



Australian Energy Market Commission

DRAFT RULE DETERMINATION

NATIONAL ELECTRICITY AMENDMENT (OPERATIONAL SECURITY MECHANISM) RULE 2022

Hydro Tasmania
Delta Electricity

21 SEPTEMBER 2022

DETERMINATION

INQUIRIES

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AEMC, Operational security mechanism, Draft rule determination, 21 September 2022

ABOUT THE AEMC

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

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SUMMARY

- 1 The Australian Energy Market Commission (AEMC or Commission) has made a draft determination for a more preferable rule (draft rule) that would establish an 'Operational security mechanism' (OSM) to value, procure and schedule security services in the National Electricity Market (NEM). The draft rule would improve the efficiency of how the system is managed currently. It would also better facilitate the transition to service-led management of the power system and encourage technological innovation.
- 2 This is in response to two rule change requests from Hydro Tasmania and Delta Electricity, which each propose operational procurement mechanisms to value, procure and schedule essential system services (ESS) to help keep the system secure. This draft determination also progresses the Energy Security Board's (ESB's) recommendations as part of the ESS workstream to consider introducing such a mechanism.
- 3 We are seeking feedback on our draft determination and rule by **17 November 2022**. There are a variety of ways to provide feedback from participating in our public forum, deep dives and bilateral meetings to providing formal submissions.

The draft rule would help facilitate the transition

- 4 The NEM is undergoing a significant transformation, with a changing generation mix, driven by factors such as the decarbonisation of the sector, changing technology costs, and consumer preferences. This changing generating mix is pressing the limits of current system security and operational experience.
- 5 The NEM's regulatory and market frameworks were originally designed on a power system consisting primarily of synchronous generation (coal-fired, gas-fired and hydro-powered generators) that are electromagnetically coupled to the power system. Such generators inherently provide ESS, such as grid formation and reactive power support, as a by-product of energy generation when they are committed into service in operational timeframes.
- 6 In contrast, non-synchronous plant (which typically include solar, wind and batteries) are connected to the power system through power electronics. While these inverter-based resources can be configured to provide some services, they do not automatically do so as a by-product of their generation as a matter of course.
- 7 Because ESS were historically provided in abundance by synchronous generators, there was little need in the original market design to explicitly value these services so that market participants had an incentive to provide them. While efforts have been made to unbundle some services (for example, system strength), this is not the case for all services. Therefore, the changing generation mix means fewer of these services are being provided and there are few, if any, investment and operational signals to encourage new providers to provide these services.
- 8 A symptom of this means that the Australian Energy Market Operator (AEMO) is increasingly having to direct generators to be online that would otherwise not be in order to ensure the system is secure. Directions are a tool primarily intended to be used as a last resort

mechanism. Reliance on this and other of AEMO's operational tools places increased risk on the security of the system and are opaque.

9 The Commission considers that the current approach to managing system security in the NEM is not an enduring solution. This sentiment was unanimously supported by stakeholders throughout this process.

Implementing a new tool to manage security is in the long-term interests of consumers

10 The long-term vision for the NEM is an efficient, secure and reliable power system. As set out in the ESB's post-2025 advice,¹ the market bodies - AEMC, AEMO and the Australian Energy Regulator (AER) - consider that the best way to achieve this, where possible, is to unbundle ESS from one another so that they can be individually and explicitly valued, priced, and scheduled through market-based mechanisms, acknowledging that such mechanisms may require a staged introduction. In turn, this would provide investment and scarcity signals for participants to deliver these services at least cost to consumers.

11 However, there are practical considerations that must be considered. With respect to security services, current engineering knowledge does not allow a direct translation from a number of power system requirements to specific service definitions that meet those requirements. Instead, AEMO is using system configurations that represent a secure technical operating envelope to operate the power system. Markets require services to be individually specified, and so, engineering knowledge needs to develop further to fully unbundle security services.

12 The directions paper set out two options for how essential system services can be procured:

- A market ancillary services approach (MAS) – which would introduce new services to be scheduled through the pre-dispatch engine to allow it to produce dispatch schedules that result in secure dispatch, and
- Non-market ancillary services approach (NMA) – which would introduce new services to be procured and scheduled in an optimisation approach outside of the spot market to ensure secure dispatch in a more efficient manner.

13 While we expressed a preference for the NMA, stakeholders in response generally either expressed a preference for a MAS or preferred more limited changes to be made, such as improving the compensation and transparency arrangements for the existing directions process.

14 The Commission acknowledges this feedback. However, given the practical limitations set out above, a MAS option is not feasible at this time. The Commission considers implementing a mechanism that is a more efficient way of managing system security today and helps set us up so we are better prepared for the future is a more attractive option than continuing to rely on the directions framework (even with enhancements) and is in the long-term interests of consumers.

15 Therefore, the Commission has designed the OSM - as set out in this draft determination and accompanying draft rule - as an operational tool to enable the procurement and scheduling of

1 ESB, Post-2025 Market Design: Final Advice to Ministers, Part A, 2021.

security services to support the secure operation of the NEM and maximise value for consumers. Putting an OSM in place would ensure that system security can be managed more efficiently than current tools like directions and constraints allow. The current arrangements are unable to operationally schedule some resources that are needed for security in a way that comprehensively considers costs and benefits for consumers. Putting an operational tool in place would improve efficiency and ensure that directions return to being used as a last resort mechanism, as per their original intent.

16 It would also prepare the system for the future. The energy transition underway is inevitable and so the limitations of the current arrangements need to be addressed. Flexible and fit-for-purpose arrangements for system security need to be developed and implemented in time to help the system adapt, and to address security challenges as soon as they emerge.

17 The OSM has also evolved since the NEM design set out in the directions paper. Taking on board feedback from stakeholders, advice from AEMO and the AER, and our own analysis, we have sought to design a mechanism that incorporates key benefits of the MAS approach, while recognising the practical current limitations, for example:

- scheduling would occur as close to real-time as practicable, minimising any inefficiencies due to making decisions ahead of time;
- security services would be scheduled alongside the real-time spot market to utilise current resources efficiently, with outcomes from the mechanism co-optimised in real-time with the energy market;
- transparency would be a core design principle of the mechanism, providing technology-neutral investment, retirement and operational signals to new and current market participants for providing security services; and
- flexibility and adaptability would be built into the mechanism as AEMO learn more about the operation of the system, and as services are unbundled the mechanism should move towards procuring services closer to real-time.

18 The OSM would work alongside other existing and proposed reforms to contribute to the long-term vision for the NEM. It would commence on **1 October 2025**.

The Commission has been informed by stakeholder feedback

19 Stakeholders throughout this process have expressed significant support for, and agreement with, our long-term vision of moving towards unbundled markets for security services outlined above. However, Stakeholders have mixed views on what to do in the interim. As outlined above, the Commission considers that making a change is in the long-term interest of consumers.

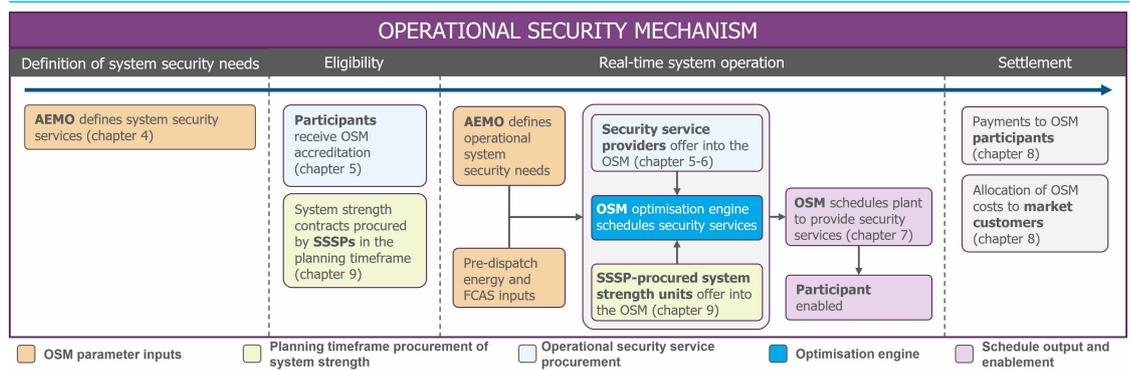
20 In particular, the Commission is aware that many generator stakeholders throughout this process have expressed discomfort with any mechanism that makes decisions on what services are to be provided ahead of real-time, given they consider it undermines one of the fundamental premises of the NEM. The Commission recognises this, but considers the proposed change is better than the current arrangements and is consistent with current engineering understanding.

- 21 In addition, the Commission has been mindful of key stakeholder concerns and feedback throughout this process in designing this mechanism. For example, transparency, appropriate governance and flexibility have been core tenets for the design of the mechanism.
- 22 Overall, the Commission agrees with stakeholders that it is important that we move towards this longer-term vision, and the draft rule helps us do this:
1. In the **near-term**, an OSM would be a more efficient tool than directions for managing the security of the system. Introducing an OSM would mean that a tool is available to help manage the system through periods of high renewable penetration and low levels of synchronous generation, without resorting to interventions as a primary tool.
 2. In the **medium-term**, an OSM would provide a way of explicitly valuing security services and improving market outcomes while also encouraging efficient investment and operational decisions in the supply of energy and security. This is a critical reform that needs to be designed now to manage security services and prevent situations from arising in other jurisdictions as we have seen in South Australia, where frequent interventions have been needed to manage security.
 3. In the **long-term**, an OSM would facilitate the transition to unbundled services. It would help transition the system from asset-based management to service-led management, by encouraging new investment and innovation in security services as well as improving and evolving how we understand and achieve a secure power system.

The draft rule would introduce a mechanism to value, procure and schedule security services

- 23 The proposed OSM would co-optimize the procurement of security services, energy and frequency control ancillary services (FCAS):
- AEMO would be responsible for defining the system security needs, and accrediting market participants to supply system services.
 - Accredited market participants would bid to provide system services into the OSM close to real-time.
 - OSM schedules would be published to enable participants to position their units accordingly.
 - Providers of services through contracted arrangements with networks, such as system strength, could be incorporated into the OSM.
- 24 The design of the OSM as set out in this draft rule has been informed and developed closely with AEMO - it has been designed in such a way that reflects current engineering realities, as well as being mindful of how best to minimise costs, but still set us up for the long-term vision.

Figure 1: Operational security mechanism



The OSM would procure and schedule security services to maximise the value of trade

25 The OSM would procure and schedule “security services”, which are those ESS that are not already procured through a market. This could include both:

1. system configurations that provide security services and which are being used to manage the power system today; and
2. unbundled, system services as they become known e.g. inertia. It would not include frequency, which is already procured through co-optimised markets.

26 Given the OSM is an operational tool, it would also be used to co-ordinate and operationalise any contracts that network service providers (NSPs) have entered into in the planning timeframes with resources to provide system services, such as those system strength contracts procured under the new system strength framework or potentially Network Support and Control Ancillary services (NSCAS) contracts in the future.

27 The OSM’s objective function would seek to maximise the value of trade to coordinate the dispatch of security services alongside the existing markets of energy and FCAS. Maximising the value of trade would bring the greatest benefits to consumers, ensuring security services are procured at lowest cost and unlocking broader benefits to consumers where addressing security issues can reduce overall costs of dispatch.

The OSM would use real-time procurement and scheduling rather than long-term contracts

28 Participants would have the option to offer into the OSM or not. If they choose to do so, participants would have to submit multi-part bids in real-time to provide security services, with pricing comprising both a variable component in \$/MWh and fixed enablement component.

29 These offers into the OSM would be close to real-time, and could be iterated over time as conditions change and more information is known. Such an approach was preferred compared to an option that locks in prices upfront in long-term contracts given it would provide a clearer real-time price signal for participants to provide system services, as well as

promote efficiency by allowing the prices and offers to best reflect current market conditions.

Timing and scheduling arrangements are designed to achieve efficiency and practicality

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Figure 2 sets out the OSM timing and scheduling arrangements.

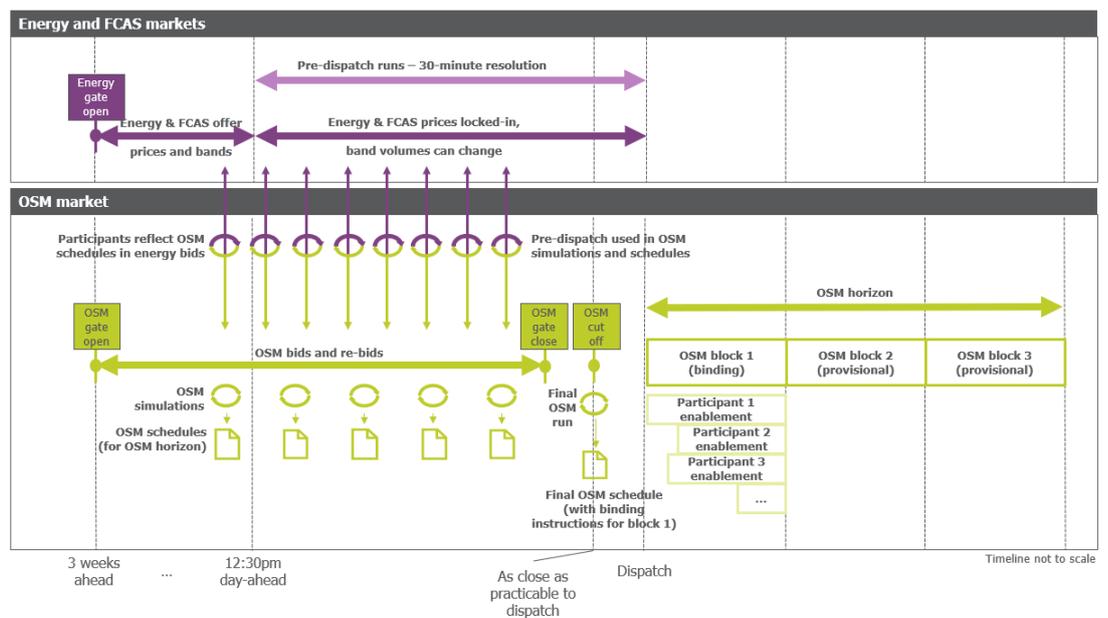
31

AEMO would determine precise timings for the scheduler, which would run alongside and be co-optimised with the energy market.

32

Given current engineering knowledge some form of 'aheadness' is inevitable; however, we have sought to design this in such a way that promotes iteration, solves as close to real-time as possible and so maximises efficiency.

Figure 2: OSM scheduler - key components and interaction with pre-dispatch/dispatch



OSM revenue arrangements have been designed to not distort spot market outcomes

33

Participants have raised concerns about the current compensation process under directions. The OSM is designed to be an improvement on the directions process, the OSM has been deliberately designed to address those concerns by being more transparent and reflective of costs.

34

The OSM revenue arrangements have been designed to not distort spot market outcomes. Participants would be able to choose whether to participate in the OSM; and if so, would receive revenue in accordance with their OSM offer prices by providing security services that are valuable to the power system. For participants that provide energy alongside security services, OSM revenue would only apply to the energy production associated with the unit's provision of security services (for example, up to a plant's minimum generation, which would

be agreed through accreditation). Any energy generated above this would be paid at the energy spot market rate.

35 OSM costs would be allocated to market customers, taking into account regional benefits and the customer's proportion of load. This is because customers would ultimately benefit from the efficient price outcomes.

The potential for market power would be reviewed by the AER

36 The Commission considers that there is potential for the exercise of market power to increase OSM prices, given the initial limited number of system configurations, particularly at the start of the mechanism before new entrants have been incentivised in. The exercise of market power can undermine the efficiency of economic markets as participants are able to influence prices through the supply or demand of a good or service.

37 Given this, we have put in place specific arrangements to mitigate these concerns. It involves:

- allocating responsibilities to the AER who would use a two-step process to:
 - a. identify whether there is the potential for the exercise of market power in specific regions of the NEM; and
 - b. if potential market power is identified, recommend the best approach to managing it through price monitoring or price caps;
- having a flexible, rather than prescriptive, approach to ensure changing market conditions can be accounted for.

38 The AER would have flexibility in recommending price cap arrangements – for example, caps could be set differently over different regions or bid components. This would give the AER the ability to determine the best approach to a price cap depending on the nature and extent of potential market power identified.

Planning timeframe contracts could be operationalised by the OSM

39 Planning timeframe contracts, such as system strength contracts and NSCAS, would be able to be scheduled through the OSM. AEMO would also be able to procure additional security services, including system strength, in the operational timeframe in order to maximise the value of trade to consumers. The OSM would not prioritise contracts procured in planning timeframes over other resources when choosing which resources to schedule to meet security needs. This would allow any contracts that had been entered in the planning timeframe, and which were being scheduled by the OSM, to be used most effectively, and result in lower cost outcomes for consumers.

40 Suppliers of system strength under the new system strength framework would be required to supply their system strength via the OSM. These suppliers would have the incentive of OSM prices as well as the certainty of a long-term contract and potentially further financial incentives, for example, availability payments. These arrangements would maintain incentives for participants to enter contracts with System strength service providers, ensuring that the system strength framework can deliver its outcomes.

