all months (grey and yellow columns) may indicate increasing occurrence of negative price curtailment by semi-scheduled generators.

50 AER, issues paper, p. 19.

Figure 4.2: Frequency of >20 MW variation by South Australian semi scheduled generators in a single dispatch interval when the price is negative



Source: AER, updated with August and September data

Implications of semi-scheduled generator curtailment in response to price

The AER's rule change request identifies system security and market efficiency implications from the semi-scheduled generator curtailment in response to negative prices.

The AER identifies that all scheduled and semi-scheduled market participants have the ability to amend their bids and offers but, once a 5 minute dispatch target and associated price has been calculated, the NEM's wholesale market arrangements effectively assume all generators will follow their targets. AEMO manages system security on that basis. The optimisation of dispatch through NEMDE also presumes all generators comply with dispatch instructions.[51]

The AER identify the following benefits of the rule change which illustrate the materiality of the economic and security issues created by negative price curtailment.[52]

- Optimisation of dispatch through AEMO's dispatch software, NEMDE, presumes all generators comply with dispatch instructions and the proposed rule will increase the probability that **energy will be produced at least cost**, given constraints and limitations on the system, contributing to the National Electricity Objective (NEO). The materiality of this outcome is expected to only increase as the generation mix continues to change, such as a higher penetration of intermittent generation.

51 AER, rule change request, p. 5.
52 AER, rule change request, p. 26.

- The proposed rule will **reduce the call on FCAS**. If instances of controllable rapid reductions in output that prompted this proposal were to grow, in the absence of the amendment it is likely there would be an increase in occasions where the frequency exceeds the normal operating frequency band. This situation would prompt AEMO to increase the amount of FCAS and increase cost of supply.
- The proposed rule change will **reduce the cost of supplying electricity** and benefit customers and therefore promotes the NEO. In the absence of the rule change, increased volatility in frequency is likely to create risks to system security, this is managed by AEMO adjusting the FCAS requirement. This would increase the cost to provide that FCAS service and that incremental cost would flow through to customers.

The AER cite the following observation from AEMO's renewable integration study on the system security challenges of managing increasing uncertainty associated with intermittent generation levels for the operation of the NEM.[53]

> "...increasingly variable and uncertain supply and demand, and declines in system strength and inertia, have moved the system to its limits, reducing its resiliency and increasing the risk to the system for complex events. The knowledge and tools operators have used in the past to operate the system securely are now less effective and need to be adapted. For example, intervention by AEMO has always been a part of operating a secure NEM, but where it was used rarely in the past as a last resort to manage specific issues on the grid, it has now become commonplace, especially in regions with higher shares of renewable generation (South Australia, Tasmania, and Victoria). This RIS analysis projects that under the current market design the need for interventions to address system security requirements will grow across all NEM regions. Successfully managing the system's increased uncertainty and operational complexity will require different approaches and better co-ordination of all resources. The existing dispatch process for the NEM was not designed for these new conditions, and the current reliance on operators to balance factors and intervene is sub-optimal and unsustainable."

Growth in issue materiality given higher penetrations of intermittent renewable generation

The AER identifies the potential for the materiality of the issue to increase with the growth of intermittent generation in the NEM.[54] In particular, the AER notes the amount of semi-scheduled generation has grown significantly and now comprises around 11,000 megawatts of installed and commissioning capacity, around 20% of the 56,000 megawatts of generating capacity in the NEM. This form of generation is forecast to grow to around 56% of the installed capacity in the NEM by 2035.[55] Due to rapid expected increase in the amount of

53 AEMO 2020, Renewable Integration study, www.aemo.com.au/-/media/files/major-publications/ris/2020/renewable-integration-study-stage-1.pdf?la=en, p. 25.

54 AER, rule change request, p. 7.

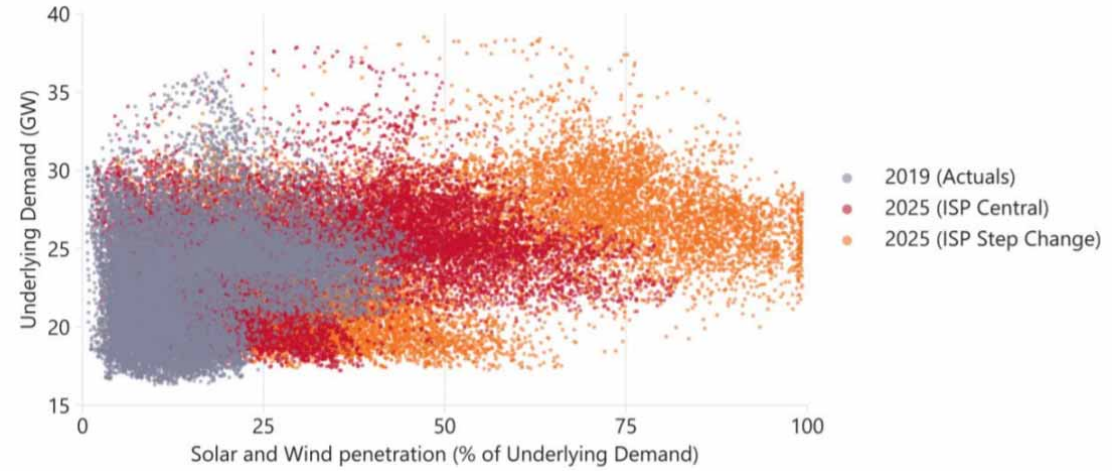
55 AEMO, 2020, Central scenario, 2020 Integrated System Plan, www.aemo.com.au/en/energy-systems/major-publications/integrated-system-plan-isp/2020-integrated-system-plan-isp

semi-scheduled generation, the AER consider the limited obligations required of semi-scheduled generators under existing arrangements are no longer appropriate.

In addition to the growth in generation capacity, the AER support its claim on the materiality of the issue by referencing the increasing proportion of demand met by renewable generation. The AER points to information from AEMO's Renewable Integration Study (RIS). The study shows that, in 2019, renewable generation was, at times, able to meet almost 50% of electricity demand in the NEM (grey scatter dots) and by 2025 this is forecast to increase to 75–100% under different ISP scenarios (red scatter dots shows the central scenario, and yellow scatter dots show the higher step change scenario).[56]

The AER also notes a primary conclusion of the RIS report is that, by 2025, instantaneous intermittent renewable penetration levels in the NEM will be such that they will be constrained to between 50%-60% of the time unless a range of initiatives are implemented.[57]

Figure 4.3: Instantaneous penetration of wind and solar generation, actual in 2019 and forecast for 2025 under ISP Central and Step Change generation builds



Source: AEMO, renewable integration study, p. 6.

4.1.2 Shortcomings identified by the AER in existing arrangements

The AER identify that the rules as currently drafted do not prevent a semi-scheduled generator from rapidly reducing their output to zero during negative price dispatch intervals without an instruction from AEMO or valid rebid.[58] Existing rule arrangements only require semi-scheduled generators to observe a cap in their generation during semi-dispatch intervals. Existing arrangements therefore do not prevent semi-scheduled generators from rapidly reducing generation at any time and for any reason.

56 Note: Penetration on this graph represent NEM half-hourly wind and solar generation divided by the underlying demand which includes demand response, energy storage, and coupled sectors such as gas and the electrification of transport.