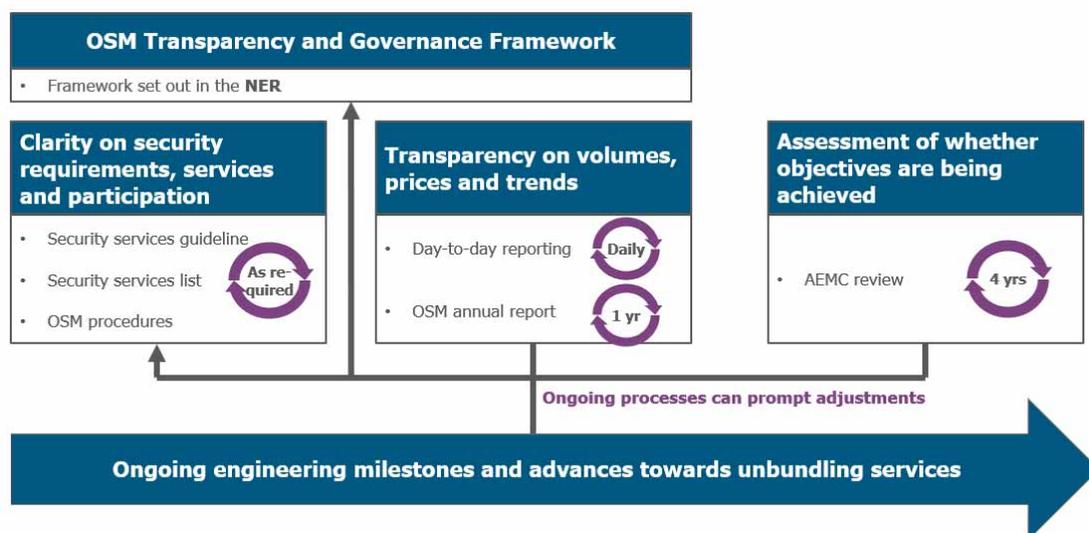
Robust transparency and governance arrangements are included to facilitate the transition

41 Figure 3 sets out the transparency and governance arrangements for the OSM. The arrangements would help facilitate the transition in the longer term to unbundled services by:

- providing clear signals to the market on what security services are needed, where, and their value. This would encourage investment and innovation by potential or current market participants, as well as assist market participants to make efficient operational decisions including retirement decisions, and
- providing information and helping improve understanding of the way we deliver system security to evolve as knowledge and technology develop.

42 Stakeholders throughout have highlighted the importance of having significant transparency and appropriate checks and balances on whatever mechanism is designed. We have kept these principles core to the design of the OSM.

Figure 3: Transparency and governance arrangements

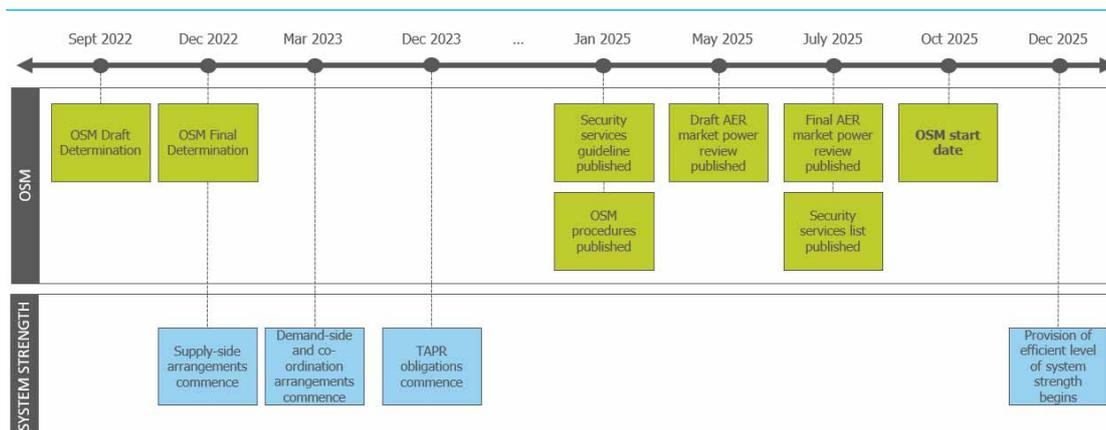


The OSM would start on 1 October 2025

43 Figure 4 sets out the key dates for the OSM. The OSM would 'go live' on 1 October 2025. However, key processes for participants to engage with would occur in advance of the OSM to help participants prepare and get ready.

44 1 October 2025 is the closest feasible implementation date, given the need for AEMO to develop, test and implement the details of the OSM engine and scheduling process, and for participants to implement changes to systems. It also balances the urgency of reform with what AEMO and the Reform Delivery Committee consider to be efficient sequencing given other post-2025 initiatives.

Figure 4: OSM timing, including interactions with the implementation of the System strength rule change



The OSM would add to the suite of operational tools to manage security

45 The draft rule does not amend the directions process. Rather, the introduction of the OSM would reduce the reliance on the directions framework, and so allow it to be used as it was intended to - as a backstop arrangement to ensure the security and integrity of the energy market. Many of the issues that stakeholders have raised with this framework become less material if it is used less often.

We have also considered our draft rule against the seven assessment criteria most relevant to this rule change request

46 The Commission considers that the draft rule would help promote the National Electricity Objective (NEO) by better achieving these criteria than the status quo arrangements. Given the current security challenges of the transitioning system, simply maintaining current arrangements for managing system security does not promote efficient operation of, and investment in, the electricity system, and therefore would not meet the NEO.

47 The Commission has made a more preferable draft rule because it better contributes to the achievement of the NEO, as assessed through the assessment principles than the two solutions proposed by the proponents. While the two rule change requests each propose an operational mechanism to value, procure, and schedule ESS to help keep the system secure, the Commission has identified material limitations in both proposed solutions:

- Hydro Tasmania’s solution is not technically feasible; and
- Delta Electricity’s solution, while technically feasible, does not meet our principles of technological neutrality, predictability, flexibility and transparency.

48 This has been informed by our assessment of the draft rule against our assessment criteria, which shows that the benefits outlined below outweigh the expected costs:

- **System security would be promoted through optimised scheduling of security services** - rather than the continued use of high numbers of directions, participants would have clear, transparent signals as to what system services are required at any point in time and would be able to signal that they could provide this service and receive revenue for this. In turn, this would provide more confidence that the right services would be online.
- **The OSM would strike an appropriate balance between risks to AEMO and participants** - the OSM would promote more efficient management of security services by providing a signal of their value to the participants and providing a tool to coordinate these services which takes into account their costs. This would help the market allocate resources as efficiently as possible while ensuring the security of the network. The mechanism seeks to allocate incentives and risks to those best placed to manage them.
- **The OSM would be a timely solution to a critical issue** - the OSM would mean there is less likelihood that other areas of the NEM reach a similar situation to South Australia, where directions are relied on as a primary means to coordinate security needs. In addition, the implementation of the OSM would help foster the transition towards an unbundled future, moving the system from an asset-based to a service-led system.
- **Transparency and predictability over the security needs of the system would increase** - the Commission has designed the proposed OSM to be transparent, predictable and simple. Stakeholders have continually provided feedback throughout this process that these components are important to any mechanism. Information would be available to the market on technical descriptions of security services required, quantities procured, prices and units scheduled, with updates as technical understanding improves. AEMO and the AEMC would report on and review the mechanism.
- **Those best able to meet security needs would be encouraged to provide security services** - the OSM has been designed to be technology neutral, which the Commission considers particularly important as understanding develops on how new technologies can support system security.
- **The OSM would be flexible to accommodate evolving solutions** - it would help facilitate the transition underway as it would be flexible and consistent with broader reform. Given the challenges of the transition that the market is facing, the proposed OSM framework would provide AEMO with the flexibility to incorporate new services into the OSM as technical knowledge improves and accredit new technologies to enhance competition in the market.
- **Implementation costs and complexity are minimised and align with meeting the system's needs** - the Commission has also designed the OSM to be as simple, which would keep implementation costs and complexity to a minimum. In the design of the OSM, the Commission has aimed to minimise the administrative burden for both AEMO and participants while still providing transparency. AEMO has estimated that its implementation costs at \$11.4million ± 40%. The Commission designed the OSM in such a way that the bulk of the implementation costs would be on AEMO, and that the only costs for participants would be for those wishing to participate in the OSM. Service providers who choose to participate in the mechanism may incur costs of updating

systems and processes in order to participate in the OSM, as well as participating in relevant consultants. However, the Commission expects these to be relatively modest, with the decision made to participate based on an individual assessment of the costs and benefits of doing so.

HOW TO MAKE A SUBMISSION TO THIS PROCESS

We encourage you to make a submission

Stakeholders can help shape the solution by participating in the rule change process. Engaging with stakeholders helps us understand the potential impacts of our decisions and, in so doing, contributes to well-informed, high-quality rule changes.

How to make a written submission

Due date: Written submissions responding to this draft determination and rule must be lodged with Commission by **17 November 2022**.

How to make a submission: Go to the Commission’s website, www.aemc.gov.au, find the “lodge a submission” function under the “Contact Us” tab, and select the project reference code **ERC0290**.²

Tips for making submissions on rule change requests are available on our website.³

Publication: The Commission publishes submissions on its website. However, we will not publish parts of a submission that we agree are confidential, or that we consider inappropriate (for example offensive or defamatory content, or content that is likely to infringe intellectual property rights).⁴

Next steps and opportunities for engagement

There are other opportunities for you to engage with us, such as one-on-one discussions or industry briefing sessions.

The Commission recognises that this is a substantive change to the market design and is therefore keen to undertake substantial stakeholder consultation in order to test and gain input. This will occur in a number of formats. Stakeholders are invited to register for each event via the Commission’s website.

Table 1: Key milestones and opportunities for engagement

ITEM	DESCRIPTION	DATE
Public forum on draft determination and rule	The public forum will be an information session, providing an overview of the draft determination and proposed mechanism to assist with understanding and engagement.	6 October 2022
Deep dive #1 on draft determination and rule	Deep dive #1 will focus on the particular issue of ‘market power’ noting the vital roles of other market bodies. The Commission is keen to work through the	20 October 2022

² If you are not able to lodge a submission online, please contact us and we will provide instructions for alternative methods to lodge the submission.

³ See: <https://www.aemc.gov.au/our-work/changing-energy-rules-unique-process/making-rule-change-request/our-work-3>.

⁴ Further information is available here: <https://www.aemc.gov.au/contact-us/lodge-submission>.

ITEM	DESCRIPTION	DATE
	proposed arrangements with industry stakeholders who have particular expertise and views on market power, given that this element of the mechanism is critical to its success.	
Deep dive #2 on draft determination and rule	Deep dive #2 will be used to work through technical elements of the draft rule, for example, arrangements for accreditation, scheduling and revenue.	3 November 2022
Submissions close for draft determination and rule	Written submissions responding to this draft determination and rule must be lodged with Commission by this date as per the 'How to make a written submission' instructions above.	17 November 2022
Publication of final determination (and rule, if applicable)	The Commission is due to publish a final determination (and rule, if applicable) by this date.	29 December 2022

In addition, we are happy to meet bilaterally with any interested party, or answer any questions or feedback at any stage.

You can also request the Commission to hold a public hearing in relation to this draft rule determination.⁵

Due date: Requests for a hearing must be lodged with the Commission by 29 September 2022.

How to request a hearing: Go to the Commission's website, www.aemc.gov.au, find the "lodge a submission" function under the "Contact Us" tab, and select the project reference code **ERC0290**. Specify in the comment field that you are requesting a hearing rather than making a submission.⁶

For more information, you can contact us

Please contact the project leader with questions or feedback at any stage.

Project leader: Clare Stark

Email: clare.stark@aemc.gov.au

Telephone: (02) 8296 7819

⁵ Refer to s.101. of the NEL.

⁶ If you are not able to lodge a request online, please contact us and we will provide instructions for alternative methods to lodge the request.

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1 THE COMMISSION HAS MADE A DRAFT DETERMINATION TO VALUE, PROCURE AND SCHEDULE SECURITY SERVICES

The Australian Energy Market Commission (AEMC or Commission) has made a draft rule that would establish an 'Operational security mechanism' (OSM) to value, procure and schedule security services. The draft rule would provide a more efficient way of managing system security today and facilitate the transition to a service-led management of the power system and encourage technological innovation.

BOX 1: DEFINING KEY TERMS USED IN THIS DETERMINATION

Essential system services (ESS): These are services that help keep the technical parameters of the electricity system within acceptable limits so that it can securely deliver electricity to consumers. These include a suite of services such as inertia, system strength and frequency. This term is used in this determination to describe the broad range of essential system services that could be present in the system, recognising that some of these services are provided through existing arrangements.

Security services: These are defined under clause 3.7G.3 of the draft rule. These represent a subset of services within essential system services that focuses on the security of the system. A security service can be either a) a system configuration service i.e. a set number of units that need to be online to maintain security or b) a separate security service e.g. inertia. The draft rule would introduce a mechanism to value and schedule these security services, focusing on the operational elements of security. This term is used throughout this determination to reflect those services that could be procured and scheduled under the OSM. These are distinct from broader ESS, which may include services procured through existing mechanisms.

This section provides context on, and gives a brief overview of, the draft rule including:

- Section 1.1 - the Commission has considered two proposals to more efficiently manage the operational security of the power system
- Section 1.2 - the Commission has made a draft determination to introduce a mechanism to more efficiently manage operational security of the power system
- Section 1.3 - the Commission's draft determination has taken into account stakeholder feedback
- Section 1.4 - the draft determination and rule would help facilitate the transition and make current management of security more efficient

1.1 The Commission has considered two proposals to more efficiently manage the operational security of the power system

The Commission received two rule change requests, both of which propose solutions to better value ESS to deliver a secure system more efficiently than current arrangements.

There are a broad range of tools and frameworks in place in the existing National Electricity Rules (NER) to manage system security. These include:

- tools that act predominantly on an **investment timescale**, such as network service provider (NSP) planning obligations to provide a safe, secure network in accordance with requirements set out in the NER and in local jurisdictional frameworks, the analysis and information provided by the Australian Energy Market Operator (AEMO) in its planning reports, such as the Integrated System Plan (ISP) and inertia shortfall reports and the recently introduced system strength planning standard under the *Efficient management of system strength on the power system* rule (System strength rule),⁷ as well as the technical requirements that plant that connect to the network needs to meet
- tools that act predominantly in the **operational timescale**, such as the frequency control markets, the use of constraints in the National Electricity Market dispatch engine (NEMDE) to result in a secure dispatch of the system, market notices issued that provide information on system services that are required, and then, as a last resort interventions such as directions, instructions and the use of the reliability and emergency reserve trader (RERT).

These two rule changes requests - one by Hydro Tasmania⁸ and one by Delta Electricity⁹ - propose two different approaches to scheduling and provision of ESS:

- Hydro Tasmania proposes an approach to address the shortage of “inertia and related services” in the NEM by explicitly valuing the provision of services in **real-time**, in much the same way that energy is valued.¹⁰ The pre-dispatch and dispatch engines, which currently provide forecast and actual dispatch targets and prices for energy and market ancillary services, would be altered so that they also determine forecast and actual dispatch targets and prices for other essential system services.¹¹
- Delta Electricity proposes to introduce an **ex-ante, day-ahead** “capacity commitment mechanism” and payment system so that generators or demand response providers remain available to offer operational reserve and any other system security or reliability services that AEMO may require to meet its security and reliability objectives.¹² AEMO would determine system service requirements and, through a market operating ahead of real-time, procure these services from market participants.¹³

⁷ AEMC, *Efficient management of system strength on the power system*, Rule determination, 21 October 2021.

⁸ Hydro Tasmania, *Synchronous services markets*, Rule change request, 14 November 2019.

⁹ Delta Electricity, *Capacity commitment mechanism for operational reserve and other system services*, Rule change request, 4 June 2020.

¹⁰ Hydro Tasmania, *Synchronous services markets*, Rule change request, 14 November 2019, p. 2.

¹¹ Hydro Tasmania, *Synchronous services markets*, Rule change request, 14 November 2019, p. 2.

¹² Delta Electricity, *Capacity commitment mechanism for operational reserve and other system services*, Rule change request, 4 June 2020.

¹³ Delta Electricity, *Capacity commitment mechanism for operational reserve and other system services*, Rule change request, 4

Details of the two proposed rule changes and Hydro Tasmania's subsequent submission that provided further detail on its proposed model are discussed in more detail in appendix A.

This draft determination also progresses one of the Energy Security Board's (ESB) recommendations from the essential system services workstream from its post 2025 market design advice, as discussed in appendix B.¹⁴

1.2 The Commission has made a draft determination to introduce a mechanism to more efficiently manage operational security of the power system

The Commission has made a draft rule that would introduce the OSM, a mechanism to value and schedule "security services", as described in Box 1. This would:

- help meet the security needs of the system today in a more efficient way
- facilitate the transition from an asset-based to service-led power system
- encourage technological innovation
- work in concert with other existing and proposed mechanisms for providing system services.

Such a mechanism is needed as the National Electricity Market's (NEM) generation mix is undergoing a significant transformation, driven by factors such as the decarbonisation of the sector, changing technology costs, and consumer preferences. This changing generating mix is pressing the limits of current system security and operational experience.

Both large- and small-scale renewable generation and batteries are entering the system rapidly and in high volume. At the same time, the thermal generation fleet has started to retire from the system faster than anticipated, as outlined in the 2022 Integrated System Plan,¹⁵ or operate less frequently due to the influx of resources with lower short run marginal costs. The new resources connecting to the system do not automatically provide essential system services as a by product of their generation, unlike the older synchronous generators such as coal-, gas- and hydro-powered resources.

Consequently, under the current market design, which does not explicitly value all ESS, the changing generation mix is providing fewer of these services and there are few, if any, investment and operational signals to encourage new plant to provide these services. A symptom of this is that increasingly AEMO is having to direct generators to be online that would otherwise not be, in order to ensure the system is secure.

The Commission considers that the current approach to managing system security in the NEM is not an enduring solution. To date, the lack of markets or other means of valuing security services means the practical outcome is that AEMO is significantly intervening in the

June 2020, p. 15.

14 ESB, Post-2025 Market Design: Final Advice to Ministers, Part A, 2021, <https://www.datocms-assets.com/32572/1629944958-post-2025-market-design-final-advice-to-energy-ministers-part-a.pdf>.

15 Australian Energy Market Operator, Integrated System Plan, 2022, <https://aemo.com.au/-/media/files/major-publications/isp/2022/2022-documents/2022-integrated-system-plan-isp.pdf?la=en>.

market to procure these essential capabilities by directing participants to be online. While these interventions to date have been largely in South Australia, and the likelihood has reduced following investment in synchronous condensers, the problem is not removed. Moreover, this situation may be extended to other jurisdictions.

This process and other operational tools available to AEMO:

- increase the risks of the system related with the system remaining secure, and
- are opaque and so do not send the appropriate investment, retirement and operational signals to participants.

As set out in the ESB's post-2025 advice, the market bodies - AEMC, AEMO and the Australian Energy Regulator (AER) - consider that the best way to achieve an efficient, secure and reliable power system, where possible, is to unbundle ESS from one another so that they can be individually and explicitly valued, priced and scheduled. However, the reality is that given current levels of engineering knowledge it is difficult for AEMO to individually specify security services, which would be a prerequisite for setting up individual co-optimised markets. Current engineering knowledge does not allow a direct translation from a number of power system requirements to specific service definitions that meet those requirements. Instead, AEMO is currently using system configurations that represent a secure technical operating envelope to operate the power system - refer to Box 2.

The Commission considers we need to move towards our long-term vision and therefore, introducing a new tool to manage security would be in the long-term interest of consumers, as explained in chapter 2.

Therefore, this draft determination is intended to improve arrangements by introducing a mechanism to more efficiently manage operational security of the power system. This will put in place important foundational aspects for a later eventual move to unbundled services being procured through individual markets. The mechanism is set up to be flexible - allowing the continued use of system configurations transitionally while also allowing for individual services to be procured as knowledge develops to fully unbundle and individually value security services where possible.

BOX 2: CASE STUDY ON SOUTH AUSTRALIA

Until recently, in South Australia a minimum of four synchronous generators were required to be online at all times (i.e. a system configuration) to support system security. This requirement has recently changed with four synchronous condensers installed, with AEMO assessing the system can securely operate down to two synchronous generators.

As part of the system configuration with the synchronous condensers, the system security aspects being delivered by the synchronous generators may include: grid formation and grid reference capabilities; adequate voltage control, ensuring adequate operation of protection systems, to maintain rate of change of frequency below 3Hz/s for non-credible loss of Heywood; secure operating envelope for voltage and transient stability; ramping

management; and other unknown unknowns.

Many system parameters and many interactions between parameters make the exact requirements difficult to independently specify.

AEMO has committed to undertaking further studies to better understand the operational envelope in South Australia, and is now exploring reducing the minimum synchronous generator requirement to a single unit. The NSPs are providing support that is required in defining the operational envelope, including on transfer limit advice and protection adequacy.

Initial desktop studies for grid formation and grid reference show that the South Australian system could be theoretically capable of 'holding together' without synchronous generators. Further desktop studies and real-time tests would be required as this is world-first operation.

Source: Refer to <https://aemo.com.au/energy-systems/electricity/national-electricity-market-nem/system-operations/congestion-information-resource/related-resources/operation-of-davenport-and-robertstown-synchronous-condensers>.

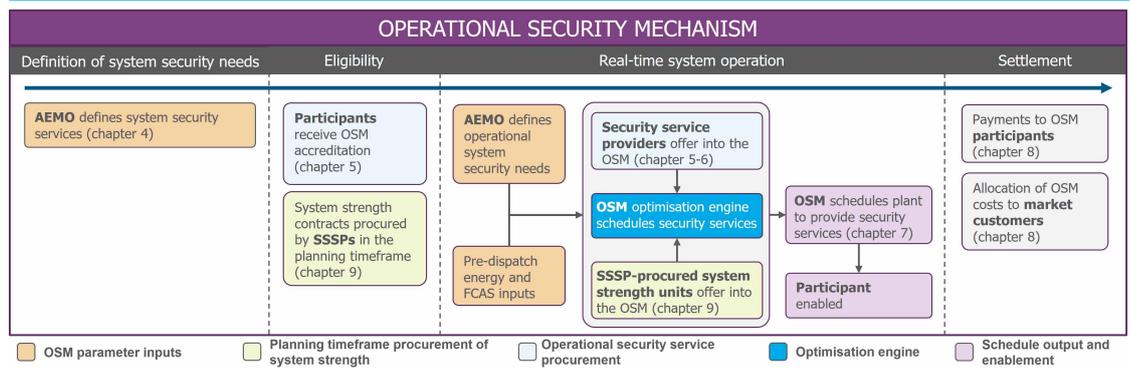
The proposed design of the OSM is shown in Figure 1.1:

- required security services would be defined by AEMO;
- participants which could provide these services would bid prices for these services into the OSM;
- the OSM would schedule plant close to real-time to achieve operational security, taking into account the expected outcomes of the energy market;
- participants would be paid through an OSM settlement process; and
- costs would be allocated to market customers.

The OSM would commence on 1 October 2025, with AEMO developing eligibility information before this date so that participants have time to understand their capacity to provide services through the OSM and go through accreditation.

The OSM could also be used to schedule any planning timeframe contracts entered into between participants and NSPs relating to security services. So, for example, the contracts entered into under the system strength framework in planning timeframes could be scheduled through the OSM, as well as potentially Network Support and Control Ancillary Services (NSCAS) contracts where it is beneficial to do so.

Figure 1.1: Schematic of the Operational security mechanism



Implementation costs are estimated to mostly fall to AEMO, at an estimated cost of around **\$11.4 million ± 40%**, rather than participants. Service providers who choose to participate in the mechanism may incur costs of updating systems and processes in order to participate in the OSM, as well as participating in relevant consultations. However, the Commission expects these to be relatively modest, with the decision made to participate based on an individual assessment of the costs and benefits of doing so.

1.3 The Commission’s draft determination has taken into account stakeholder feedback

The rule changes were initiated by the AEMC in a consultation paper in July 2020¹⁶, as part of a set of seven “system services” rule changes, all of which relate to the provision of services that are necessary for the secure operation of the power system. 43 submissions were received in response to the consultation paper and were diverse. The majority were committed to an approach where system security services were explicitly unbundled. Most were also generally supportive of the Commission’s approach to analysing the rule changes. However, there were mixed views on the proposals themselves. Many stakeholders emphasised the need for technology neutrality, including accommodating future technologies, and noted the complexity of a mechanism to value synchronous services.

In September 2021, the Commission considered both proposals further in a directions paper informed by this initial consultation.¹⁷ 22 submissions were received to this paper. Stakeholders expressed a variety of viewpoints on what should be done in the interim period while we transition to the long-term vision, and, indeed, whether there was a problem in the interim.

¹⁶ AEMC, System services rule changes, Consultation paper, 2 July 2020.

¹⁷ AEMC, Capacity commitment mechanism and synchronous services markets, Directions paper, 9 September 2021.

Despite the varying viewpoints on the need and approach, the Commission received a near-unanimous agreement on the long-term vision for unbundling system services. Stakeholders agreed that procuring system services individually, through market-based mechanisms where possible, would deliver an efficient system in the best interest of consumers. The Commission - along with the Australian Energy Regulator (AER) and AEMO - all agree with this long-term vision and as set out above, this is what the Commission is moving towards through the design of this mechanism.

Stakeholder submissions to these papers can be found on our website, and are responded to throughout this determination, as well as previously in the directions paper.

In addition, the Commission has held eight technical working group (TWG) meetings in developing this draft rule.¹⁸ The TWG comprises industry stakeholders across generators, retailers, networks, consumer groups, market bodies and government organisations. The Commission thanks these participants for their constructive input and time in the course of the process.

The Commission is aware that some generator stakeholders consider that if we can't move towards that long-term vision today, then we should do nothing or make more limited changes, such as improving the compensation and transparency arrangements for the directions process. While the Commission acknowledges this view, implementing a mechanism that has a more efficient way of managing system security today, as well as helping set us up so we are better prepared for the future, is a more attractive option than doing nothing and is in the long-term interests of consumers.

The Commission is also aware that many generator stakeholders throughout this process have expressed discomfort with any mechanism that makes decisions on what services are to be provided ahead of real-time, given they consider it undermines one of the fundamental premises of the NEM. The Commission recognises this, however, given the current engineering understanding, this is necessary. In addition, the mechanism is designed in such a way that:

- any inefficiencies being driven by this are minimised, for example, it would operate alongside the real-time spot market to utilise current resources in an efficient manner with outcomes from the mechanism co-optimised in real-time with the energy market facilitating efficient scheduling;
- transparency is a core design principle of the mechanism, providing technology-neutral investment, retirement and operational signals to new and current market participants for providing security services; and
- flexibility and adaptability are built into the mechanism as AEMO learns more about the operation of the system, and as services are unbundled, the mechanism should move towards procuring services closer to real-time.

¹⁸ Topics included the difference between the market ancillary service (MAS) and non-market ancillary service (NMAS) approaches; system configurations and meeting system requirements; transparency and predictability; the objective function; practical issues to consider; interaction with the system strength contracts.

1.4 The draft determination and rule would help facilitate the transition

As set out above, the energy transition is underway. This draft rule puts in place important elements that will help us as we move through the transition and to our long-term vision of unbundled system services markets. These include:

- the OSM would be a more efficient, transparent and robust way of managing system security outcomes in the NEM when the only option available to us to manage system security is using system configurations - it would avoid us continuing to use a 'back stop tool' as the main mechanism to achieve security
- the OSM would provide clear and transparent price signals as well as information on technical capabilities required, encouraging new participants to invest and bring forth to the market capability to provide these services
- the transparency and governance arrangements create a discipline and a learning cycle that help us move towards individual definition of services and so our long-term vision.

2 REASONS FOR THE COMMISSION'S DECISION - THE CASE FOR AN OPERATIONAL SECURITY MECHANISM

BOX 3: KEY POINTS IN THIS SECTION

- As set out in the ESB's post-2025 advice, the market bodies - AEMC, AEMO and the Australian Energy Regulator (AER) - consider that the best way to achieve an efficient, secure and reliable power system, where possible, is to unbundle ESS from one another so that they can be individually and explicitly valued, priced and scheduled. However, our understanding from AEMO is that current engineering knowledge means this is not feasible.
- The Commission also considers that implementing a new tool to manage security is in the long-term interests of consumers. Therefore, it has sought to design a mechanism that procures security services ahead of real-time but also seeks to integrate this as closely as possible with the energy market through co-optimisation to minimise any inefficiencies that may occur from procuring system services ahead of real-time.
- The Commission considers that this mechanism is preferable to doing nothing and helps us to move towards our long-term vision of unbundled procurement of ESS - which has been universally agreed as the desired end outcome by the market bodies and stakeholders.
- The Commission has therefore decided to introduce an operational security mechanism because it promotes the long-term interests of consumers by having a more efficient and transparent way of managing power system security. It would help put in place important elements that are prerequisites for a move towards unbundled markets, facilitating the transition to a service-led management of the power system and encouraging technological innovation.

After considering the issues raised in the rule change request and during consultation, the Commission is satisfied that the introduction of an OSM would, or is likely to, contribute to the achievement of the National Electricity Objective (NEO). This section sets out the Commission's reasons for making the more preferable draft rule, including:

- Section 2.1 - The Commission made its decision in line with the energy objectives
- Section 2.2 - Implementing a new tool to manage security is in the long-term interests of consumers
- Section 2.3 - Current technical understanding limits the options available
- Section 2.4 - How the Commission has applied the assessment framework in making this decision
- Section 2.5 - The draft rule would not have practical application in the Northern Territory.

2.1 The Commission made its decision in line with the energy objectives

Under the National Electricity Law (NEL), the Commission may only make a rule if it is satisfied the rule will, or is likely to, contribute to the achievement of the NEO.

The Commission considers that a draft rule which implements the OSM would, or is likely to, contribute to the achievement of the NEO, that is:

BOX 4: THE NEO

“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 -

- price, quality, safety, reliability, and security of supply of electricity; and
- the reliability, safety, and security of the national electricity system.”

In coming to this decision, the Commission has considered both the system services objective and a set of assessment principles for this rule change process.

2.1.1 The system services objective for considering issues related to system services

The **system services objective** was set out in the consultation paper, and has been developed by the Commission in relation to assessment of system services rule changes.

It reflects the trade-offs that are expected when considering issues related to the provision of system services. The system services objective seeks to:

Establish arrangements to optimise the reliable, secure and safe provision of energy in the NEM, such that is it provided at efficient cost to consumers over the long-term, where ‘efficient cost’ implies the arrangements must promote:

- Efficient short-run operation of,¹⁹
- Efficient short-run use of,²⁰
- Efficient longer-term investment in, generation facilities, load, storage, networks (i.e. the power system) and other system service capability.²¹

Achieving dynamically efficient outcomes, given these attributes, will require flexible regulatory frameworks.

19 This refers to factors associated with the ability of the service design option to achieve an optimal combination of inputs to produce the demanded level of the service at least cost i.e. for a given level of output, the value of those resources (inputs) for this output are minimised.

20 This refers to factors associated with the ability of a service design option to allocate limited resources to deliver a service, or the right combination of services, according to consumer preferences or system need.

21 This refers to factors associated with the ability of the service design option to continue to achieve allocative and productive efficiencies over time. This means developing flexible market and regulatory frameworks, that can adapt to future changes.

2.1.2 Assessment framework to help promote the NEO

The Commission considers the following criteria relevant for understanding how the draft rule promotes the NEO:

- **Promoting power system security:** The operational security of the power system relates to the maintenance of the system within pre-defined limits for technical parameters such as voltage and frequency. It is necessary to have regard to the potential benefits associated with improvements to system security brought about by the proposed rule changes, weighed against the likely costs.
- **Appropriate incentives and risk allocation:** The allocation of risks and the accountability for investment and operational decisions should rest with those parties best placed to manage them.
- **Timely and appropriate mechanism for security:** The power system's rapid transition is already underway, and tools to support system security need to be in place in time to help manage the transition. Tools need to be appropriate to the issue being managed, with market-based tools likely to be most efficient where practicable.
- **Transparency, predictability and simplicity:** The market and regulatory arrangements should promote transparency and be predictable, so that market participants can make informed and efficient investment and operational decisions. Simple frameworks tend to result in more predictable outcomes and are lower cost to administer and participate in.
- **Technology neutrality:** Regulatory arrangements should be designed to take into account the full range of potential market and network solutions. They should not be targeted at a particular technology, or be designed with a particular set of technologies in mind.
- **Flexibility and consistency with broader reform:** Regulatory arrangements must be flexible to changing market and external conditions, and consistent with the direction of broader reform. Arrangements must be able to remain effective in achieving security outcomes across the NEM over the long-term in a changing market environment.
- **Implementation costs and complexity:** Regulatory change typically comes with some implementation costs for regulators, the market operator and/or market participants. These costs are ultimately borne by consumers. The cost of implementation should be factored into the overall assessment of any change. Increased complexity comes with increased costs, and therefore the level of complexity of regulatory change should be justified by the benefits achieved.²²

The assessment principles are depicted in Figure 2.1.

²² Since the release of the directions paper, the Commission has progressed more detailed consideration of the issues presented in the rule change proposals and potential solutions, informed by issues raised in stakeholder submissions. As the rule change has progressed, the Commission has considered it appropriate to amend the assessment principles in response to its refined understanding of the issues presented and the potential solutions.

Figure 2.1: Assessment principles

NATIONAL ELECTRICITY OBJECTIVE							
BROAD POLICY QUESTIONS	Is the system need met through market mechanisms?		Are the principles of market efficiency met?			Is implementation timely and fit for purpose?	
	Assessment principles	Incentives and risk allocation	Timely and appropriate mechanism for security	Transparent, predictable and simple	Technology neutrality	Flexibility and consistency with broader reform	Implementation considerations
Specific questions considered	Is security maintained? What are the risks to security?	How efficient is the approach in the operational timeframe, with regard to incentives, risk allocation and other relevant features?	Will security measures be suitable for the pace of change in the power system in the right timeframes?	Does the approach allow participants to make informed operational and investment decisions?	Is the approach neutral between all technologies and solutions that are able to provide the service?	Is the approach able to accommodate and adapt to market, technological, policy and other changes?	What are the implementation complexity and cost?
		How well does the approach achieve both allocative and productive efficiencies in the planning timeframe?	Are power system needs met by market mechanisms?	Is the approach predictable and durable to provide investment certainty in both the short and long term?		Does the approach move the system towards the intended future in a path-efficient manner?	What are the ongoing costs?

2.2 Implementing a new tool to manage security is in the long-term interests of consumers

The Commission considers that, given the current security challenges of the transitioning system, simply maintaining current system security arrangements does not promote efficient operation of, and investment in, the electricity system, and therefore would not meet the NEO.

2.2.1 Current arrangements are not fit for purpose

As the transition continues, the changing energy mix has implications for how ESS are provided, and as a result, how power system requirements are satisfied now and in the future. The NEM's regulatory and market frameworks were originally designed based on a power system consisting primarily of synchronous generators (coal-fired, gas-fired and hydro-powered generators) that are electromagnetically coupled to the power system. These generators inherently provide ESS like grid formation and reactive power support as a by-product of energy generation when they are committed, in operational timeframes, into service.