57 AER, rule change request, p. 7.

58 AER, rule change request, p. 8.

The AER considers that when the semi-scheduled classification was introduced there was limited experience of the impact of resource variations, and wind generation forecasting was immature. Further, semi-scheduled generators were expected to be relatively minor passive participants, not a dominant source in the future energy mix. The focus of the rules for semi-scheduled generators in 2008 was to allow them to generate to the full extent of available wind resources. Consequently, for dispatch purposes, their targets could be determined by wind forecasts. According to the AER, there was little or no consideration of changes in market conditions that could lead semi-scheduled generators to rapidly reduce output in response to price.[59]

The AER consider that the situation has now changed. The following factors necessitate changes to the requirements on semi-scheduled generators:[60]

- the cost of intermittent renewable generating technologies are now significantly cheaper and have evolved significantly, supported by precise control system software facilitating both very fast ramping and close control of output.
- grid demand is static or falling and conventional generation is retiring and not being replaced by generators of equivalent capability. There is now enough intermittent renewable generation to meet all of a region's demand in some periods.
- negative prices are occurring more frequently and more recent contracts are likely to require these generators to take some exposure in negative price periods.
- automated dispatch software is now available and being used by some generators – in some cases this may be occurring without integrating with dispatch offers or without allowing for appropriate ramping across a dispatch interval.
- wind and solar forecasting have improved markedly due to generators' experience and the increased capabilities of computers and learning software.

4.2 Non-rule change options considered by the AER

The AER's rule change request considered a number of alternative options that would address the issue but not require a rule change.[61] The non-rule change options considered relevant to the Commission's consideration are:

- limiting the use of systems and procedures for negative price curtailment through AEMO's registration conditions, or
- addressing the issue in other rule change processes currently being considered.

Limiting the use of systems and procedures for negative price curtailment through registration conditions - In the issues paper, the AER considered the option of limiting the use of facilities or procedures that lead to rapid reduction in output in response to price through the generation registration process. AEMO currently manages the registration process and can impose conditions on the registration of new generating systems. In principle the conditions attached to the registration of semi-scheduled generators could

59 AER, rule change request, p. 4.
60 AER, rule change request, p. 4.
61 These are set out in the AER's rule change request section 4.

include restrictions to address generators dramatically changing their output without a corresponding dispatch instruction.[62]

The AER did not consider this approach a substitute for a rule change as it is not clear that AEMO's current powers to impose conditions on generators when they register extend to prohibiting the operation of control systems and manual procedures that allow for a rapid change in output. In addition, the AER noted that imposing conditions would not apply to existing registrations/conditions thereby creating inconsistencies in the registration arrangements applying to different generators in the same registration category.[63]

Whether the issue is best addressed in rule change processes currently being considered or implemented - Stakeholder responses to the AER's issues paper highlighted the importance of assessing the need for a rule change at this time given potential changes being developed through the ESB's post 2025 work, as well as recent amendments to require Mandatory Primary Frequency Response (MPFR).[64]

Regarding the MPFR, several stakeholders questioned whether a rule change was required given the MPFR rule places an obligation on all scheduled and semi-scheduled generators to operate their plant in accordance with Primary Frequency Response Requirements (PFRR) that require all generating systems (including semi scheduled generators) to respond to frequency deviations from 50Hz by ±0.015Hz at the connection point.[65] Some stakeholders considered these requirements would address the issue as semi scheduled generators operating in frequency responsive mode will respond to frequency deviations and be unable to manually change their energy output in these situations.[66]

The AER considered and countered this view. The AER noted that variations in frequency due to semi-scheduled generators unilaterally deviating from a dispatch target may be mitigated by MPFR obligations. However, while the MPFR is designed to require all generators to respond to correct a frequency deviation, the AER considers its rule change proposal will remove one possible source of deviation; by prohibiting semi scheduled generators from responding to price without a dispatch instruction. The AER considers obliging semi scheduled generators to follow their targets is consistent with the MPFC and should reduce the overall requirement allowing existing FCAS and MPFR to operate more efficiently.[67]

In regards to potential changes being developed in the ESB's NEM 2025 work, the AER also notes that the request from COAG Energy Council to the AER to consider two of the six interim security measures which the ESB considered needed to occur within the next 12 to 18 months, prior to the large market reforms underway in the post 2025 market design. The AER is cognisant of the changes to the design of the NEM and considers this amendment to

62 AER, issues paper, p. 38.
63 Ibid.
64 AER, rule change request, p. 13.
65 Where those generating systems have been dispatched at greater than 0 MW.
66 Ibid, p. 14.
67 Ibid.

the current design to be relatively minor and does not detract from the range of options being considered by the ESB in its post 2025 market design work.[68]

4.3 Stakeholder views

The Commission has determined to fast track the AER's rule change request on the basis that consultation on the issue and the proposed solution was conducted by the AER in its issues paper and update paper. The Commission has therefore used the submissions to the AER's consultation process to inform its draft determination. A complete summary of submissions to the AER's issues and update paper is provided in the AER's rule change request. The following summary is therefore limited to stakeholder views on whether a rule change is required to address the issue.

By way of an overview:

- Thirty submissions were received in response to the AER's issues paper and a further five were received in response to the AER's update paper. [69]
- A wide range of stakeholders considered the specific behaviour targeted by the AER's rule change request, being semi-scheduled generator curtailment in response to negative prices without rebidding or waiting for an updated dispatch target, to be a material issue for AEMO's maintenance of system security that required a rule change to address.
- Of the thirty submissions received in response to the AER's issues paper, twenty-three considered a rule change, of some type, to be required.[70]

Points made by stakeholders in support of a rule change included:

- AEMO consider the Rules must facilitate the secure, reliable and efficient operation of the NEM power system. AEMO considers existing provisions for the dispatch of semi-scheduled generation do not achieve these outcomes and are no longer fit for purpose. Given the continued rapid pace of intermittent generation installation and innovation, AEMO identify a rule change is needed now. AEMO notes that the increasing incidence of semi-scheduled generators rapidly reducing output in response to negative prices greatly increases the potential for very large aggregate supply shortfalls in a dispatch interval, and consider that further growth in adoption of sophisticated automated bidding software will exacerbate these impacts, even at current intermittent generation levels and before the introduction of five-minute settlement.[71]
- Infigen considers that this is a material issue that should not be left to market signals, and a regulatory solution is required. Infigen agrees with the AER that this behaviour by semi-scheduled generators could ultimately lead to system security issues. The view is

68 Ibid.

69 These submissions are available on the AER's consultation project page: https://www.aer.gov.au/publications/reviews/semi-scheduled-generators-proposed-rule-changes.

70 Submissions to the AER's issues paper: AEMO; Infigen; ASMC, AEC, AGL, AMS, CEC, CEEM, CEIG, Edify Energy, Energy Queensland, Energy Australia, Engie, Fulcrum 3D, Hydro Tasmania, IIG, Meridian, Major Energy Users (MEU), Neoen, Pacific Hydro, Shell, Snowy Hydro, TILT Renewables.

71 AEMO, submission to the AER issues paper, p. 2.

that, at the extreme, the rapid curtailment of a significant portion of the generation fleet within a dispatch interval could lead to a shortfall of generation.[72]

- AMS consider the problem of negative price curtailment is apparent and significant today, the symptom of a gap in the market rules, and addressable by a relatively simple and straightforward rule changes to close the gap. AMS suggests that the AER's rule change process focus primarily on closing this gap.[73]
- The Clean Energy Council (CEC) agrees with the AER's assessment of the issue as outlined in the issues paper that recent behaviour by some semi-scheduled generators moving away from their expected output in response to negative price intervals, without rebidding, is causing issues for the market operator's ability to maintain a stable power system. The CEC agrees with the AER that AEMO's reliance on generators meeting dispatch expectations to balance customer demand is critical. The CEC considers that improving confidence in semi scheduled generators meeting their dispatch instructions is important to support a future NEM that comprises significantly higher levels of semi-scheduled generation.[74]

Several stakeholders did not support a rule being made at this time to address the issue of negative price curtailment by semi-scheduled generation, on the basis that

- that rapid changes in output are beneficial for AEMO should they require fast activating technologies in the future to manage the Power System[75]
- the issue would be addressed by non-rule change or rule change processes or market reform processes currently underway.[76]

The submission from Diamond Energy was the only submission to argue that rapid changes in output – without rebidding and waiting for a new dispatch target - should be allowed to continue. They noted that registration arrangements that restrict ramp rate to no more than 20 per cent of capacity exclude fast acting response from the NEM stating: `[o]ur view is that this constrains the capability of fast activating technologies, and limits their potential useability to AEMO should they require fast activating technologies in the future to manage the Power System. In short, why limit the future by imposing the control systems of the past?'[77]

Of the five submissions received to the AER's update paper all five supported the making of the AER's rule change,[78] with one providing qualified support.[79] No submission to the update paper advocated not making a rule.

72 Infigen, submission to the AER issues paper, p. 3.
73 AMS, submission to the AER's issues paper, p. 3.
74 Clean Energy Council, submission to the AER's issues paper, p. 1.
75 Submission to the AER's issues paper: Diamond Energy.
76 Submission to the AER's issues paper: Acciona, HARD Software, SW Advisory, RATCH.
77 Diamond Energy, submission to the AER's issues paper, p. 1.
78 Submissions to the AER's update paper: Shell, Infigen, Meridian, CEIG,
79 TILT renewables, submission to the AER's update paper, p. 1.

4.4 Commission's considerations

The Commission has considered the following in coming to its draft determination:

- is the issue identified by the AER material to the achievement of the NEO?
- are there non-rule options that better advance the NEO than a rule change?

4.4.1 Is the issue identified by the AER material to the achievement of the NEO?

The Commission considers that the issue identified by the AER in respect to negative price curtailment by semi-scheduled generators without rebidding or waiting for an updated dispatch target is material to achievement of the NEO. The Commission identifies the system security and market efficiency implications of this behaviour as contrary to the efficient investment in, and efficient operation and use of, electricity services for the long-term interests of consumers of electricity. The Commission's considerations in coming to this view are set out below.

System security implications

The Commission considers negative price curtailment by semi-scheduled generators without rebidding or waiting for an updated dispatch target to materially impact AEMO's ability to maintain power system security, for the following reasons.

Increased challenges for AEMO to maintain the power system in a secure state - AEMO maintains the power system in a secure state for the set of credible contingency events where a credible contingency is generally the loss or removal from service of a single power system element.[80] AEMO procures contingency FCAS and determines the constraints forming the technical envelope for this purpose. The power system is secure if it is sufficiently constrained with enough FCAS such that load shedding is avoided and voltage and frequency is maintained within acceptable limits following any credible contingency event. AEMO does not operate the power system in a secure state for non-credible events.[81] The probability of the failure or removal from service of more than one generating system or network element within 30 minutes is generally considered to be a non-credible contingency event.

AEMO has no visibility in advance of the negative price curtailment behaviours that motivated the AER's rule change request as generators do not inform AEMO of their change in availability through their offers before curtailing generation in response to negative prices. Rapid, un-forecast withdrawal of capacity by semi-scheduled generators is likely to introduce significant uncertainty into AEMO's ability to maintain the system in a secure state following a large unforeseen negative price curtailment event. This uncertainty increases the risk that the technical envelope may not sufficiently constrain the system to keep it in a secure state under some conditions. In particular, the technical envelope may not fully allow for a credible contingency that occurs following a negative price event which sees semi-scheduled generators withdraw capacity.

80 This is referred to as being N - 1 secure.

81 This is because their probability of occurrence is too low to justify the costs of maintaining the power system in a secure state for their occurrence.

Contingency FCAS is procured on the general assumption that contingency events are independent of one another and there is a non-credible chance of another contingency occurring within the 30 minutes that is allowed to fully restore reserves following a contingency. When rapid changes like those shown in Figure 3.1 occur multiple times a day, and over time grow in size as more participants start to act in this way, regulation FCAS, and possibly even contingency FCAS, are at risk of being insufficient to prevent load shedding following a credible contingency event. While negative price curtailment does not mean that FCAS will be insufficient, it increases the risk that the amount of FCAS procured by AEMO may be insufficient in some circumstances.

System security risks arising from co-incident curtailment by multiple semi-scheduled generating systems - Rapid curtailment of generation by a semi-scheduled generator may remove a material volume of generation from the power system in a very short space of time. This has a similar effect on the power system as a contingency event involving the failure or removal of service of a power system asset. As noted above, the power system is maintained in a secure state for the occurrence of any single credible contingency. Multiple contingency events are considered non-credible and the power system is not maintained in a secure state for their occurrence.

The Commission is aware that automatic dispatch systems are available that enable negative price curtailment. As the uptake of such systems increases, a number of semi scheduled generating systems may invest in automatic dispatch systems which automatically curtail generation in response to the same regional reference price. As AEMO has no visibility over the intentions of these generators it is not able to introduce diversity into their responses. Therefore, a negative price is likely to see number of semi-scheduled generators in a region curtail generation at the same time, similar to the effect of a non-credible multiple contingency event.

The Commission does not consider the possibility of the above outcomes, although remote at this point, to be consistent with the promotion of system security in a way that maximises net benefits to consumers. The Commission therefore considers the system security implications of negative price curtailment by semi-scheduled generators to be material to the achievement of the NEO, particularly as the penetration of intermittent generation increases.

Market efficiency implications

The Commission considers negative price curtailment by semi-scheduled generators without rebidding or waiting for an updated dispatch target to have material implications for market efficiency. This is due to the potential for negative price shutdown behaviour to lead to:

- higher prices due to a more constrained power system
- less efficient market participation due to reduced forecast accuracy
- higher FCAS costs, and
- dispatch inefficiencies.

Higher prices due to a more constrained power system - As described above, AEMO sets the technical envelope by constraining the power system to maintain it in a secure state. These constraints act to limit the dispatch engine's (NEMDE's) ability to utilise the least cost

set of generating resources available. A more constrained power system, due to higher levels of uncertainty in semi-scheduled generation levels, may therefore use a higher cost set of generation resources to meet demand than would otherwise have been the case.

In addition, AEMO defines constraints in NEMDE which include offsets and confidence margins to account for uncertainty.[82] Increased uncertainty will lead to larger offsets and confidence intervals. This further increases the degree of constraint on the dispatch engine's solution leading to higher market costs than would have otherwise been the case.