In contrast, non-synchronous plant (which typically include solar photovoltaic, wind and batteries), are connected to the power system through power electronics. While these inverter-based resources (IBR) can be configured to provide some services, they do not automatically do so as a by-product of their generation as a matter of course today.

Because ESS were historically provided in abundance by synchronous generators, there was little need in the original market design to explicitly value these services so that market participants had an incentive to provide them. While some efforts have been made to explicitly value some services (for example, system strength), this is not the case for all

services. Consequently, under the current market design, which does not explicitly value all ESS, the changing generation mix is providing fewer of these services and there are few, if any, investment and operational signals to encourage new plant to provide these services.

A symptom of this is that increasingly AEMO is having to direct generators to be online that would otherwise not be, in order to ensure the system is secure. Directions are a tool primarily intended to be used as a last resort mechanism. Reliance on this and other of AEMO's operational tools places increased risk on the security of the system and creates opaqueness. Stakeholders have raised concerns about the effectiveness of these regimes being used all the time, including:

- that the compensation regimes may not be fit for purpose;
- that such last resort mechanisms do not send appropriate, transparent investment and operational signals to participants about what equipment, resources and services are needed at a particular point in time; and so
- do not encourage new participants to invest in providing these services.

The Commission has been informed by the current experience in South Australia. In that jurisdiction, there has been an upwards trend in the number of power system security directions that are occurring given the high penetration of IBR.²³ Analysis by the Reliability Panel has also shown that the number of changes to constraints continues to be high, and there is a significant increase in the number of market notices issues by AEMO.²⁴ The Commission is mindful that these trends may be present in other jurisdictions, and so considers it important to get ahead of this occurring.

The energy transition underway is inevitable and so the limitations of the current arrangements need to be addressed. The Commission considers that more efficient operational tools are needed to manage system security than the current tools available to AEMO, which includes directions and constraints. This is particularly important given the task of managing system security through periods of high renewable penetration and low levels of synchronous generation. The current arrangements are unable to operationally schedule some resources that are needed for security in a way that comprehensively considers costs and benefits for consumers.

Putting an operational tool in place would ensure that directions return to being used as a last resort mechanism, as per their original intent. Such a mechanism would also put a clear value on the supply of certain security services and provide clear signals to participants to invest in new technologies that can provide these services.

2.2.2

Implementing a new tool is more efficient now and in the future

The transition is underway and moving faster than forecasts demonstrate meaning that steps need to be made towards better managing the security of the system. We are mindful that we should not let perfect be the enemy of the good in any solution that arises, and so consider doing something and moving in steps towards our long-term vision is preferable.

²³ AEMC, 2021 Annual Market Performance Review, 28 April 2022, p. 62.

²⁴ AEMC, 2021 Annual Market Performance Review, 28 April 2022, p. 62.

Some stakeholders have queried whether anything additional is required while the system strength framework is being rolled out. However, we consider something else is necessary - the system strength framework is focused on planning timeframes; whereas this mechanism is focused on improving operational outcomes. The two frameworks have been designed to work in concert with each other - see chapter 9 and chapter 12 for further detail.

Having an operational tool in place would prevent situations from arising in other jurisdictions as we have seen in South Australia, where frequent interventions have been needed to manage security. Also, we need to put in place clear signals to investors on what is required in a future power system, helping us better manage these issues in future.

Putting in place a mechanism and changing how system security is managed operationally will help to improve AEMO's and industry's understanding of the evolving needs of the power system in time to effectively address these needs. There is a strong need for a pathway to manage system security as the system decarbonises and transitions.

Therefore, the Commission agrees with both rule change proponents that there is a need to implement a mechanism to procure security services in operational timeframes.

2.2.3

Stakeholders agreed that the operational management of security should be improved

All submissions to both the consultation and directions paper noted the challenges underway and agreed with the need to do something:

- The Clean Energy Investor Group noted that it is very cognisant of the need for reforms to ensure security of the NEM as it undergoes a significant transformation.²⁵
- Energy Queensland Australia noted the significant and disruptive change in recent years require regular and ongoing development of the rules for the foreseeable future.²⁶
- The South Australian Government noted the need for critical reform in relation to essential system services.²⁷
- TasNetworks acknowledged the challenges faced in ensuring the stability of the network as the generation mix changes.²⁸
- The AEC noted the challenges emerging in the energy transition are expected to grow without a solution.²⁹
- Origin agreed reform is needed to manage system security needs.³⁰
- CS Energy noted that the experience in South Australia has highlighted that AEMO and the market need more forward certainty and visibility of essential system services and their provision.³¹

25 Clean Energy Investor Group, Submission to the consultation paper, p. 3.

26 Energy Queensland Australia, Submission to the consultation paper, p. 3.

27 Government of South Australia, Department for Energy and Mining, Submission to the directions paper, pp. 1-2.

28 TasNetworks, Submission to the consultation paper, p. 1.

29 Australian Energy Council, Submission to the consultation paper, p. 78.

30 Origin Energy, Submission to the directions paper, p. 2.

31 CS Energy, Submission to the directions paper, pp. 1-2.

- AEMO generally agreed with the issues impacting the current arrangements for ensuring security.³²
- Shell noted clear changes to the market are needed to support the system services necessary to keep the system operating in a secure state.³³
- Delta considered the AEMC's characterisation of the inefficiency of current arrangements to be concise and balanced.³⁴

However, while noting the current challenges to managing security and agreeing on the need for reform, stakeholders disagreed on what the solution should be. For example:

- The South Australian Government considered it appropriate to initially procure system configurations while technical understanding improves and supported either the NMAS or MAS approach.³⁵
- The AEC strongly supported both the MAS or NMAS approach and agreed that directions should only be used as a last resort.³⁶
- Origin noted that directions should only be used infrequently and the recent over-reliance on this tool to manage system security needs to be addressed by either the MAS or NMAS approach, depending on the service in question.³⁷
- Shell noted that the existing directions process is not an enduring solution for security and supported the AEMC's initial preference for the NMAS approach, but raised concerns regarding predictability and transparency.³⁸
- Delta supported the NMAS approach, noting it would result in more efficient scheduling and dispatch of generators.³⁹
- Hydro Tasmania considered the MAS approach would allow system services to be unbundled and co-optimised from the start and lead to a more economically efficient outcome.⁴⁰
- The CEC did not consider that the issues with the existing directions mechanism warranted the introduction of the NMAS mode, and instead the AEMC should take the time to produce a properly transparent market mechanisms for the long-term procurement of unbundled system services.⁴¹
- Snowy Hydro considered that the NMAS or MAS approaches did not form part of the critical path to creating markets for system services, being primarily a scheduling mechanism designed to address AEMO's lack of confidence in the current dispatch process.⁴²

32 AEMO, Submission to the directions paper.

33 Shell Energy, Submission to the directions paper, p. 1.

34 Delta Electricity, Submission to the directions paper, p. 11.

35 Government of South Australia, Department for Energy and Mining, Submission to the directions paper, pp. 1-2.

36 Australian Energy Council, Submission to the directions paper, p. 1.

37 Origin Energy, Submission to the directions paper, pp. 1-2.

38 Shell Energy, Submission to the directions paper, pp. 2-3.

39 Delta Electricity, Submission to the directions paper, p. 1.

40 Hydro Tasmania, Submission to the directions paper, p. 2.

41 CEC, Submission to the directions paper, p. 6.

42 Snowy Hydro, Submission to the directions paper, p. 2.

- EnergyAustralia did not consider that any proposed solution would address the efficiency and investment issues of the current asset-based approach to system services procurement.⁴³

2.3 Current technical understanding limits the options available

The earlier directions paper on this rule change looked at two broad options to value, procure and schedule system services:

- **a market ancillary services (MAS) approach** – which would introduce new services to be scheduled through the pre-dispatch engine to allow it to produce dispatch schedules that result in secure dispatch - consistent with Hydro Tasmania’s rule change proposal, and
- **a non-market ancillary services (NMAS) approach** – which would introduce new services to be procured and scheduled in an optimisation approach outside of the spot market, to ensure secure dispatch in a more efficient manner - consistent with Delta Electricity’s rule change proposal.

The Commission considers that the ideal solution would be to create individual and co-optimised markets, which aligns with the ESB’s long-term vision. This would be similar to those currently used for frequency but expanded for all security services. However, there are practical considerations that must be considered. With respect to security services, current engineering knowledge does not allow a direct translation from a number of power system requirements to specific service definitions that meet those requirements.

AEMO is currently managing the secure technical operating envelope through the use of system configurations, which cannot be used in the MAS approach. This has been informed by advice from AEMO as well as the Commission’s own analysis. In recognition of this, the Commission considers that at the current time, the proposed MAS option has complex and substantial issues that would take significant time to address. While we recognise that Hydro Tasmania has provided information on how constraints could be implemented in a MAS approach through bespoke conversion to ‘piecewise linear’ constraint formulation, this would require significantly more effort and time on behalf of participants as well as AEMO. We are not confident that such an approach could be made to work at this stage.

The extent to which it is possible to completely separate all power system requirements and translate these requirements to services is unknown. To date, AEMO has been able to identify specific system configurations and constraints that represent a secure technical operating envelope within which a secure power system can be modelled and operated. These configurations and constraints are used to manage security services that are not able to be separately defined and managed. Figure 2.2 below shows an extract of the existing secure configurations in operation in South Australia. Similar sets of secure configurations have previously been developed for Victoria and North Queensland.^{44 45}

43 EnergyAustralia, Submission to the directions paper, p. 1.

44 AEMO, Transfer Limit Advice - System Strength in SA and Victoria, January 2022, p. 18.

45 Powerlink, North Queensland System Strength Constraints, August 2022, p. 6.

Figure 2.2: South Australia’s minimum secure configurations

Combination	Non-sync generation level	Syn Cons ^A	Torrens Island A	Torrens Island B	Pelican Point*	Osborne GT + ST#	Quarantine 5	Dry Creek	Mintaro	BIPS
SA_1	≤ 2,500 MW	4		2						
SA_2	≤ 2,500MW	4		1	1					
SA_3	≤ 2,500MW	4		1		1				
SA_4	≤ 2,500MW	4		1			1			
SA_5	≤ 2,500MW	4			1				1	
SA_6	≤ 2,500MW	4			1	1				
SA_7	≤ 2,500MW	4		1				2		
SA_8	≤ 2,500MW	4		1						8
SA_9	≤ 2,500MW	4		1					1	4
SA_10	≤ 2,500MW	4			1		1			

Source: AEMO, Transfer Limit Advice - System Strength in SA and Victoria, January 2022, p. 8.

Note: The figure shows an extract of the first 10 configurations from a total of 119 developed for system normal conditions.

It is crucial that any solution is able to support the way system security is currently managed, as well as support the transition to new ways of managing services and new technologies. Given the rapid pace of the energy transition, the uncertainty over the MAS’s feasibility and the significant time that would be needed to progress this option, the Commission considers it prudent to progress with an NMAS approach to value, procure and schedule system services. However, the Commission has incorporated as many elements of the MAS as possible.

This reflects the importance of reform as soon as possible for providing an efficient yet practical design choice that ensures the proposed OSM is in place when it is needed. The mechanism would have important foundational aspects for a later eventual move to a MAS (or unbundled services) being procured through markets. The flexibility of the mechanism would ensure it evolves alongside engineering knowledge, so that system configurations can continue to be used transitionally until such time that it is possible to procure individual security services.

Appendix C provides further discussion comparing the MAS and NMAS approaches.

2.4 How the Commission has applied the assessment framework in making this decision

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 issues 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 draft rule because it better contributes to the achievement of the NEO, as assessed through the assessment principles than the two solutions proposed by the proponents. While the two rule change requests each propose an operational mechanism to value, procure, and schedule ESS to help keep the system secure, the Commission has identified material limitations in both proposed solutions:

- Hydro Tasmania’s solution is not technically feasible, as outlined in section 2.3, and
- Delta Electricity’s solution, while technically feasible, does not meet our principles of technological neutrality, predictability, flexibility and transparency. In particular, it is a wholly day-ahead mechanism, which we consider results in inefficient outcomes⁴⁶

Therefore, the more preferable draft rule has been designed drawing on the solutions in the rule change requests to achieve greater dynamic efficiency, transparency and flexibility. The reasons are summarised below, with the benefits expected from this mechanism outweighing the costs.⁴⁷

2.4.1 **System security would be promoted through optimised scheduling of security services**

The OSM would **promote power system security** by providing an operational tool to help AEMO manage system security through the rapid transition.

Rather than continued use of high numbers of directions, the OSM would be used to more transparently signal system security needs to participants. As a result, participants would be able to make efficient investment and operational decisions to offer their services into the OSM. By providing a clear signal, and giving participants confidence over the revenue they would receive from this providing security services, AEMO would have more and better information on how security services would be provided. This would also provide more confidence that the right services would be online. The OSM’s optimisation engine and AEMO’s processes would be designed to ensure that the output of OSM - each OSM schedule - supports a secure system.

Unlike Delta Electricity’s rule change request, where participants could be committed to provide services for a whole day (for slow-start plant) or specific trading intervals (for faster-start plant), the OSM would allow participants to offer into the OSM closer to real-time. It also allows outcomes to be iterated. While we expressed a preference for system security services to be dispatched in real-time, as outlined in Hydro Tasmania’s proposal, given the practical limitations this is not feasible at this time.

2.4.2 **The OSM would strike an appropriate balance between risks to AEMO and participants**

An OSM would create **more appropriate incentives and risk allocation** than currently exists for security services. The OSM would promote more efficient management of security services by providing a signal of their value to the participants and providing a tool to

⁴⁶ It is worth noting that Delta’s proposal was submitted in conjunction with another proposal to implement an operating reserve market. This accompanying rule change request is being considered in a separate process - although the Commission is considering holistically how the different system security mechanisms would fit together. This is discussed in further detail in appendix D.

⁴⁷ Further supporting material is provided in appendix A and appendix C.

coordinate these services which takes into account their costs. This would help the market allocate resources as efficiently as possible while ensuring the security of the network. The mechanism seeks to allocate incentives and risks to those best placed to manage them.

Placing an explicit value (that is, a price) on system services signals to participants that these services are needed operationally and allows participants to more actively position and operate their plant to provide these services.

Along with better operational signals to participants, pricing ESS would allow these services to be optimised – that is, a systematic and transparent process would be applied to choose the lowest-cost options for consumers. This process would ensure the most efficient operational outcome is achieved. Explicitly valuing system services would improve market outcomes and increase the value of trade by alleviating security constraints that would otherwise undermine the efficiency of the market. This would in turn reduce total energy prices for consumers as security issues would no longer constrain certain types of generation (for example, cheaper renewable sources), therefore maximising the value of trade across the NEM. Cumulatively, the increased efficiency of investment and operational decisions made by participants as a result of the OSM would deliver lower costs to energy consumers across the NEM.

The Commission notes that in the short-term, these costs may increase in the initial period the OSM is operational. With system services more accurately valued, the costs of procuring these services to maintain security may be higher than the previous status quo of directions. The Commission expects that as more competitive participants begin to participate in the OSM (e.g., batteries), these costs would gradually decline as competition increases and new technologies emerge (e.g. grid-forming inverters).

The Commission is also conscious that scheduling participants ahead of real-time dispatch under the OSM has implications for efficiency, for example, because it introduces the risk of forecasting errors in calculating the required security services. However, the Commission considers that this risk is mitigated through a number of design features of the OSM, including principles requiring decisions to be made as close as possible to real-time.

2.4.3

The OSM would be a timely solution to a critical issue

The OSM has been designed in such a way that it is compatible with current systems and understandings of the power system, meaning it would be a **timely and appropriate mechanism for security**. Having this tool in place would mean there is less likelihood that other areas of the NEM reach a similar situation to South Australia, where directions were relied on as a primary means to coordinate security needs.

However, the Commission also considers that the implementation of the OSM would help foster the transition towards an unbundled future, moving the system from an asset-based to a service-led system. The OSM would help AEMO iteratively improve its understanding and management of the system as the system transitions. This would support the unbundling of services and the participation of new and emerging technology.

Flexibility in service definitions mean that if AEMO identified a candidate service that could be separately valued and scheduled ('unbundled'), the OSM would be able to separately schedule this service. Using the OSM in this way would give AEMO and participants the ability to test and learn about the best way to manage unbundled services in a market environment and would promote the development of a separate market for these services. It would also provide a flexible and fast way to define, manage and value new individual security services within a tool that is already clearly understood, without the need for lengthy regulatory processes to develop new mechanisms. Over time, the management of these services could evolve within or outside of the OSM as appropriate. This would also provide added resilience to the security of the NEM as the system changes, to ensure the secure, reliable and safe supply of electricity to consumers.

2.4.4

Transparency and predictability over the security needs of the system would increase

The Commission has designed the proposed OSM to be **transparent, predictable and simple**. Stakeholders have continually provided feedback throughout this process that these components are important to any mechanism.

It would provide added transparency on the security needs of the system and how different technologies can meet them. Information would be available to the market on technical descriptions of security services required, quantities procured, prices and units scheduled, with updates as technical understanding improves. AEMO and the AEMC would report on and review the mechanism.

The use of an optimisation engine and publication of OSM schedules would also provide predictability. This would improve participants' understanding of how the power system is operated and their ability to provide the right services when and where they are needed. In addition, transparency would:

- aid in improving engineering knowledge so that we can move towards unbundled management of system services, and
- help encourage new investment and innovation, by providing direct information on the technical requirements that would allow innovative providers of ESS to be paid for providing these services, as well as sending price signals demonstrating how much the service is needed in the market. Such information could encourage the adoption of grid-forming inverters.