Consistent with the Commission's conclusions in 2008 when the semi-scheduled registration category was created, a more constrained system is likely to put upward pressure on prices. One rationale for the introduction of the semi-scheduled category in 2008 was to avoid reductions in market efficiency associated with higher operating margins (that would have occurred if intermittent generators were registered as non-scheduled generators). The Commission considered that reducing the operating margins on network constraint equations would increase the transfer capability of the network, thereby promoting trade both within and between regions. Increased trade would reduce dispatch costs in the NEM, putting downward pressure on energy prices and electricity costs over the long term.[83] The Commission also identified lower operating margins from increased network capability during times of supply shortfall. The Commission considered this would, all other things being equal, generally improve the reliability of supply to consumers of electricity and improve AEMO's ability to maintain system security for given levels of demand from consumers of electricity.[84]

Less efficient market participation due to reduced forecast accuracy - The AER is also concerned about the negative price curtailment diminishing market efficiency through less accurate price forecasts. The Commission agrees with AER's concerns in this area.

Market participant operating and investment strategies are informed by price and generation forecasts published by AEMO. These span dispatch, pre-dispatch, PASA, and ESOO timelines. Market participants' ability to formulate strategies that lead to greatest market efficiency is a function of the type and accuracy of the information available. Negative price curtailment by semi-scheduled generators without re-bidding or waiting for an updated dispatch instruction increases the uncertainty in the instantaneous active power balance thereby reducing the accuracy of AEMO's operational and price forecasting. This reduction in accuracy may compromise the ability of market participants to optimise their participation strategies thereby impacting overall market efficiency.

Increased uncertainty and less accurate information may also impact investment decision-making, by increasing the risk premium required for investment. Over time this will lead to higher market prices than would have otherwise been the case. Participants may also be more risk averse in their decision making on operational participation to reflect a more

82 The confidence level is expressed as the percentage of critical cases that are covered by the limit equation. A confidence level of 95% means that 95% of critical cases had less restrictive limits than predicted by the limit equation - AEMO, confidence levels, offsets and operating margins policy.

83 AEMC, semi-scheduled rule - final determination, 2008, p. 18.

84 Ibid.

uncertain set of outcomes. Both of these factors will also have a negative effect on overall market efficiency.

Higher FCAS costs - As already noted, negative price curtailment by semi-scheduled generators increases uncertainty in the instantaneous active power balance requiring more regulation and contingency FCAS than would otherwise have been required. The uncertainty introduced by rapid, withdrawal of generation by semi-scheduled generators in response to negative prices will increase the quantity, and therefore the cost, of both regulation and contingency FCAS procured by AEMO. This additional cost ultimately increases costs for consumers.

In conclusion, the Commission does not consider the possibility of the above outcomes to be consistent with the promotion of market efficiency. The Commission therefore considers the market efficiency implications of negative price curtailment by semi-scheduled generators to be material to the achievement of the NEO, particularly as the penetration of intermittent generation increases.

BOX 2: COMMISSION'S VIEW ON THE MATERIALITY OF THE ISSUE

The Commission's draft determination is that the issue of negative price curtailment by semi-scheduled generators without rebidding and waiting for an updated target from AEMO is material to the achievement of outcomes in the NEM, and so the NEO, specifically to security and market efficiency

4.4.2 Are there non-rule options that better contribute to achieving the NEO than a rule change?

The Commission has considered whether the non-rule change options considered by the AER and introduced in section 4.2 represent a more preferable approach to addressing the issue than a rule change. The non-rule change options considered relevant to the Commission's consideration are:

- limiting the use of systems and procedures for negative price curtailment through AEMO's registration conditions, or
- addressing the issue in other rule change processes currently being considered.

Limiting the use of systems and procedures for negative price curtailment through registration conditions -

The AER identified that, in principle, the conditions attached to the registration of semi scheduled generators could include restrictions to prevent generators dramatically changing their output without a corresponding dispatch instruction. In order to give effect to this, AEMO would have to change their arrangements for registration. However, the AER did not consider this approach a substitute for a rule change given:

- the uncertainty whether current powers allowed such an approach

- the inconsistencies that would be introduced into registration conditions applying to different generators in the same registration category and not apply to generators already registered.

Irrespective of the extent of existing powers, the Commission considers a rule change to be preferable to limiting the use of systems and procedures for negative price curtailment through registration conditions. As identified by the AER, such an approach would likely introduce inconsistencies in the registration conditions applying to different generators in the same registration category. The Commission considers such an outcome may increase uncertainty amongst market participants and potential investors, with negative effects on market confidence. The Commission considers that regulatory intent should be clearly articulated in the rules and provide a clear basis for the assessment of compliance.

Whether the issue is best addressed in rule change processes currently being considered or implemented - The AER also considered whether a rule change was needed at this time given potential changes being developed by the Energy Security Board's (ESB) NEM 2025 work, as well as recent amendments to require MPFR.[85]

The AER concluded a rule change to address the issue of negative price curtailment by semi-scheduled generators was needed notwithstanding the changes being developed by the ESB's NEM 2025 work, or amendments to require MPFR.

- the AER considered obliging semi scheduled generators to follow their targets is consistent with MPFC and should reduce the overall requirement allowing existing FCAS and MPFR to operate more efficiently, and
- the request was made from COAG Energy Council to the AER to consider two of the interim security measures which the COAG Energy Council considered needed to occur within the next 12 to 18 months, prior to the large market reforms underway in the post 2025 market design.

The Commission finds the system security and market efficiency implications of negative price curtailment by semi-scheduled generators to be material for system security and market efficiency in the NEM today. In that regard, it notes the need identified by the former COAG Energy Council for this issue to be addressed in the next 12 to 18 months. We therefore do not consider it appropriate to wait for the issue to be addressed through the longer term market arrangements being developed by the ESB. The Commission considers that a rule change should however be consistent with the implementation of future long term market arrangements.

The Commission agrees with the AER that variations in frequency due to semi-scheduled generators unilaterally deviating from a dispatch target may be mitigated by MPFR obligations. However, there are significant levels of uncertainty as to the extent to which MPFR will address the issue in the absence of a rule change clarifying how semi-scheduled generators operate in respect of their dispatch targets. The Commission considers any rule change made should be compatible with MPFR obligations. We have considered these interactions when developing this draft determination and rule.

85 AER, rule change request, p. 13.

In summary, the Commission does not consider either of the non-rule options to be a more preferable approach to addressing the issue than a rule change at this time. We are strongly of the view that any rule change should be compatible with existing arrangements and support future reforms.

BOX 3: COMMISSION'S VIEW ON THE NON-RULE CHANGE OPTIONS

The Commission does not consider any non-rule change options to better achieve the NEO than amending the rules to address the issue identified by the AER in respect of the rule change request.

5 SEMI-SCHEDULED GENERATOR DISPATCH OBLIGATIONS

The Commission has determined to make a rule on dispatch obligations for semi-scheduled generators as proposed by the AER. The Commission has made this draft determination on the basis that the AER's rule change proposal better advances the NEO than the other options available to address the issue of negative price curtailment by semi-scheduled generators. This chapter details the Commission's draft rule along with the Commission's considerations in making the draft determination. It describes:

- the AER's rule change proposal
- other rule change options available to address the issue
- stakeholder views on the AER's rule change, and
- the Commission's analysis and conclusions.

BOX 4: DRAFT DETERMINATION ON SEMI-SCHEDULED GENERATOR DISPATCH OBLIGATIONS

The Commission's draft determination is to amend the NER to make rules that reflect those proposed by the AER, as follows:

- a dispatch instruction to a semi scheduled generator in a:
  - non semi-dispatch interval will be in the form of a MW target defined at the end of the dispatch interval
  - semi-dispatch interval will retain an output cap expressed in MW for the end of the dispatch interval.
- semi scheduled generators will be expected to meet the target (for a non semi-dispatch interval) or cap (for a semi-dispatch interval) subject to variations in resource availability
- during non-semi dispatch intervals semi-scheduled generators would be able to generate above and below the target where the deviation is due to natural resource variability
- during a semi dispatch interval, the generator's output should be the lower of
  - the generator's output cap specified by AEMO and
  - the generator's output as determined by its resource availability in that dispatch interval.

5.1 AER rule change proposal

The AER's proposal is to amend rule obligations to make rapid curtailment by semi-scheduled generators in response to price without first re-bidding and waiting for an updated dispatch clearly non-compliant. This is achieved by:

- amending the existing definition of **dispatch level** during a non-semi dispatch interval from being an estimate of MW generation to become a MW target at the end of the interval. The active power target during non-semi dispatch intervals would reflect the unconstrained intermittent generation forecast (UIGF) for the semi-scheduled generator.
- removing reference to a **dispatch instruction** being the maximum level of power to be supplied by a semi-scheduled generating unit and align requirements with those applying to scheduled generators.
- oblige semi scheduled generators to follow dispatch targets except to the extent that deviation is due to variations in natural resource availability. During non-semi dispatch intervals variation above and below the target is permitted. During a semi-dispatch interval, only variation below the existing cap is permitted.

The AER's rule change request does not propose amendments to existing arrangements applying to:

- the UIGF
- the specification of semi-dispatch intervals, and
- causer pays arrangements.

The AER's proposal does not include a requirement for linear ramping between dispatch targets, or impose a cap on generation during a non semi-dispatch interval.

The AER considers the effect of its rule change is, as far as possible, to retain existing arrangements and flexibility to reflect the variable resource, and restrict the negative price curtailment without rebidding and waiting for an updated AEMO dispatch instruction.[86]

Table 5.1: Details of AER's proposed changes to the Rules

	AER RULE CHANGE REQUEST
Definition of dispatch level	• for a semi-dispatch interval, an amount of electricity specified in the dispatch instruction as both the target and the maximum permissible active power at the end of the dispatch interval specified in the dispatch. • for a non semi-dispatch interval, an amount of electricity specified as the target active power at the end of the dispatch interval specified in the dispatch instruction.
Dispatch instructions	A dispatch instruction in the case of a semi-scheduled generating unit specifies the level or schedule of power to be supplied by the generating unit over the specified period.
Responsibility to follow dispatch targets	A semi-scheduled generator must comply with a dispatch instruction given to it by AEMO unless to do so would be a hazard to public safety or materially risk damaging equipment. Specify that a semi-scheduled generator is not taken to have

86 AER, rule change request, p. 3.

	AER RULE CHANGE REQUEST
	failed to comply with a dispatch instruction if • during a semi-dispatch interval any shortfall in generation is the result of resource availability • during a non semi-dispatch interval any excess of generation is the result of resource availability.
New definition of 'resource'	For a semi-scheduled generator, means the natural environmental energy from which the generator creates electrical energy, for example, for a solar farm - solar radiation, and for a wind farm the energy captured from the moving air.

Source: AER rule change request

5.2 How the AER's proposal addresses the issue of negative price curtailment

The AER's proposed rule change would address the issue of negative price curtailment by semi-scheduled generators by bringing overarching obligations for semi-scheduled generators in line with those of scheduled generators with additional flexibility to address natural resource variability.

Existing arrangements require semi-scheduled generators in the NEM to comply with dispatch instructions but only defines a dispatch instruction in terms of a maximum level of power to be supplied by the generating unit over a semi-dispatch interval.[87] During non-semi dispatch intervals,[88] MW dispatch levels specified in AEMO dispatch instructions are simply estimates of generation and not binding on semi-scheduled generators.

Existing arrangements permit a semi-scheduled generator to generate at any level during a non semi-dispatch interval and at any level below the cap specified in the dispatch instruction during a semi-dispatch interval. Existing arrangements therefore do not prohibit semi-scheduled generators from curtailing generation in response to negative prices without rebidding and waiting for an updated dispatch instruction from AEMO.

The AER's rule change would address the issue of curtailment by semi-scheduled generators by requiring a semi-scheduled generator to follow a dispatch target subject to natural resource availability. The AER's proposal would effectively require semi-scheduled generators to generate at the full extent of their resource except when its output is constrained during a semi-dispatch interval. Semi-scheduled generators would not have the flexibility to generate at any level under these arrangements unless justified by variations in the natural resource.[89]

87 Clauses 4.9.8(a) and 4.9.2(a)(3) of the NER.

88 A semi-dispatch interval occurs when AEMO constrains a semi-scheduled generators output to be less than its forecast generation due to a binding constraint or the dispatch of the semi-scheduled generator being uneconomic based on its offers.

89 Note, existing exemptions to the requirement to follow dispatch instructions exist covering circumstances including the provision of FCAS and where damage to equipment or hazards to public safety may result.

The effect of the AER's proposal would be to require a semi-scheduled generator that wishes to reduce generation level in response to negative market prices to first rebid and wait to receive an updated dispatch instruction before curtailing generation.

5.3 Other options assessed by the AER

The AER considered and consulted on a range of rule change options for addressing the issue of negative price curtailment by semi-scheduled generators. The set of options identified by the AER is relevant to the Commission's considerations on whether there are alternatives that better achieve the NEO than the AER's proposed rule change.

In its issues paper, the AER consulted on the following rule change options:[90]

- amending causer pays factors for ancillary services to increase economic incentives for semi-scheduled generation to follow dispatch instructions
- removing the semi-scheduled classification
- amending existing arrangements for semi-scheduled generation including:
  - amending dispatch instructions for semi-scheduled generators to be MW target for the 5-minute interval which would automatically incorporate the effect of a cap on output if necessary
  - defining an energy target be defined to provide for variations in resource within 5-minute intervals, and
  - operating as an inflexible generator and advising AEMO of a fixed megawatt level for the dispatch interval.

The Commission has considered these options, and the AER's reasons for rejecting them in favour of its rule change proposal. These options are briefly introduced below along with the AER's reasons for not accepting them.

Amending causer pays factors for ancillary services to increase economic incentives for semi-scheduled generation to follow dispatch instructions - Semi-scheduled generators are subject to causer pays which allocates a share of the regulation FCAS costs required to manage the impact of intermittent generator output on power system frequency.[91]

The AER's assessment of this option is that the current arrangements do not create a material incentive to follow an dispatch instruction as if it were a target. The AER identify that while in principle a new causer pays approach could be designed to provide sufficient incentives for semi scheduled generators to follow their dispatch targets, it would require a major overhaul of the calculation and application of these factors and may have other unintended consequences. The AER therefore did not consider this option to be a practical solution in context of this problem.[92]

90 AER, rule change request, p. 5.
91 AER, issues paper, p. 29.
92 AER, issues paper, p. 5.

Removing semi-scheduled registration category - The AER consulted on removing the semi-scheduled generation registration category and requiring all intermittent generators above a certain size to register as scheduled generators and follow dispatch instructions accordingly. The AER considered removing the semi scheduled classification to be a major structural change to the rules that would require the development of unique compliance arrangements for intermittent generators that could make broader enforcement actions problematic.