The transparency and governance arrangements would also improve understanding of system security requirements over time by allowing AEMO to gain more operational experience and understand the performance of new technologies.

Each of these factors would help decrease costs to consumers over time. The OSM would introduce procedures that would facilitate innovation and technology neutrality by providing participants with the information to make more efficient operational and investment decisions, working to reduce overall energy costs for consumers.

2.4.5 **Those best able to meet security needs would be encouraged to provide security services**

The OSM has been designed to be **technology neutral**, which the Commission considers particularly important as understanding develops on how new technologies can support system security.

This design moves away from Delta Electricity's proposed solution, which focused on eligible providers being scheduled generators that are most likely to be subject to direction. The Commission considers the technological neutrality of the more preferable rule is important given the need for rapid decarbonisation of the energy system and need to accommodate new technologies. While scheduled generators are likely to be the majority of service providers in the first years of the OSM implementation, the OSM's design encourages new entrants and new technologies to be accredited overtime.

The OSM's rules are consistent for all participants, and the Commission has paid particular attention to designing timing and scheduling decisions to be technology-neutral, putting efficiency at the centre of decision-making rather than supporting particular technologies. Definitions of participants and revenue arrangements are also broad and flexible, allowing participation by a broad range of technologies and services, not just those that generate energy.

2.4.6 **The OSM would be flexible to accommodate evolving solutions**

Importantly, the proposed OSM would help facilitate the transition and make management of security more efficient now as it would be **flexible and consistent with broader reform**. Given the challenges of the transition that the market is facing, the proposed OSM framework would provide AEMO with the flexibility to incorporate new technical knowledge and expand the number of technologies that are able to compete in the market.

In contrast, under Delta Electricity's proposed design, AEMO must assess the technical characteristics and capabilities of eligible participants at the time of registration. The more preferable draft rule would introduce an obligation (draft clause 3.7G.4) for AEMO to develop a Security services guideline to describe the security services procured through the OSM.

The Commission considers the ability to define new services would mean the OSM can assist in the transition from an asset-based to a service-based system. This is discussed further in chapter 10. The mechanism would incentivise the additional capital investment required to provide further ancillary services, thereby increasing competition and preparing the electricity network for a potentially accelerated retirement of traditional generation.

2.4.7 **Implementation costs and complexity are minimised and align with meeting the system's needs**

The Commission has also designed the OSM to be as simple as possible, which would keep **implementation costs and complexity** to a minimum. In the design of the OSM, the Commission has aimed to minimise the administrative burden for both AEMO and participants while still providing transparency. AEMO has estimated that its implementation costs at **\$11.4 million ± 40%**.

These cost estimates do not include costs to participants. The Commission designed the OSM in such a way that the bulk of the implementation costs would be on AEMO, and that the only costs for participants would be for those wishing to participate in the OSM. Service providers who choose to participate in the mechanism may incur costs of updating systems and processes in order to participate in the OSM, as well as participating in relevant consultations. However, the Commission expects these to be relatively modest, with the decision made to participate based on an individual assessment of the costs and benefits of doing so.

2.5 The draft rule would not have practical application in the Northern Territory

The NER, as amended from time to time, apply in the Northern Territory, subject to derogations set out in regulations made under the Northern Territory legislation adopting the NEL.⁴⁸ Under those regulations, only certain parts of the NER have been adopted in the Northern Territory.⁴⁹ As the draft rule either relates to parts of the NER that currently do not apply in the Northern Territory, or have no practical application in the Northern Territory, the Commission has not assessed the rule against the additional elements required by the Northern Territory legislation.⁵⁰

48 The regulations under the NT Act are the National Electricity (Northern Territory) (National Uniform Legislation) (Modifications) Regulations.

49 The version of the NER that applies in the Northern Territory is available on the AEMC website

50 From 1 July 2016, the NER, as amended from time to time, apply in the NT, subject to derogations set out in regulations made under the NT legislation adopting the NEL. Under those regulations, only certain parts of the NER have been adopted in the NT (see the AEMC website for the NER that applies in the NT). National Electricity (Northern Territory) (National Uniform Legislation) Act 2015.

3 OVERALL DESIGN OF THE PROPOSED OSM

BOX 5: KEY POINTS IN THIS SECTION

- As outlined in the previous section, the OSM would be based on an NMAS approach, but incorporate key elements from the MAS such as being co-optimised with the procurement of security services, energy and frequency control ancillary services (FCAS).
- AEMO would be responsible for defining the system security needs, and accrediting market participants to supply system services.
- Accredited market participants would bid to provide system services into the OSM close to real-time. OSM schedules would be published to enable participants to position their units accordingly.
- The mechanism is designed to be flexible and accommodate system configurations to start with but has also been designed to adapt to procuring and scheduling individual system services as our understanding of the power system develops.
- In addition, the mechanism seeks to strengthen the links between any investment timeframe contracts entered into with participants to provide system security services, with providers of services through contracted arrangements with networks, such as system strength, being incorporated into the OSM.
- Chapter 4 to chapter 11 provide detail on the proposed design of each element of the OSM.

This section gives an overview of the Commission's proposed design of the OSM, with detail in subsequent sections:

- Section 3.1 - The OSM would operate parallel to the spot market
- Section 3.2 - AEMO would define system security needs
- Section 3.3 - Participants would be accredited to participate
- Section 3.4 - Participants would bid to provide security services close to real-time
- Section 3.5 - The OSM would optimise security services close to real-time
- Section 3.6 - The OSM schedule would be published to the market
- Section 3.7 - Participants would be paid according to their bids
- Section 3.8 - Ongoing transparency would support the system transition
- Section 3.9 - The OSM would be implemented as soon as feasible and in time to coordinate system strength contracts.

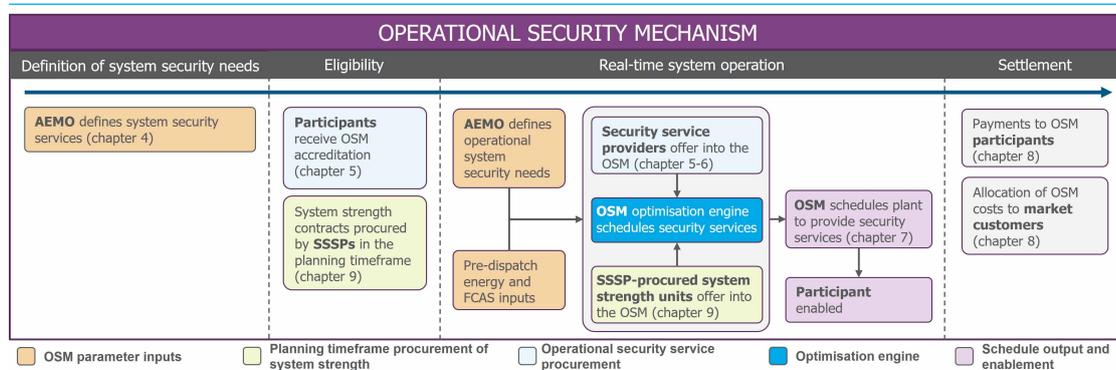
3.1 The OSM would operate parallel to the spot market

The proposed OSM would efficiently optimise the procurement of security services alongside energy and FCAS.

In response to stakeholder feedback to the directions paper and in technical working groups, the Commission’s proposed design for the OSM provides flexibility for participants and aims to maximise the choices participants can make and reduce aspects of central commitment. For example, participants would retain the choice to position their assets between the OSM, energy and FCAS until as close to real-time as possible.

Figure 3.1 below shows an overview of the elements of the OSM.

Figure 3.1: Schematic of the Operational security mechanism



3.2

AEMO would define system security needs

AEMO would define the security needs of the system, and therefore what the OSM could procure in technical terms (see chapter 10). This would be confined to services not otherwise valued in operational timeframes or provided through an explicit operational mechanism. In other words, services that are already procured separately in co-optimised, real-time spot markets would not be included in the OSM. The OSM would only manage services that are not already procured in operational timeframes or where they are procured in planning timeframes, and so where operational needs may differ.

3.3

Participants would be accredited to participate

AEMO would define participant eligibility through an accreditation process, which would set any specific technical requirements for participants’ provision of a security service in the OSM.

Through accreditation, AEMO would approve a participant’s capability to deliver ESS under particular conditions, for example:

- mode of operation (for example, synchronous condenser mode)
- load level (for example, for thermal plant, running at minimum load or in ‘synchronous condenser mode’)
- key parameters (for example, for battery storage plant, determining key inverter parameters such as inertia contribution).

See chapter 5 - Eligibility and offers and chapter 10 - Transparency and governance.

In order to participate, participants would need to be operating equipment that is scheduled by AEMO through the OSM scheduling process that would interact with pre-dispatch (further information is available in section 3.5). This would not include network plant which is scheduled and managed outside of the pre-dispatch process (for example, network-operated synchronous condensers). This equipment and its operation would contribute to understanding expected system security needs, but would not be scheduled through the OSM. The Commission does not consider it is appropriate for infrastructure in the regulated asset base, paid for by consumers, to participate in a competitive market where it would be paid for by consumers again for providing the service. Instead, such equipment should be considered as part of the baseline of network infrastructure that helps maintain system security.

See chapter 5 - Eligibility and offers and chapter 7 - OSM timing and scheduling.

3.4 Participants would bid to provide security services close to real-time

Accredited participants would be able to submit bids into the OSM, but would not be *required* to participate. However, some contractual arrangements (such as system strength arrangements) may place requirements on participation in the OSM. Participants would be able to bid and re-bid close to real time to provide security services, and AEMO would decide on enablements (i.e. the units activated by the OSM for security) as close to dispatch as reasonably practicable.

See chapter 7 - OSM timing and scheduling.

Participants would be able to submit multi-part bids. Bids would comprise:

- Variable bids (the 'OSM variable price') in the form:
 - \$/MWh for participants that generate electricity to supply security services, which reflects energy production while supplying these services, or
 - \$/hour for participants that do not generate electricity to supply security services, which reflects the cost of being able to supply these services over time.
- A fixed enablement offer (the 'OSM enablement price') that reflects the cost of being enabled through the OSM.

Participants' bids may be subject to measures to mitigate the effects of market power.

See chapter 5 - Eligibility and offers.

3.5 The OSM would optimise security services close to real-time

AEMO would determine operational system security requirements, accounting for pre-dispatch information, security services contracts, demand forecasts and other operational parameters.

See chapter 10 - Transparency and governance arrangements.

AEMO would optimise security services to maximise the value of trade, which would provide consumers with the greatest benefit from the mechanism. Optimisation would be an iterative process, with AEMO continuing to forecast and evaluate the system security requirements needed ahead of time. Optimisation would be conducted over a 'horizon' to give participants a look-ahead view as to likely OSM resources needed. Participants would be enabled close to dispatch.

See chapter 4 - Security services that the OSM would schedule and chapter 8 - How participants would earn revenue from the mechanism.

Planning timeframe contracts for security services, such as system strength and NSCAS, would be able to be scheduled through the OSM, with these contracts being set up in advance. System strength contracts would be required to be scheduled through the OSM, and NSCAS contracts could also be scheduled through the OSM when beneficial.

See chapter 9 - OSM interactions with the planning timeframe frameworks.

3.6 The OSM schedule would be published to the market

The OSM schedule for each iteration of the OSM would be published to the market, to inform participants' positioning of their plant. The final OSM schedule for a particular block would advise the market of enablements, beyond which a participant would be required to bid into the energy market and position its plant in a way that it could meet its OSM commitment.

See chapter 7 - OSM timing and scheduling.

3.7 Participants would be paid according to their bids

When a participant is enabled through the OSM, it would receive revenue equal to its OSM bid over its enablement period. Participants would always receive revenue for their variable bid, but would only receive fixed enablement revenue when the OSM causes a participant to incur those enablement costs.

Revenue arrangements have been deliberately designed to reward participants for providing security services, but also not to distort spot market outcomes.

OSM costs would be allocated to market customers. This is because they would ultimately benefit from more efficient dispatch outcomes. OSM costs would be distributed to regions that benefit from the OSM and in proportion to customer load.

Settlements and cost recovery processes would take place through AEMO systems.

See chapter 8 - How participants would earn revenue from the mechanism.

3.8 Ongoing transparency would support the system transition

The OSM's transparency and governance arrangements would help facilitate the transition in the longer term to unbundled services by:

- providing clear signals to the market on what security services are needed, where, and their value to encourage investment and innovation by potential or current market

participants, as well as assisting market participants make efficient operational decisions including retirement decisions, and

- providing information and helping improve understanding of, and evolving, the way we deliver system security as knowledge and technology develop.

The OSM would include the following arrangements to achieve transparency and clear signals on what system services are needed and their value:

- AEMO would develop a **Security services guideline** to describe the security services procured through the OSM.
- **AEMO's security services list** would complement the guideline
- The **OSM procedures** would explain the accreditation, bidding, simulation and scheduling processes for the OSM.
- AEMO would conduct **day-to-day reporting** on key inputs and outputs for the OSM and prepare an **annual report** to comment on the OSM's performance and work underway to separate security services.
- The AEMC would also commit to performing a holistic **review** of the OSM on a four-year cycle using its existing review powers.

See chapter 10 - Transparency and governance.

3.9

The OSM would be implemented as soon as feasible and in time to coordinate system strength contracts

The OSM would start on **1 October 2025**, which is as soon as feasible given the scale of system changes for AEMO and participants. This date has been informed by work AEMO has undertaken on its NEM Reform Implementation Roadmap.⁵¹ The OSM would be implemented in time to schedule the first contracts for system strength - the first date for compliance under the *System strength* rule change 2 December 2025, allowing any of these contracts to be readily integrated from that date.

Key processes for participants to engage with would occur in advance of OSM start, including publication of the first Security services guideline and OSM procedure document, technical accreditation, and the AER's OSM market power reviews.

See chapter 11 - Implementation.

⁵¹ See: <https://aemo.com.au/initiatives/major-programs/nem-reform-implementation-roadmap>.

4

SECURITY SERVICES THAT THE OSM WOULD SCHEDULE AND ITS OBJECTIVE FUNCTION

BOX 6: KEY POINTS IN THIS SECTION

- The OSM would be able to procure and schedule security services. At the start, this would include the scheduling of system configurations; however, over time as engineering knowledge develops, individual unbundled system services could be incorporated. This would provide an economic signal of the value of these services to the system by explicitly valuing the contribution of existing and new units with such capabilities. Services that are already separately procured through real-time markets i.e. frequency would not be scheduled in the OSM.
- Given the OSM is an operational tool, it could also be used to co-ordinate and operationalise contracts entered into in planning timeframes, such as those system strength contracts procured under the new system strength framework or potentially NSCAS contracts in the future (see chapter 9).
- The OSM has been designed in such a way that it would actively assist the transition towards a service-based system by allowing AEMO to learn about the engineering capabilities of the system through this mechanism, as well as allowing new 'services' to potentially be procured through these mechanisms to deepen the number of suppliers that could provide these services in future markets.
- AEMO under the draft rule would transparently define for existing and potential market participants the **technical definitions of the services** that are able to be procured by the OSM in the 'Security services guideline'. This would provide clear information and certainty for stakeholders about what a service would be comprised of, and the technical capability necessary.
- If asset-based system configurations are still being used to manage the system, rather than fully unbundled services, AEMO would also develop a 'security services list' to provide transparency over configurations that are being procured by the OSM.
- The OSM's **objective function** would seek to maximise the value of trade, which would provide consumers with the greatest benefit from the mechanism. This objective function would underpin the OSM's optimisation engine, providing the central goal which would determine how the OSM would coordinate the dispatch of security services alongside the existing markets of energy and FCAS.
- The Commission has proposed such an objective function, because this means that the OSM would:
 - co-optimize security services alongside the procurement of energy and FCAS to lead to an efficient allocation of resources, lowering costs to consumers given that the least number of resources would be used to provide a secure service to consumers.

- be able to trade-off between procuring additional security services and dispatching lower-cost sources of energy to the benefit of consumers.

This section covers the Commission’s proposed approach to defining the security services that the OSM would procure and schedule, and the objective function which would determine how these services are selected for procurement and scheduling, including:

- Section 4.1 - The OSM would schedule security services to assist the transition from an asset-based to a service-based system
- Section 4.2 - The OSM would use an optimisation approach to schedule security services.

4.1 The OSM would schedule security services to assist the transition from an asset-based to a service-based system

The OSM would help keep the power system secure by procuring and scheduling security services which are currently not valued or scheduled in the operational timeframe i.e. a subset of all ‘essential system services’. It would transparently define these security services and provide a tool to procure them, thus signalling their value to the market and incentivising the market to provide them. Box 1 in chapter 1 sets out that these security services comprise both system configurations and individual services.

Initially, the OSM would be used to procure and schedule system configurations, thus providing a signal of their value to the system. The OSM would also be able to co-ordinate and operationalise contracts entered into in planning timeframes, including system strength contracts procured under the new system strength framework or potentially NSCAS contracts in the future (see chapter 9). This flexibility and adaptability is built into the design so that it is fit for purpose as the NEM continues to evolve.

Over time, it is envisaged that the OSM could assist the transition towards a service-based system by scheduling new services as technical understanding of the system evolves and services are able to be separately defined. Using the OSM, AEMO would be able to begin the process of testing the separation and eventual unbundling of services to meet these needs. This would help move the system towards the long-term vision of individually procuring each individual essential system service. The OSM could support this progression by providing a transitional platform for managing newly defined services — for example, if the long-term approach is complex to implement, if AEMO and participants can learn from a transitional period, or to develop capabilities of the market to provide newly defined services.