The AER further identified that there would be numerous legacy and transition issues to be dealt with under this approach. Special arrangements would be needed to facilitate these generators continuing to use Australian Wind Energy Forecasting System (AWEFS) or Australian Solar Energy Forecasting System (ASEFS) calculations to determine their dispatch, creating further complications. Neither the AER nor stakeholders supported the option as a proportionate response to the issue of negative price curtailment by semi-scheduled generators.[93]

Amending existing arrangements applying to semi-scheduled generation - The AER consulted on three sub-options for retaining the semi-scheduled registration category while also imposing requirements for semi-scheduled generators to respond to dispatch instructions in a manner more closely aligned with scheduled generation. These sub-options were:[94]

- Dispatch instructions for semi-scheduled generators to be MW target for the 5-minute interval which would automatically incorporate the effect of a cap on output if necessary. This was the AER's preferred approach put forward in its issues paper.
- Dispatch instructions for semi-scheduled generators to be defined as an energy target (MWh) for the 5-minute interval which would automatically incorporate the effect of a cap on output if necessary.
- Semi-scheduled participants to develop and advise AEMO of their preferred dispatch and subject to system security requirements these preferences will become their target via an instruction back to the generator.

The AER's preferred option was for semi scheduled generators to receive and comply with a MW dispatch instruction based on forecast resource availability for the end of the 5-minute interval which would automatically incorporate the effect of a cap on output and a ramp rate.[95] This option also required semi scheduled generators to (linearly) progress to a MW target for the end of a dispatch interval, and increasing their output above target in the presence of an increased resource would not be allowed. The feedback from submissions to the issues paper was not supportive of this approach citing material revenue impacts for semi-scheduled generators, and requirements for additional raise FCAS.[96]

Neither of the other two options were considered desirable either by the AER or stakeholders. While the AER considered expressing the target in terms of MWh energy would effectively

93 AER, issues paper, p. 32.
94 AER, issues paper, p. 5.
95 AER issues paper, p. 34.
96 AER, rule change request, p. 18.

provide flexibility to account for resource availability, while addressing the issue of negative price curtailment, a number of drawbacks were identified. For instance, complications in causer pays calculations, and the disadvantage of adopting an approach different to the MW target specified for scheduled generators.[97]

The fourth option, of semi-scheduled generators specifying their preferred dispatch level, also had a range of drawbacks and was considered would likely lead to inefficient outcomes.[98]

Require a self reported 'bonafide reason' for the deviation - In their submissions to the issues paper, a number of stakeholders cited arrangements in New Zealand. These require intermittent generators to self report a 'bonafide reason' for a significant deviation from dispatch targets. Stakeholders considered this to be a simpler approach to addressing the challenge of negative price curtailment than the options put forward by the AER in its issues paper.

The AER was not supportive of this approach. It considered the 'self reporting' model presented a range of monitoring and compliance issues. The AER preferred a discretionary AER-initiated 'please explain' method linked to clear rule obligations. The AER considers this approach allows, when questioned, semi-scheduled generators to link sudden changes in their output to any relevant feature not apparent from data. For example unexpected high speed cut out or run back, temperature effects or other technical protection systems not related to the energy price.[99]

5.4 Stakeholder submissions

A full summary of submissions to the AER's issues and update papers is provided in section four of the AER's rule change request. The summary presented in this section focuses on stakeholder views specific to the scope of the rule change required to address the issue and the AER's rule change proposal.

Stakeholder submissions to the AER supported a rule change to address the issue motivating the rule change request. A majority of these stakeholders however explicitly supported a rule change narrowly focused on addressing the issue of negative price curtailment, rather than making structural changes to rules frameworks.[100]

- Engie considered the issue to be material but recommended revised obligations should be the minimum necessary to remedy the issue[101]
- AES considered that a rule change narrowly focused on preventing early economic curtailment that is complementary with other reforms need not wait.[102]

97 AER, issues paper, p. 37.
98 AER, issues paper, p. 38.
99 AER, rule change request, p. 16.
100 Submissions to the AER's issues paper: AGL, AMS, CEC, CEIG, Edify Energy, Engie, Fulcurm 3D, IIG, Infigen, Meridian, Neoen, Pacific Hydro, Tilt Renewables.
101 Engie, submission to the AER's issues paper, p. 3.
102 AES, submission to the AER's issues paper, p. 6.

- Infigen considered a simple change to address the issue to be justified which is to require semi-scheduled units to make best efforts to generate at their available resource unless receiving a dispatch instruction from AEMO.[103]
- Tilt Renewables agreed that amending the rules to close this 'loophole' for semi-scheduled generators would be appropriate.[104]

The AER's August update paper published the AER's revised rule change proposal (which matches the proposal in its rule change request). The AER received five submissions in response to its update paper.[105]

Of the submissions received in response to the AER's update paper, four of the five submissions supported the AER's updated rule change without qualification.[106]

Tilt Renewables supported the rule change proposal in principle but urged the AER to consider all sound technical reasons that a semi-scheduled generator may be off its dispatch target and ensure that these are considered in its rule change request. In particular, Tilt Renewables noted several technical reasons other than resource intermittency which may require a semi-scheduled generator to be off its targets including wind turbine active power recovery times following a turbine pause and ramping down for a network outage.[107]

5.5 Commission's considerations

This section sets out the Commissions considerations and analysis in forming its draft determination. In Chapter four of this draft determination the Commission set out why it considered a rule change was necessary to address the issue identified by the AER in its rule change request. In this section the Commission assesses whether the rule change proposal put forward by the AER represents the approach to addressing the issue that best promotes the achievement of the NEO.

The Commission's considerations in making its draft determination include the following:

- the scope of the rule change necessary to address the issue identified by the AER
- dispatch level and dispatch instruction, and
- the requirement to follow dispatch instructions subject to natural resource availability.

5.5.1 The scope of the rule change necessary to address the issue identified by the AER

The Commission has determined to make a rule change that is narrowly focused on amending existing arrangements to address the specific issue motivating the rule change, rather than making structural changes to rules arrangements. This approach is consistent with the proposal submitted by the AER.

103 Infigen, submission to the AER' s issues paper, p. 2.
104 Tilt Renewables, submission to the AER issues paper, p. 2.
105 Submissions were received by: Clean Energy Investor Group; Infigen; Meridian; Shell Energy; Tilt Renewables.
106 Submission to the AER's update paper: Infigen, CEIG, Meridian, Shell Energy
107 Tilt Renewables, submission to the AER's update paper, p. 1.

In making its determination, the Commission considered whether the need to develop rules arrangements to best integrate high penetrations of intermittent generation in the NEM required a rule change with broader scope than that proposed by the AER. Consideration involved identifying whether options such as removing the semi-scheduled registration category or reforming causer pays arrangements to enhance financial incentives for accurately following dispatch targets would better achieve the NEO than the AER's rule change proposal.

In this regard, the Commission notes that stakeholders have advocated for a rule change that is narrowly focused on addressing the issue of negative price curtailment, rather than one that makes structural changes to rules frameworks to achieve a broader purpose.

The Commission also identifies that several rule change and market reform programs are underway which are considering longer term structural arrangements. These are relevant to the future of the semi-scheduled registration category and financial incentives for achieving dispatch targets. These are as follows:

- **Future of the semi-scheduled registration category -** The ESB's two-sided markets work stream is exploring a range of options for evolving registration and classification categories as an intermediate term (two to five years) task. Options include developing less complex registration processes, and developing a revised set of scheduling obligations and incentives that lower the barriers to currently non-scheduled participants becoming scheduled and encourage greater participation in central dispatch.[108] The role and future of the semi-scheduled registration category is an element of this work.
- **Causer pays and financial incentives for achieving dispatch targets** - The AEMC's mandatory primary frequency response work program is considering changes to causer pays arrangements to incentivise semi-scheduled generators to minimise deviations from their dispatch targets. This work is part of a suite of changes to improve frequency control and efficiently integrate high penetrations of intermittent generation in the NEM.

In contrast to these long term reform programs, the AER's rule change request is one of the ESB's interim security measures which are to be considered over the next 12 to 18 months. For this reason, the Commission considers questions regarding the future of the semi-scheduled registration category and reform of causer pays to be best addressed in the above work streams.

The Commission agrees with the AER and stakeholders that, given the other rule change and reform programs underway, a rule change that is narrowly focused on the specific issue of negative price curtailment will better achieve the NEO than the other options considered by the AER. This determination is consistent with the assessment principle of proportionality, requiring that the rule change, and costs imposed on participants, be proportionate to the issue being addressed. This includes making the minimal changes to the Rules necessary to address the issue motivating the rule change, given the context of the broader market reforms currently underway.

108 ESB, consultation paper, September 2020, p. 93.

BOX 5: DRAFT DETERMINATION ON THE SCOPE OF THE RULE CHANGE

The Commission considers the rule change should be narrowly focused on the specific issue motivating the rule change request. Structural rule arrangements for efficiently integrating high penetrations of intermittent generation are best managed through other regulatory change and market reform processes.

5.5.2 Dispatch level and dispatch instruction

The Commission's draft determination is to make a draft rule as proposed by the AER, but with some drafting changes to better reflect and clarify the policy intent.

Existing arrangements require a dispatch instruction for a semi-scheduled generator to nominate a maximum level of power to be supplied by the generating unit over the specified period, being a semi-dispatch interval.[109]

The AER's rule change request proposes amending these arrangements such that a dispatch instruction to a semi-scheduled generator will be a MW target for the end of each non semi-dispatch interval and both a target and a cap on generation during a semi-dispatch interval. During a non semi-dispatch interval the target will be based on the forecast resource availability for the end of the interval. The AER identifies this arrangement as effectively requiring semi-scheduled generators to generate in line with their resource availability except when a cap is applied during a semi-dispatch interval.

The Commission identifies the current definition of dispatch instruction and dispatch level as the 'loop hole' in the Rules that allows negative price curtailment by semi-scheduled generators. The AER's proposal aligns existing arrangements for scheduled generators which are required to meet MW dispatch targets at the end of a dispatch interval, except without requiring a specific linear ramp between dispatch targets to be followed.

In making its draft determination, the Commission considered whether the option of defining a MWh energy target would better advance the NEO than the AER's proposed rule change. The intent of the MWh option, consulted on by the AER, was to require semi-scheduled generators to comply with a target for the 5-minute interval at a rate that accommodates both their dispatch instruction and intermittency of resource. The MWh target option would provide for resource variability while also precluding significant generation curtailment in response to market prices.

The Commission notes the AER's view, expressed in its issues paper, that while a dispatch target expressed in terms of energy would effectively address the issue of negative price curtailment, drawbacks existed including complications in causer pays calculations, and the disadvantage of adopting an approach different to the MW target specified for scheduled generators.[110]

109 Existing arrangements for dispatch instruction does not specify any arrangements other than a maximum power level cap which applies during a semi-dispatch interval.

110 AER, issues paper, p.37.

The Commission considers that there are risks associated with implementing a MWh target option for semi-scheduled generators given the approach is not consistent with existing arrangements applying to semi-scheduled generators and scheduled generators. The Commission considers consistency in arrangements for semi-scheduled and semi-scheduled generators, to the extent possible given technology characteristics, to be desirable from a technology neutrality perspective. For this reason, the Commission does not consider implementing a MWh target to better advance the NEO that the AER's proposed approach.

BOX 6: DRAFT DETERMINATION ON THE DEFINITION OF DISPATCH LEVEL AND DISPATCH INSTRUCTION

The Commission's draft determination is to make a draft rule on the definition of dispatch level and dispatch instruction largely as proposed by the AER but with some drafting changes to better reflect and clarify the policy intent.

5.5.3 Requirement to follow dispatch instructions subject to natural resource availability

The Commission has made a draft rule on the requirement to follow dispatch instructions, subject to natural resource availability, as proposed by the AER.

Existing arrangements do not prescribe a requirement to follow a target, other than by observing a cap during semi-dispatch intervals, and do not specify limits on the reasons why a semi-scheduled generator may vary their generation level at any time. This provides scope for semi-scheduled generators to curtail generation in response to price. The AER's rule change request proposed to amend arrangements to specify natural resource availability as the sole reason why a semi-scheduled generator may deviate from its dispatch targets (other than the existing ability to deviate due to public safety or material risk of damaging equipment).[111]

The Commission has determined to make the rule as proposed by the AER on the basis that:

- current arrangements are not technology neutral
- regulatory intent is clearly articulated in the AER's proposal and provides a clear basis for the assessment of compliance
- the flexibility available to semi-scheduled generators to deviate from dispatch targets is sufficient, and
- alternative approaches considered by the AER do not better achieve the NEO than the AER's rule change proposal.

Current arrangements are not technology neutral - The Commission considers current arrangements are not technology neutral. The ability to withdraw generation for economic reasons without re-bidding confers a competitive advantage on semi-scheduled generators given their registration category. In this regard, the Commission notes that existing

111 Note clause 4.9.8(a1) of the NER provides scope for scheduled and semi-scheduled generators to deviate from their dispatch targets when operating in frequency response mode.

arrangements are discriminatory towards scheduled generators that are not provided with such flexibility. If scheduled plant exhibited similar behaviour to that exhibited by some semi-scheduled generators, they would be similarly individually profitable, but such behaviour would not be tolerated under the AER's compliance regime.

While the AER's proposed rule would have the effect of marginally increasing exposure to negative prices for semi-scheduled generators engaging in negative price curtailment without rebidding or waiting for an updated dispatch instruction, this revenue adjustment simply acts to remove a non technology neutral competitive advantage for these generators given their registration category and bring them in line with the commercial opportunities available for scheduled generators.