Security services that are already procured as market ancillary services, such as FCAS, would not be procured under the OSM (draft clause 3.7G.3(e)), because:

- this service is already being procured consistent with our long-term vision; and
- it would ensure that the OSM does not duplicate existing price signals or scheduling mechanisms for security services.

The draft rule proposes a transparent yet flexible process for AEMO to define what services the OSM can procure, both initially and into the future.⁵² The Commission considers that the requirements to provide clear service descriptions and for stakeholder consultation as set out below would provide this transparency. This would also put in place appropriate checks and balances to make sure participants understand how the system is operated and also allow for learning as an industry over time. AEMO would:

- be required to set out service descriptions in a Security services guideline (draft clause 3.7G.4) and provide specific detail on configurations in a Security services list (draft clause 3.7G.5)
- be required to consult on the Guideline when it is created and updated (draft clause 3.7G.4(e)), allowing this to be updated to incorporate new services as knowledge and understanding develops, provided stakeholders are consulted
- be required to consider updates to the Guideline if requested by stakeholders
- also consult with TNSPs on service definitions, and draw on its own operational experience and technical work, for example the Engineering Framework, and
- not be required to consult on the Security services list, as it would be compiled based on the guideline, which is already subject to consultation.

AEMO would be able to update the Guideline to incorporate new services as knowledge and understanding develops — provided stakeholders are consulted as per the Rule consultation procedure. Stakeholders would also be able to request amendments to the Guideline (draft clause 3.7G.4(c)).

Chapter 10 provides a full description of the process for defining and updating the security services that the OSM would procure.

4.2 The OSM would take an optimisation approach to provide the greatest benefits for consumers

The purpose of the OSM is to deliver a secure system more efficiently than current arrangements. To do this, it would need to coordinate the dispatch of security services with the dispatch of energy and FCAS to create the most efficient outcomes for consumers and market participants. This coordination is crucial to ensure that efficient levels of security services are procured and no more resources are used than ideally required, meaning that costs for consumers are minimised.

In submissions to the directions paper and through direct consultation, stakeholders considered the importance of co-optimising the procurement of energy, FCAS and security

⁵² As discussed further in chapter 10, stakeholders have been clear with the Commission that the OSM provides an opportunity to improve the transparency over the status quo arrangements for procuring and scheduling security services. For example, submissions to the directions paper: AEMO, pp. 28-29; AEC, pp. 4-5; Delta Electricity, pp. 12-13; EnergyAustralia p. 5; Hydro Tasmania, pp. 9,23; Major Energy Users, p. 4; Shell Energy, p. 2; Tesla, pp. 1-3; SnowyHydro pp. 2-3; Government of South Australia, p. 2; Ergon Energy, p. 1; ENA, p. 5; CS Energy, pp. 2,8-14; AGL, p. 3; AER, p. 2; EUAA, p. 1; Origin Energy, p. 2; CEC, pp. 2-8.

services.⁵³ Stakeholder submissions thereby implicitly supported an objective function that maximises that value of trade (see section 4.2.1 for further detail). Stakeholders supported an objective function that encapsulates the entirety of energy-related services to manage system security more efficiently.

The Commission agrees that an objective function relating to maximising the value of trade would mean customers would experience the lowest cost outcome, with further rationale set out below. The OSM would be underpinned by a mathematical optimisation engine to coordinate resources, which would efficiently schedule security services alongside the existing markets of energy and FCAS. The optimisation engine, separate from NEMDE and developed by AEMO, would be able to schedule the most cost-effective security services while taking into account the ability to lower costs in other markets. This engine would require a clear objective function that mathematically describes the goal of the optimisation algorithm.

4.2.1

The OSM's objective function would maximise the value of trade

The OSM's objective function would maximise the value of trade across security services, energy and FCAS (draft clause 3.7G.2(b)). This means that the optimisation engine would procure and schedule the amount of security services that brings the greatest benefits to consumers across all three of these markets while minimising costs.

In doing this, the optimisation engine would schedule security services to ensure that the dispatch schedule is secure (draft clause 3.7G.2(a)). The engine would:

- select the lowest priced security services to meet system needs of minimum security levels, to minimise costs for consumers, and
- schedule additional security services above the minimum level required for security if this would benefit consumers, such as when procuring additional security services lowers costs in other markets. For example, the procurement of additional system strength could alleviate a security constraint and avoid the curtailment of low-cost renewable energy generation — the reduction in energy costs can outweigh the additional cost for system security, meaning consumers are better off overall.

It is important to note that, while the OSM may reduce energy prices by paying providers to alleviate security constraints, the OSM would not schedule security services for the sole purpose of reducing energy costs. Instead, it would only incur the costs of providing security services to the extent that it contributes to power system security.

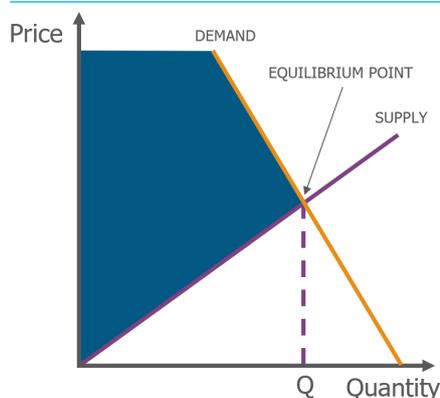
An objective function that maximises the value of trade is shown in Figure 4.1 below:

- the demand curve shows the value to the system of security services procured by the OSM — this takes into account the value of providing minimum levels of security, as well as benefits from alleviating security-related constraints on energy and FCAS provision
- the demand curve shows what consumers are willing to pay for a secure electricity supply

⁵³ Submissions to the directions paper: Hydro Tasmania, p. 19; Origin Energy, p. 2; AGL, p. 2; CS Energy, p. 12; ENA, p. 5; Snowy Hydro, pp. 3-4; AEMO, p. 16; Akaysha Energy, p. 2; AEC, pp. 4-6; Delta Electricity, p. 3; Energy Australia pp. 3-6; Major Energy Users, p. 3; Shell Energy, p. 3; Stanwell, p. 2.

- the supply curve shows the cost of security services that participants supply through the OSM
- total benefits to society are represented by the blue area - where consumers value the security services at higher levels than the cost of supplying those services.
- The OSM would dispatch the quantity of security services at Q , the point which provides the maximum benefits available to consumers - thus the OSM is maximising the value of trade.

Figure 4.1: Economic efficiencies of maximising the value of trade



4.2.2

An objective function that minimises OSM costs would result in a less efficient outcome for consumers

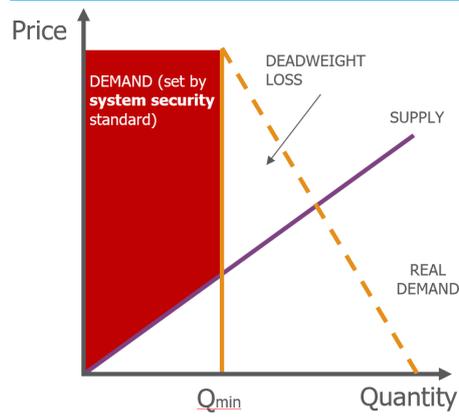
An alternative to maximising the value of trade would have been to set up the OSM to simply schedule minimum system security requirements at the lowest cost. This approach would ignore any potential for lowering costs to consumers through bringing security services online to unlock cheaper generation, such as solar and wind.

This approach would likely result in the lowest overall costs for the OSM. However, it would mean that consumers miss out on benefits because it would not consider the outcomes of related energy markets. If the OSM could not incur additional costs above minimum requirements, cheaper and cleaner sources of energy could remain curtailed even where security services are available to support their dispatch at lower overall cost.

A least cost objective function is depicted in Figure 4.2:

- the OSM engine would procure security services up to Q_{min} , which represents the system's minimum security requirements - this would be set based on an ex-ante minimum security standard
- security services would be procured to meet the standard at the lowest cost. The red area in Figure 4.2 shows the benefits to consumers from the least-cost approach, which are lower than the benefits under the Commission's proposed approach of maximising the value of trade. The deadweight loss is the benefit that society misses out on under this approach.

Figure 4.2: Economic inefficiencies of the objective function minimising procurement costs



5 ELIGIBILITY AND OFFERS

BOX 7: KEY POINTS IN THIS SECTION

Participants would have the option to offer services into the OSM or not - similar to how participants can currently choose whether or not they wish to participate in the frequency markets. This means that some participants may incur costs of updating systems and processes in order to participate in the OSM, as well as participating in relevant consultations. However, the Commission expects these to be relatively modest, with the decision made to participate based on an individual assessment of the costs and benefits of doing so.

- In order to participate in the OSM, service providers would need to have the capability to supply a required security service, as specified in the Security services guideline and Security services list. In addition, they would need to successfully pass an accreditation process prior to offering to provide security services.
- The accreditation process would be developed by AEMO and outlined in the OSM procedures. The accreditation process would include assessment of matters such as:
 - mode of operation required to provide security services,
 - load level required to provide security services, such as the minimum generation of synchronous generators, and
 - other key technical parameters, such as storage status or ramping constraints.
- To ensure the costs of supplying security services are accurately captured participants would be required to submit multi-part bids to provide security services, with pricing comprising:
 - Variable bids (the 'OSM variable price') in the form:
 - \$/MWh for participants that generate electricity to supply security services, which reflects energy production while supplying these services, and
 - \$/hour for participants that do not generate electricity to supply security services, which reflects the cost of being able to supply these services over time.
 - A fixed enablement bid (the 'OSM enablement price') that reflects the cost of being enabled through the OSM.
- Including a fixed as well as a variable component in bids would allow participants to best reflect their costs in their bids and for the most cost-effective bids to be selected. This would lead to lower costs for consumers.

This section discusses the Commission's proposed approach to the OSM participant eligibility and the OSM's bid process including:

- Section 5.1 - Eligibility to participate in the OSM would depend on participants passing an accreditation process

- Section 5.2 - Participants would be able to reflect both fixed and variable costs in OSM bids.

5.1 Eligibility to participate in the OSM would depend on participants passing an accreditation process

Participation in the OSM would be optional. Potential providers of security services would not be required to participate, but by doing so, they would be entitled to receive additional revenue for supplying security services that would be valuable to the system.

In order to participate in the OSM, participants would need to have the general capacity to provide required security services, as defined in the Security services guideline and Security services list - chapter 10 explains in full how AEMO would develop the definitions for these tools. Participants would also need to be operating equipment that is scheduled by AEMO through the OSM scheduling process that would interact with pre-dispatch (for more information on scheduling please see chapter 7).

Network equipment that forms part of the regulated asset base owned by network service providers would continue to contribute to understanding expected system security needs by being part of the baseline of network infrastructure that helps maintain system security, but would not be scheduled through the OSM. This would be scheduled and managed outside of the pre-dispatch process as it currently is (for example, network-operated synchronous condensers). The Commission does not consider it is appropriate for infrastructure in the regulated asset base, paid for by consumers, to participate in a competitive market where it would be paid for by consumers again for the service.

Participants who offer services into the OSM would need to go through an accreditation process conducted by AEMO to determine their eligibility to participate in the OSM. Accreditation would set any specific technical requirements for their provision of the service (draft clause 3.7G.11).

Accreditation would involve evaluating the type of service that participant is seeking to provide the OSM with, and, for system configurations, the ability to form part of system configurations or to provide specific security services in the operational timeframe. Through accreditation, AEMO would approve a participant's capability to deliver ESS under particular conditions. Some example conditions that could be outlined in a participant's accreditation include:

- mode of operation (for example, synchronous condenser mode)
- load level (for example, for thermal plant, running at minimum load or in 'syncon mode')
- key parameters (for example, for battery storage plant, determining key inverter parameters such as inertia contribution).

The accreditation process would be set out by AEMO in the OSM procedures, as discussed in section 10.1.3, which would provide clarity to participants on key information to participate. For example:

- what technical parameters would need to be met through accreditation,

- what information participants would need to provide to AEMO to be accredited,
- any modelling or testing required,
- the criteria AEMO would use to assess accreditation, and
- any requirements for aggregated units or loads participating in the OSM (draft clause 3.7G.11(b)).

These technical parameters - while varying for different technologies - are designed to be technologically neutral. In other words, every type of technology that contributes to system security should be able to participate in the OSM. It is expected that these parameters would be frequently updated as engineering understanding and plant capability improves over time.

AEMO would be required to consult on the OSM procedures, including accreditation requirements, using the Rules consultation process when they are developed or updated (draft clause 3.7g.11(f)). This adds accountability and transparency to the process AEMO uses to accredit participants.

Once accredited, participants would be able (but not required) to submit bids into the OSM to provide security services (draft clause 3.7G.7(a)). Similar to energy or market ancillary services, OSM participants would also be able to submit default bids to supply security services for OSM blocks (draft clause 3.8.9(d1)).

However, providers of security services that have entered a contract with a network in the planning timeframe to provide these services (for example, under the System strength framework), would have contractual requirements to bid into the OSM to be scheduled to provide the services. Chapter 9 provides more detail on the arrangements for these contracts.

5.2 Participants would be able to reflect both fixed and variable costs in OSM bids

Once participants are accredited to supply security services in the OSM, they would be able to submit bids indicating the price at which they would be willing to supply those services. The OSM engine would need to be able to compare these prices in order to optimise security services, and would also need to take into account participants' technical parameters to ensure it delivers physically feasible schedules. Technical parameters would be set in accreditation and OSM bids would need to be consistent with these requirements.

5.2.1 Cost parameters would inform efficient scheduling of security services

The Commission considers it important that participants can accurately reflect their costs in OSM bids so participants can have certainty that they can recover the costs of providing the service. In providing security services, participants could incur a number of costs.

Real-time pricing would be used

Participants would bid into the OSM close to real-time, in contrast to using a long-term contracting approach like NSCAS or the Reliability and Emergency Reserve Trader (RERT).

This would promote efficiency by allowing service providers to respond to the needs of the market close to real-time.

The Commission did consider having a longer-term contracting approach which would require a tendering process, resulting in a contract between AEMO and a market participant that included both the price and other terms and conditions such as technical terms. Such an approach would provide more price certainty for participants, but the disadvantages outweighed this pro:

- Tendering and contract negotiation would be administratively burdensome on both AEMO and participants.
- This would lock prices in advance that would result in inefficiencies because they would not be reflective of changing market conditions.
- There would be no clear real-time price signal for security services to encourage investment and operational decisions that promote the provision of security services.

Participants would bid in variable and fixed costs

Participant costs can broadly be divided into variable costs (for example, costs of running at minimum generation/load, costs of charging storage plant) and fixed costs (for example, start-up costs). Clause 3.7G.7(c)(1) of the draft rule outlines that OSM bids would be able to include the following components:

- a **variable price**, where a participant could reflect their variable costs (draft clause 3.7G.7(c)(1)(i)). This would be in the form of:
 - \$/MWh for participants that generate electricity in supplying security services, for example, a thermal generator running at minimum generation, or
 - \$/hour for participants that do not generate electricity in supplying security services, for example, a battery that reserves headroom to assist with inertia management, or a gas plant running in synchronous condenser mode, or a privately owned synchronous condenser.
- a fixed **enablement price**, where participants could reflect their start-up, initiation or activation costs (draft clause 3.7G.7(c)(1)(ii)).

Including a fixed as well as a variable component in bids would allow participants to best reflect their costs in their bids and for the most cost-effective bids to be selected. Participants could submit bids of 'zero' against either component, which would mean that they can configure their bids to best meet their needs. For example, a participant operating technology with no or low enablement costs like a synchronous condenser could bid a low or zero enablement cost, making their bid relatively more competitive than a participant with high enablement costs like a synchronous generator. The participant with low enablement costs would be more likely to be selected by the OSM; assisting the transition. However, at times where the synchronous generator is needed for security, they would be able to recover enablement costs and not be out of pocket. Section 5.2.2 provides an example illustrating the advantages of this bidding structure.

Requiring OSM bids to take consistent formats would deliver efficient outcomes by allowing the optimiser to easily compare bids to deliver a secure system at least cost to consumers. Prescribing the format of OSM bids in the Rules would provide certainty to system strength service providers in the system strength framework on how to structure any contracts that they enter into for the supply of system strength - even where these contracts are entered into before the OSM commences. System strength arrangements are discussed in detail in chapter 9.

Unlike the energy market where participants offer energy quantities into price bands, OSM bids would generally not be expected to be submitted in bands. For participants that generate energy with their supply of security services, there would usually only be one quantity of energy associated with the security services being procured (that is, their minimum generation). Some participants may not produce any energy – for example, generators operating in syncon mode or a privately owned synchronous condenser – and quantity bands would not apply.

While the rules would not be prescriptive as to how participants price their bids, the Commission expects that competition would drive participants towards bidding at a level equal to their costs. This is consistent with what occurs in highly competitive markets such as the NEM, where participants are incentivised to bid at or close to their variable cost of producing energy to ensure they have the best chance of being dispatched. As the OSM and market for security services develops and entrants increase, competition to provide these services would drive similarly efficient outcomes through participants bidding at or close to their costs to ensure they have the best chance of being scheduled by the OSM. To address any potential market power, the AER would be able to set caps on bids (or on separate bid components), however even if a cap applied, participants would have flexibility in how they bid up to this cap. Market power considerations are discussed further in chapter 6.