Regulatory intent is clearly articulated provides a clear basis for the assessment of compliance - The Commission's draft rule prescribes natural resource availability as a specific reason why a semi-scheduled generator is allowed to deviate from its dispatch targets. This is a clear requirement that can be easily interpreted by all parties with compliance easily verified by the AER. Generation curtailment in response to negative prices is clearly non-compliant under the draft rule. This clarifies requirements for semi-scheduled generators to re-bid and wait for an updated dispatch instruction prior to curtailing generation in response to negative prices.

The Commission understands that the AER's proposal effectively formalises the regulatory intent in the 2008 semi-scheduled rule. The 2008 rule was made with an underlying assumption that semi-scheduled generators would seek to generate at the level consistent with the availability of their natural resource. The 2008 rule requirements did not contemplate the current level of penetration of renewable generation in the NEM and the commercial incentives created by regular negative price periods incentivising semi-scheduled generators to engage in negative price curtailment.

Flexibility available to semi-scheduled generators to deviate from dispatch targets is sufficient - Tilt Renewables, in its submission to the AER's update paper, was concerned that limiting flexibility to deviate from dispatch targets to natural resource availability would not provide sufficient flexibility to account for technical reasons for deviating from dispatch targets. Tilt Renewables noted several technical reasons that may require a semi-scheduled generator to be off its target in its submission to the AER's update paper; for instance wind turbine active power recovery times following a turbine pause, and ramping down for a network outage.[112]

The Commission notes this concern but identifies existing arrangements in the Rules that provide additional flexibility to address Tilt's concerns. Flexibility for semi-scheduled generators to deviate from their dispatch targets is not solely limited to natural resource availability. Under the rules, a semi-scheduled generator is not taken to have failed to comply with a dispatch instruction if it is operating in frequency response mode.[113] A semi-

112 Tilt Renewables, submission to the AER update paper, p. 1.

113 Clause 4.9.8(a1) of the NER.

scheduled generator is also able to update its availability in its offer to reflect individual turbine outages, whether from overspeed protection or any other reason.

It should be noted that the general obligation to comply with dispatch instructions also has a technical and safety exception. Clause 4.9.8(a) of the NER does not require registered participants to follow dispatch instructions if it materially risks damaging equipment or is a hazard to public safety. That provision applies in cases where a plant is forced offline for a technical reason. The AER also has discretion to account for unavoidable technical issues in how it enforces compliance under the rules. Further information is available in the AER's compliance and enforcement policy.[114]

Alternative approaches considered by the AER do not better achieve the NEO - The AER's preferred approach, put forward in its issues paper, was for semi-scheduled generators to receive and comply with a MW dispatch instruction based on forecast resource availability for the end of the 5-minute interval, which would automatically incorporate the effect of a cap on output and a ramp rate.[115] This option also required semi scheduled generators to (linearly) progress to a megawatt target for the end of a dispatch interval. Increasing their output above target in the presence of an increased resource would not be allowed.

As noted by stakeholders and the AER, this approach materially impacted revenue for semi-scheduled generators. . Such a requirement was also found to increase the total amount of FCAS required to balance intermittency. This is because an under generation bias would be introduced on a fleet level and the effects of geographic 'overs and unders' averaging that acts to reduce variability on a fleet level would be lost.

By contrast, the approach proposed by the AER allows deviation above and below the target during non semi-dispatch intervals. This avoids the lost revenue and additional FCAS requirements associated with the target acting as a cap on generation levels at all times.

For these reasons the Commission considers the proposal put forward by the AER to better advance the NEO than the alternative option consulted on by the AER in its issues paper.

BOX 7: REQUIREMENT TO FOLLOW DISPATCH INSTRUCTIONS SUBJECT TO NATURAL RESOURCE AVAILABILITY

The Commission's draft determination is to make a draft rule requiring semi-scheduled generators to follow dispatch instructions subject to natural resource availability as proposed by the AER.

114 For more information on the AER's compliance and enforcement policy: https://www.aer.gov.au/system/files/AER%20Compliance%20%26%20Enforcement%20Policy%20-%20July%202019_1.pdf

115 AER issues paper, p. 34.

ABBREVIATIONS

AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
Commission	See AEMC
MCE	Ministerial Council on Energy
NEL	National Electricity Law
NEO	National electricity objective
NERL	National Energy Retail Law
NERO	National energy retail objective
NGL	National Gas Law
NGO	National gas objective
MW	Megawatt
MWh	Megawatt-hour
ESB	Energy Security Board
ASEFS	Australian Solar Energy Forecasting System
AWEFS	Australian Wind Energy Forecasting System
UIGF	Unconstrained Intermittent Generation Forecast
COAG EC	Council of Australian Governments - Energy Council

A LEGAL REQUIREMENTS UNDER THE NEL

This appendix sets out the relevant legal requirements under the NEL for the AEMC to make this draft rule determination.

A.1 Draft rule determination

In accordance with s. 99 of the NEL the Commission has made this draft rule determination in relation to the rule proposed by the AER.

The Commission's reasons for making this draft rule determination are set out in section 3.4 and Chapters 4 and 5 of this draft determination.

A copy of the draft rule is published with this draft rule determination. Its key features are described in section 3.1 of this draft determination.

A.2 Power to make the rule

The Commission is satisfied that the draft rule falls within the subject matter about which the Commission may make rules. The draft rule falls within s. 34 of the NEL as it relates to the operation of the national electricity market, the operation of the national electricity system for the purposes of safety, security and reliability of that system, the activities of persons participating in the national electricity market or involved in the operation of the national electricity system.

A.3 Commission's considerations

In assessing the rule change request the Commission considered:

- it's powers under the NEL to make the rule
- the rule change request
- submissions received in response to the AER's issues and update papers, and
- the Commission's analysis as to the ways in which the proposed rule will or is likely to, contribute to the NEO.

There is no relevant Ministerial Council on Energy (MCE) statement of policy principles for this rule change request.[116]

The Commission may only make a rule that has effect with respect to an adoptive jurisdiction if satisfied that the proposed rule is compatible with the proper performance of Australian Energy Market Operator's declared network functions.[117] The draft rule is compatible with AEMO's declared network functions because it does not amend or affect those.

116 Under s. 33 of the NEL the AEMC must have regard to any relevant MCE statement of policy principles in making a rule. The MCE is referenced in the AEMC's governing legislation and is a legally enduring body comprising the Federal, State and Territory Ministers responsible for energy. On 1 July 2011, the MCE was amalgamated with the Ministerial Council on Mineral and Petroleum Resources. The amalgamated council is now called the COAG Energy Council.

117 Section 91(8) of the NEL.

A.4 Civil penalties

The Commission cannot create new civil penalty provisions. However, it may recommend to the COAG Energy Council that new or existing provisions of the NER be classified as civil penalty provisions.

The draft rule does not amend any clauses that are currently classified as civil penalty provisions under the NEL or National Electricity (South Australia) Regulations. The Commission does not propose to recommend to the COAG Energy Council that any of the proposed amendments made by the draft rule be classified as civil penalty provisions.

A.5 Conduct provisions

The Commission cannot create new conduct provisions. However, it may recommend to the COAG Energy Council that new or existing provisions of the NER be classified as conduct provisions.

The draft rule does not amend any rules that are currently classified as conduct provisions under the NEL or National Electricity (South Australia) Regulations. The Commission does not propose to recommend to the COAG Energy Council that any of the proposed amendments made by the draft rule be classified as conduct provisions.