The Commission considers this approach to pricing to be flexible and technology-neutral. The ability to submit bids in a \$/hour format allows non-energy producing technology to participate in the OSM and submit comparable bids which the OSM can optimise. Some bid terms may not be relevant to particular technology types - in which case the participant would bid a zero value for that parameter (for example, a participant with a battery might place \$0 against start-up costs). This results in relatively competitive bids from technologies with low operational costs.

Chapter 7 and chapter 8 provide further details on timing of bids and the revenue that participants would receive from the OSM.

Stakeholder views on pricing

In consultation on the directions paper, stakeholders provided varying views on the best pricing approach for security services:

- Hydro Tasmania and the AEC, provided views in submissions to the directions paper that the lack of a single common price (a marginal price) in an NEM approach such as the

OSM reduces transparency and price discovery, as there is not one common price that can be published to provide operational and investment signals.⁵⁴

- Other participants such as Delta Electricity noted that the lack of marginal prices in the NMAS approach is not detrimental to price discovery as participants are still able to understand expected revenue from the market.⁵⁵

The Commission considers that the proposed arrangements are sufficient for providing operational and investment signals for OSM participants. While there would not be one common marginal price for security services, participants would still be incentivised to compete on prices to be enabled by the OSM and receive OSM revenue. Transparency over pricing, provided in AEMO's day-to-day and annual reporting (refer to section 10.1.4 and section 10.1.5), would also help provide these signals. This creates incentives for investment, leading to competition and innovation over time.

In addition, due to the binary nature of services being scheduled through the OSM, the Commission considers that a marginal price would not necessarily provide a more economically meaningful signal for participation. This is because a marginal price represents the price of one incremental unit of service, whereas often it is the online nature of a unit which provides the service, and producing more energy does not increase the amount of the service provided.

5.2.2

The Commission considers that including both fixed and variable components in OSM bids, rather than just variable components, would produce the most efficient outcomes

Including a fixed cost component in OSM bid structures would be different to energy and FCAS market bid structures, which only include variable prices. Also, both the rule change requests from Hydro Tasmania⁵⁶ and Delta Electricity⁵⁷ proposed that bids for security services would be single-part, variable only bids, rather than the multi-part approaches proposed by the Commission.

However, the Commission considers multi-part bids including fixed costs would be key to the efficiency of the OSM. These bid structures would allow costs to be better reflected in bids, resulting in a more efficient dispatch of security services regardless of the length of enablement of a unit.

An alternative approach was considered where participants would submit a single variable bid into the OSM, similar to the energy and FCAS markets. For example, participants could be required to submit a single bid in \$/hour – under this approach, participants would incorporate their fixed costs into this variable bid. However, to accurately reflect and recover their fixed costs in bids, participants would need to be able to forecast the length of their commitment with some degree of accuracy. Participants are not well-placed to do this for security services, as AEMO coordinates security services needs and commitments. This contrasts with the energy market, where energy is fungible and demand forecasts are

54 Submissions to the directions paper: Hydro Tasmania, p. 23; AEC, p. 5.

55 Delta Electricity submission to the directions paper, p. 14.

56 Hydro Tasmania, Synchronous services market, Rule change request, 14 November 2019.

57 Delta Electricity, Capacity commitment mechanism, Rule change request, 4 June 2020.

available to participants. Because participants cannot accurately forecast security requirements and their likely commitment length, they would be likely to price the risk of a short OSM commitment period into their variable bid. This would raise costs for consumers and lead to more inefficient outcomes than a multi-part bid approach, where the optimiser can separately take participants' fixed costs into account in its scheduling decisions. Figure 5.1 and Figure 5.2 in the scenario described below illustrate this potential outcome.

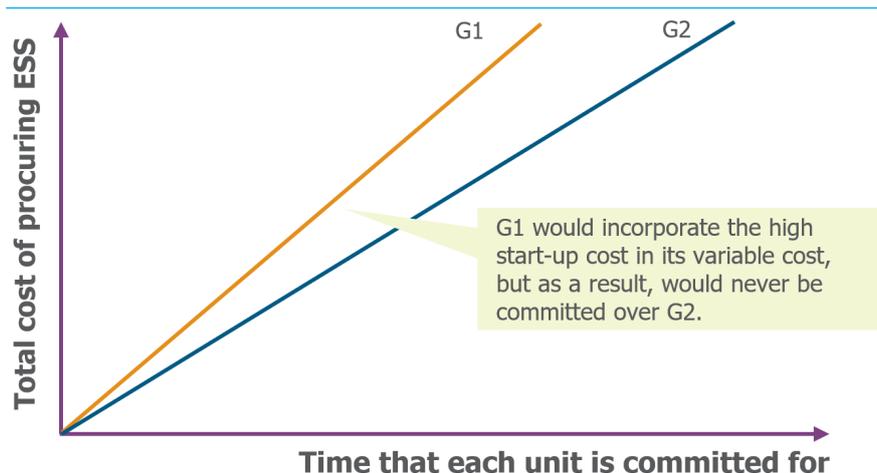
Scenario: Single variable bids vs multi-part bids

In this scenario:

- Generators 1 and 2 can both provide a security service that is needed at a particular location.
- Generator 1 has a high start-up cost and low running costs for its minimum generation, while
- Generator 2 has no start-up cost and high running costs for its minimum generation.
- Both generators reflect these costs in their OSM bids.

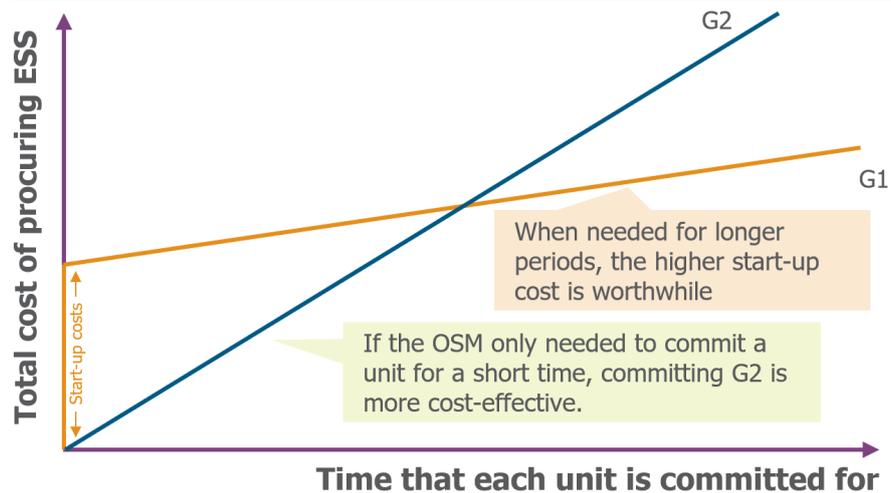
Figure 5.1 illustrates a single variable bid approach (for example, \$/MWh). Under this approach, the generators would need to estimate in advance how long they are likely to be scheduled for, and incorporate their start-up and running costs in a single figure. In this scenario, the OSM cannot distinguish that G1 becomes relatively less costly than G2 over time and would always choose G2 – thereby resulting in increased overall costs to consumers.

Figure 5.1: Optimisation of single variable bids



In contrast, Figure 5.2 illustrates a multi-part bid approach (for example, fixed enablement cost and \$/MWh). Under this approach, the generators would bid start-up and variable components to reflect their costs. In this scenario, the OSM is more likely to select the true lower-cost option, regardless of the enablement timeframes of each unit.

Figure 5.2: Optimisation of multi-part bids



5.2.3

Technical parameters set through accreditation would inform physically feasible scheduling of security services

Taking technical parameters into consideration would allow the OSM to produce technically feasible schedules for security services.

Technical parameters could include parameters such as minimum generation/load, ramping constraints, and storage status. These would be agreed in the accreditation process, and participants would then be required to bid in line with any requirements set in their accreditation (draft clause 3.7G.11(b)(6)). For example, a battery may be required to bid a certain amount of headroom or a generator may be required to bid their minimum load into the OSM.

6 MARKET POWER

BOX 8: KEY POINTS IN THIS SECTION

- The exercise of market power can undermine the efficiency of economic markets, driven by participants that are able to influence prices through the supply or demand of a good or service.
- Stakeholders have raised the concern for potential market power in the OSM and its impacts throughout this rule change process.
- While the Commission has not done comprehensive analysis on whether or not there would be market power in the OSM, the Commission accepts that there are potentially some circumstances in which market power *could* exist and be exercised. This is particularly the case towards the beginning of the OSM being in place when system configurations are being scheduled to manage security, and new entrants are still investing. For example, while there are multiple system configurations per region that may be used to maintain system security, some units feature in multiple configurations, which may lead to concerns about market power.
- Therefore, recognising the *potential* for market power, the Commission has put in place specific arrangements to mitigate these concerns. This involves putting in place a system that clearly allows market power to be identified, and if so, mechanisms to be put in place to manage it. In particular, it involves:
 - allocating responsibilities to AER to identify market power and develop arrangements to manage them through a two-step process:
 - i. whether there is the potential for the exercise of a substantial degree of market power in specific regions of the NEM, and
 - ii. if potential market power is identified, recommending the best approach to managing it.
 - having a flexible, rather than prescriptive, approach to ensure changing market conditions can be accounted for.
- Under step i, the AER would annually review whether the potential for the exercise of a substantial degree of market power exists in the OSM. The draft rules set out factors the AER would consider when identifying the potential for market power to impact the OSM, noting the AER has flexibility in what exact methods it applied. These factors are:
 - market concentration (for example, number of participants, market share observations, etc.)
 - substitutes and contestability of participants that can provide system configurations and other security services through the OSM
 - barriers to entry (for example, accreditation process, technical limitations, etc.)

- demand elasticity of security services (for example, system security requires and is dependent on a certain amount of security services, making the demand for these services relatively inelastic)
- any other factors the AER considers appropriate.
- Under step ii, if the AER identified potential substantial market power it would then consider what the appropriate mitigation method would be. In doing this, it would consider whether the implementation of OSM price caps or price monitoring would have benefit, and if so, would make a recommendation for AEMO to implement the appropriate mitigation method. In making this assessment, the AER would be guided by the following principles. Mitigation measures should:
 - be proportionate to the extent of the potential market power identified,
 - be consistent with the OSM objective, Security services guidelines and OSM procedures,
 - minimise the effect of OSM participants' potential market power and their ability to influence OSM prices,
 - reflect the value of providing security services to the power system,
 - preserve the incentive for participants to engage in the OSM and enter into system strength contracts,
 - give participants a reasonable opportunity to recover efficient costs of providing a security service,
 - allow price caps or price monitoring to vary based on changing market conditions if there is benefit in doing so,
 - incentivise investment in and participation of new technologies; and
 - minimise administrative burden for AEMO
 - any other matters the AER considers appropriate.
- This would be a significant new function for the AER. It is crucial that the arrangements are designed in a way that:
 - gives the AER appropriate guidance and flexibility in carrying out this function;
 - is a proportionate and practicable response to address the risk of market power;
 - ensures there is not an undue resourcing burden on the AER or participants; and
 - the AER can implement it in the timeframes required.
- The Commission is continuing to consult closely with the AER on its proposed role to ensure it meets these requirements.
- In addition to having checks and balances to mitigate any market power should it emerge, the Commission also considers that an equally effective way to minimise market power is to encourage new and many providers into the market to mitigate any market power that does exist. Many of the proposed transparency arrangements set out in chapter 10 are intended to encourage innovation and new providers into the market.

- The successful mitigation of any market power that exists will be important to the success of the OSM and so the Commission is particularly interested in hearing feedback on this element of the draft rule. The Commission will hold a deep dive on the market power issue and those elements of the draft rule on 20 October 2022. Stakeholders are invited to register for this event via the Commission's website.

This section discusses the proposed approach to managing market power in the OSM and ongoing governance arrangements including:

- Section 6.1 - The presence of market power in the OSM may impact the efficient provision of security services
- Section 6.2 - The OSM would have a two-step process to mitigate potential market power

6.1 The presence of market power in the OSM may impact the efficient provision of security services

The Commission considers that, due to the locational characteristics of supplying security services, the OSM *may* be prone to instances of market power, which arises when a firm has the ability to set and maintain prices at inefficiently high levels when it sells a good or service. This is more likely if the mechanism is being used to procure system configurations.

BOX 9: TYPES OF MARKET POWER

In the context of the OSM:

Transient market power involves a transient ability to increase prices for short periods of time.

Sustained market power involves sustained pricing above the level that would prevail in a workable competitive market.

Substantial market power, is a relative concept and does not require absolute freedom from competitive constraints but will generally require market power of a considerable or large degree.

These terms are used throughout this determination as per the above definitions.

6.1.1 Analysis has shown market power may be more prevalent with system configurations

BOX 10: THE PRESENCE AND EXERCISE OF MARKET POWER CAN UNDERMINE THE EFFICIENCY OF ECONOMIC MARKETS

In an energy-only market such as the NEM, the costs of generators, including fixed costs,

must be recovered over time through sales of electricity by way of spot and contract markets. Generators do not receive spot market payments during periods where their capacity is not dispatched. Volatility of energy spot prices is an inherent and necessary feature of a market with the characteristics of the NEM, allowing participants to recover their fixed costs while also incentivising investment. Flexibility is essential for maintaining a reliable system given the range of factors that impact on the dynamics of both demand and supply of electricity.

The efficiency of the NEM, and markets more generally, relies on participants being price takers — meaning no individual has influence over the prices for a good or service. When a firm, or in the case of the OSM a participant, is able to insulate itself from competition and influence the price at which it sells a good or service through manipulating supply or demand, this may indicate the presence and exercise of market power.

In the energy market, the Commission considers that transient pricing power, manifesting through occasional spikes in spot prices, to be an inherent feature of a competitive market and not in itself problematic. For example, it can serve to encourage new entry. Transient market power becomes a cause for concern if it occurs frequently enough and to such a degree that it raises average prices above the long-run marginal cost of providing energy or related services (for example, FCAS).

Although the Commission considers transient pricing power not problematic in the energy market as described above, this may not hold in the market for security services. Where there are few providers, and given the importance of these services for security, there may be no option except to accept bids from a few providers.

It may be difficult to determine whether transient market power would be enduring enough to become sustained market power, particularly at the start of the OSM. For example, consider what units comprise system configurations in South Australia. While there are multiple potential system configurations that could be used in each jurisdiction to manage system security, some units feature highly in many configurations. There are three portfolios that currently provide ESS for minimum system configurations in South Australia: AGL, Engie & Origin.⁵⁸ These contribute to making 95 possible system configurations. Applying a very simple version of the pivotal supplier test⁵⁹ shows that:

- removing AGL leaves 25 configurations available
- removing Engie leaves 21 configurations available
- removing Origin leaves 32 configurations available.

This rough analysis indicates that there may be some situations where suppliers of ESS for minimum system configurations in South Australia *may* have market power, particularly if

⁵⁸ As of January 2022, this is an accurate reflection of the unit combinations that AEMO has assessed to support secure operation in South Australia as supported by limit advice provided by ElectraNet.

⁵⁹ The pivotal supplier test determines whether the removal of any particular supplier in a market diminishes the ability to meet demand. This test helps to determine if a market is likely to be impacted by market power.

there are changes to the availability of units, for example, through planned or unplanned outages.

This also demonstrates that if there is any market power it may be more of an issue when system configurations are being used. This is why the Commission has designed the mechanism to encourage the move towards unbundled system services as soon as possible.

Without controls on market power in the OSM, market power could lead to inefficient outcomes and increased costs for consumers. For example, participants with market power could increase their offered prices due to low competition, resulting in:

- directly increased costs to meet minimum system configurations, and
- increased costs of energy and FCAS supply, as higher offers may reduce the ability to alleviate security-related constraints on lower priced generation.

6.1.2

Stakeholders and the rule change proponents also point to the potential for market power in the OSM

In submissions to the directions paper, stakeholders such as the AER, South Australian Government, the AEC, Hydro Tasmania, and Delta identified market power among the key issues for the OSM.⁶⁰ The South Australian Government raised concerns in relation to the ability for TNSPs and AEMO to contract directly with participants for the provision of services, which may be problematic in regions with concentrated generation markets.⁶¹ In TWGs, stakeholders raised similar issues, noting a general risk for shallow pools of OSM eligible participants within a region to directly impact the price for security services.

The AEC noted that market power issues can arise in both a MAS approach (for example, a spot market) and an NMAS approach (such as contracting).⁶² Hydro Tasmania considered that any initial market power in a MAS approach could be mitigated through initially entering contracts with participants to participate at set prices.⁶³ On the other hand, Delta considered that the NMAS would have a larger pool of providers and therefore more competition than a MAS, as a MAS would be more suited to fast-start providers.⁶⁴

The CEC considered that the 'aheadness' of NMAS, particularly under a model using long-term contracts, could weaken the incentive to participate in the new system strength framework.⁶⁵ Tesla also raised concerns about undermining incentives to participate in system strength arrangements.⁶⁶

60 Submissions to the directions paper: AER, p.2; South Australia Department for Energy and Mining, p. 2; AEC, p. 5; Hydro Tasmania, p. 19 and Delta Electricity, pp. 13-14.

61 South Australia Department for Energy and Mining, Submission to the directions paper, p. 2.

62 AEC, Submission to the directions paper, p. 5.

63 Hydro Tasmania, submission to the directions paper, p. 19.

64 Delta Electricity, Submission to the directions paper, p. 13.

65 CEC, submission to the directions paper, p. 7.

66 Tesla, submission to the directions paper, p. 2.

6.1.3 **The Commission considers that there may be the possibility of market power - but more in-depth analysis is required**

It is not possible to definitively conclude on market power without more in-depth analysis, due to the broad assumptions that would be involved in making this assessment. Our evaluation has been more theoretical, informed by the experience in South Australia.

Based on our initial analysis, as well as stakeholder feedback, there may be some circumstances — particularly at the beginning of the OSM where system configurations are being scheduled — in which market power may exist and be exercised. A market for security services such as the OSM may be particularly susceptible. This appears to be of greatest concern in regions where there are currently few participants that could provide security services through the OSM, such as South Australia. This trend is likely to begin occurring in other jurisdictions over time as more thermal generators (which form part of many configurations) exit the market.

Recognising this potential and stakeholder concerns, the Commission has designed the OSM with specific arrangements to mitigate any market power. Specific functions would be conferred on the AER to both assess and identify market power and recommend mitigation measures, as described below.

The Commission considers that the materiality of market power concerns should decrease over time as more suppliers enter the market. The Commission has designed the mechanism with this in mind, with the transparency arrangements set out in chapter 10 aiming to encourage innovation and new providers into the market, increasing competition.

In addition, the proposed approach to allay market power would be complemented by other frameworks within the OSM and more generally:

- the ACCC has the ability to monitor for anti-competitive behaviour in the market in accordance with relevant competition law
- the AEMC proposes a four-yearly review of the OSM (as described in section 10.1.6). This review would consider whether the market power controls remain fit for purpose and whether there are more appropriate methods to enable competition. If issues are found, the AEMC could recommend a rule change request be submitted to adjust market power mitigation arrangements.

6.2 **The OSM would have a two-step process to mitigate potential market power**

The Commission's proposed approach to market power seeks to:

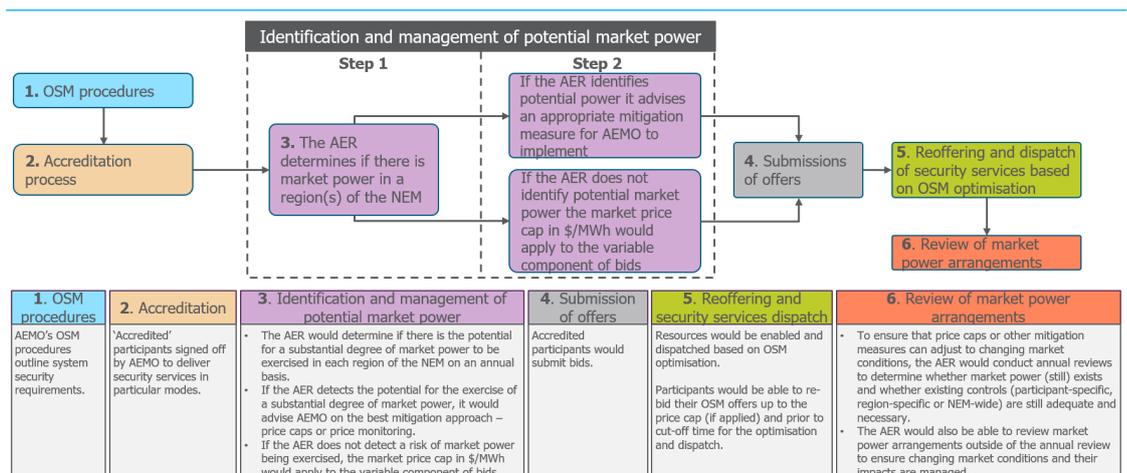
- control market power only where present, and allow competition in other cases, and
- achieve a price for ESS that reflects its value to the system (that would otherwise have been revealed through competitive outcomes) – not incurring inefficiencies by overpaying (increasing costs of system security for consumers) or underpaying (which results in missing out on sources of potential supply).

The AER would undertake annual reviews to manage the potential impact of market power on the OSM across regions of the NEM (draft clause 3.7H.1). These reviews would involve two steps:

1. The AER would assess whether there is the potential for the exercise of a substantial degree of market power in the OSM. In doing so, it would need to consider the extent of any market power and whether it is transient or sustained market power in the next year.
2. If it identifies market power, the AER would provide recommendations to AEMO for specific mitigation measures based on the extent of the potential market power identified. Measures would be set ahead of time to mitigate potential financial harm, and could take the form of a maximum offer price or 'cap', or price monitoring. The process of identifying market power and developing mitigation measures is highlighted in the purple boxes in Figure 6.1 and described in the rest of this section.

These proposed arrangements would give the AER a significant new function in reviewing market power in the OSM and proposing arrangements to mitigate any potential market power. It is crucial that the rule provides the AER appropriate guidance and flexibility in carrying out this role, is a proportionate and practicable response to address the risk of market power, and that the new function is scoped and designed in a way that does not place an undue resourcing burden on the AER or participants, and allows the AER to implement it in the timeframes required. The Commission is continuing to consult closely with the AER on its proposed role to ensure it meets these requirements, and is interested in stakeholder views on the market power arrangements.

Figure 6.1: OSM offer flow with the AER detecting potential market power, advising AEMO on the best course of action and AEMO implementing this approach



6.2.1

The AER would determine if there is the potential for the exercise of market power to affect the OSM

In its annual reviews, the AER would be required to determine whether it has identified the potential for the exercise of a substantial degree of market power in the OSM (draft clause

3.7H.1(c)(1)). The Commission considers it is important to note that the proposed market power framework focuses on the AER's ex-ante determination of the *potential* for market power, rather than whether participants *use* it.

The draft rule also requires the AER to identify broadly whether 'the potential for the exercise of a substantial degree of market power' exists in the upcoming year. This does not require evidence of actual market power but an assessment of whether the circumstances over the next year could give rise to market power concerns – which could encompass both sustained market power and transient market power.

The Rules would set out factors that the AER would consider in this analysis (draft clause 3.7H.1(d)). These are based on matters considered by the ACCC in its assessment of the misuse of market power, and include:

- market concentration (for example, number of participants, market share observations)
- substitutes and contestability of participants that can provide system configurations and other security services through the OSM
- barriers to entry (for example, technical limitations)
- demand elasticity of the services (for example, system security requires and is dependent on a certain amount of security services, making the demand for these services relatively inelastic)
- any other factors the AER considers appropriate.

Although the AER would need to consider the first four factors set out above, it could also take other relevant matters into account as reflected in the fifth factor, and it would have flexibility in what exact methods it applies to identify whether market power exists.

For example, in considering the factors outlined in the draft rule the AER's review could:

- look at how many secure system combinations exist in a particular region or in particular circumstances, and the ownership arrangements for the units in those combinations;
- analyse the potential for suppliers in these combinations to influence prices by withholding their units from the OSM; and/or
- consider whether the potential for market power exists during normal operation or is limited to when a region is islanded.

The flexibility in the AER's approach means that its assessment could accommodate changing market conditions in a transitioning power system where suppliers, technologies and security needs will continue to change over time.

The AER would also be able to observe and assess OSM participant behaviour and market information (for example, pricing outcomes) in evaluating the potential for the exercise of market power. The Commission expects that the first OSM market power review that would occur prior to market start would involve the AER's projections of potential for market power to be exercised in parts of the OSM, before market data and participant behaviour becomes available for analysis.

6.2.2 **If potential market power is identified, the AER would advise AEMO on the best approach to setting mitigation measures such as OSM price caps or price monitoring**

If the AER detects the potential for the exercise of market power, it would be required to recommend to AEMO the mitigation measures that it considers appropriate (draft clause 3.7H.1(c)(2)). Similar to identifying market power, implementation of mitigation measures, particularly prior to market start, may or may not be in response to the actual exercise of market power — but rather, the potential for it.

The draft rule deliberately gives the AER flexibility in recommending mitigation measures if it identifies potential market power. The AER would be able to recommend either the implementation by AEMO of:

- a cap applied to OSM bids, or
- price monitoring to track whether market power is being exercised (draft clause 3.7H.1(c)(2)).

These would apply for the following financial year.

In determining the appropriate measures to be applied and their specific details, the AER would consider its prior analysis of the market and could consult with AEMO or industry to inform its approach. It would also be required to consider the following principles outlined in draft clause 3.7H.1(e), along with any other relevant factors. The rule outlines that mitigation measures should:

- be proportionate to the extent of the potential market power identified,
- be consistent with the OSM objective, Security services guidelines and OSM procedures,
- minimise the effect of OSM participants' potential market power and their ability to influence OSM prices,
- reflect the value of providing security services to the power system,
- preserve incentives for participants to engage in the OSM and enter into system strength contracts,
- give participants a reasonable opportunity to recover efficient costs of providing a security service,
- allow price caps or price monitoring to vary based on changing market conditions if there is benefit in doing so,
- incentivise investment in and participation of new technologies; and
- minimise administrative burden for AEMO,
- any other matters the AER considers appropriate.

The AER would only be able to recommend mitigation measures where it identifies the potential for market power to be exercised (draft clause 3.7H.1 (c)(2)). This means market power would be controlled where it is present, but if the market for security services is sufficiently competitive, unnecessary controls would not be applied. Implementing price monitoring of the OSM would leverage the AER's current role and existing functions as the regulator of the NEM.

Price monitoring would provide a lighter-touch regulatory option for monitoring the prices and costs relating to the supply of security services. For example, this approach could be used where the AER identified the potential for the exercise of market power in a region, but considered this potential to not be extensive, or low-risk (for example, arising very few times per year). This approach would allow the AER to monitor whether prices become abnormally high in specific parts of the NEM which may indicate the ability for some OSM participants to influence the price of security services — a potential exercise of market power. Having this oversight would allow the AER to identify when market power issues emerge over time, and recommend the stronger approach of OSM price caps where needed.

6.2.3

The AER would have flexibility in setting OSM price caps

The AER would have flexibility in how to express an OSM price cap (draft clause 3.7H.2(f)). This would give the AER the ability to determine the best approach to a price cap depending on the nature and extent of potential market power identified.

Should a price cap be determined as the best mitigation measure, the AER would be able to advise AEMO of the method or formula for setting the cap, rather than the explicit level of the cap (draft clause 3.7H.2(f)(3)).

The table below illustrates some potential elements of the AER could formulate its recommended price cap:

Table 6.1: Examples of approaches to the OSM price cap

ASPECT OF OSM PRICE CAP	EXAMPLES OF HOW THE AER COULD APPROACH THIS ASPECT
Form in which the price cap is expressed	<p>The AER could set caps for each of the OSM bid parameters – so, for example, a cap could apply for variable costs measured in \$/MWh or \$/hour and a separate cap could apply for enablement costs.</p> <p>Regardless of the approach to determining the price caps, the Commission envisages that maximum prices would be set in the same format as OSM bids for consistency and transparency.</p> <p>See chapter 5 for more details on bid structure.</p>
Extent of application of the price cap	<p>The AER could, for example, set:</p> <ul style="list-style-type: none"> • a region-wide offer cap, • a participant-specific cap, or • a NEM-wide price cap.
The basis on which the maximum price is set	<p>The AER could use various factors or approaches to set the value of the cap – for example, it could set a cap:</p> <ul style="list-style-type: none"> • based on the costs of the most expensive provider plus a % margin

ASPECT OF OSM PRICE CAP	EXAMPLES OF HOW THE AER COULD APPROACH THIS ASPECT
	<ul style="list-style-type: none"> based on price regulation where an OSM participant earns revenue commensurate with a regulated per unit return based on the estimated costs of a new OSM entrant.
Timeframe over which the cap applies	<p>The AER could set caps based on different timeframes, for example:</p> <ul style="list-style-type: none"> caps that apply per bid for each parameter a cumulative price cap over time – for example, per day or per month – to cap participants’ total OSM revenue. This would be a similar approach to the current cumulative market price threshold (CPT) in the NEM’s energy only market.
The ability of the maximum price to adapt to changing market conditions	<p>The AER could choose to explicitly reference indexation to input costs in a methodology for maximum offer prices. For example, fuel or other input costs can vary and this may affect appropriate price caps.</p> <p>This would help ensure that maximum bid caps can adjust as needed to appropriate levels, and do not prevent the supply of security services if the market materially changes.</p>

6.2.4 OSM bids in \$/MWh would be subject to the market price cap, even if no market power price cap applied

Even if the AER did not recommend implementing price caps, all OSM variable bids measured in \$/MWh would be subject to the prevailing market price cap (MPC). This would maintain consistency with energy market pricing, and avoid distorting incentives for participation in the respective markets.

The Commission has not proposed any other price caps in the absence of the AER identifying the potential for the exercise of a substantial degree of market power.

6.2.5 There would be no caps on the fixed cost bid component

The Commission considered whether to impose caps on other elements of participant bids (fixed costs), or a cap on total OSM bids similar to the market price cap in the energy market. This would represent a cautious approach that aims to limit transitory market power and the potential financial harm to consumers. However, the Commission decided against this approach for two reasons:

- The AER would have significant flexibility in how it assesses whether potential market power exists, and mitigation measures it recommends. If the AER is concerned about a lack of competition in the OSM based on its analysis, it could come to a finding that potential market power exists, and implement a price cap or monitoring. Conversely, if

the AER does not identify potential market power, then there would be sufficient competitive pressure in the OSM for market power to not be of concern, and price caps would be unnecessary.

- Applying a cap to other price elements or total bids would likely be difficult and potentially prevent new entrants from entering the market. One possible approach would be to translate the current energy market price cap to an equivalent total OSM bid cap. However, this may be difficult given varying OSM enablement costs (for example, start-up costs) of certain participants (for example, thermal coal units), which may require the recovery of costs greater than this general amount.

Another potential option that was considered was to assign the role of setting an OSM price cap to a specific body, such as the AER or the Reliability Panel. However, as the security standard is currently a more holistic framework than an exact measure as compared to the reliability standard (which is used to set the market price cap), this is likely to be a particularly complex task and would require guidance to the body setting the cap – for example:

- what would the benchmark(s) be for setting a price cap – for example, would a 'value for customer security' be used; and,
- how the body would determine the benefits vs the potential costs of an overall price cap – noting that costs could include, for example, disrupting price signals for new entrants into the OSM.

The Commission also notes that the AER would have the ability to re-evaluate any market power recommendations it has made for specific regions or participants at any time between annual review cycles. This allows for flexibility in market power settings across the NEM, and ensures the AER could adjust arrangements as market conditions change or market power issues arise.

Ultimately, the Commission concluded that these extra caps to mitigate against market power were onerous and would be complex and complicated to implement and so has therefore decided against implementing these at this point in time. We are interested in stakeholder views on this conclusion.

6.2.6

AER market power reviews would be updated at least annually, and stakeholders would be consulted

The AER would conduct market power reviews at least annually, with:

- a draft review for consultation by 1 February each year (draft clause 3.7H.1(a)), and
- the final OSM market power review by 1 April, to apply for the following financial year (draft clause 3.7H.1(b)).

The AER would take stakeholder feedback into account in its final review. This timing leverages the AER's existing ongoing oversight of the NEM, as well as its ability to intervene should market power concerns arise.

The OSM would commence in October 2025, so in the first year of the OSM the AER would complete the draft review by 1 May 2025 and final review by 1 July 2025. See chapter 11 for more detail on proposed implementation timelines.

Any mitigation measures recommended by the AER would be in place for one year until the next review is complete. However, the AER could review market power arrangements within a financial year if there has been a material change in circumstances (draft clause 3.7H.3(c)).

This ensures there is flexibility to adjust caps and other mitigation measures if there are significant changes that change the assessment of whether market power exists and the best approach for managing it. For example, new entrants, technological advances and improved system understanding could increase suppliers of security services in a short space of time, decreasing market power.

AEMO would be required to publish updated price caps or implement other updated arrangements no more than 2 months after the AER's review or any updated review (draft clauses 3.7H.2 and 3.7H.3(a)).

6.2.7

The Commission is interested in hearing from stakeholders on market power

The Commission considers that market power, if not well-controlled, could be detrimental to the performance of the OSM and increase costs for consumers. As such, the Commission is particularly interested in stakeholder views on:

- whether market power would be a material issue for the OSM,
- whether the proposed approach to managing potential market power, through either price monitoring or price caps, is adequate to address the potential risks to market efficiency,
- whether stakeholders agree with the proposal to apply the market price cap to bids in \$/MWh for consistency with the energy market, but not to apply general caps to other bid parameters, as discussed in section 6.2.4,
- any proposed approaches to setting general caps for other bid parameters, and
- whether the broader design of the OSM would provide sufficient incentives to attract new investors and participants, thus increasing competition over time and reducing the potential for market power.

Given the importance of this issue, the Commission will have specific stakeholder engagement on the proposed approach to market power for stakeholder feedback following the publication of the draft determination and rule. The Commission is continuing to engage with the AER on its role in the market power arrangements. The Commission will also be seeking expert advice on the management of market power as it pertains to the OSM and supply of security services to inform its further considerations between the draft and final rule.

7

OSM TIMING AND SCHEDULING ARRANGEMENTS

BOX 11: KEY POINTS IN THIS SECTION

- The timing and scheduling considerations for the OSM aim to uphold the principles of market efficiency while meeting the security needs of the system.
- The Commission understands that the issue of how scheduling decisions are made for resources providing security services has been a key concern for stakeholders. The draft determination sets out arrangements with the principle of market efficiency at the heart of the design. These arrangements seek to leave as much of the existing arrangements and operation of the energy market in place as possible, maximise efficient outcomes, and meet the security needs of the system. We are particularly interested in stakeholder views on these matters given timing and scheduling arrangements are critical to the success of the OSM.
- The majority of the timing decisions would be at AEMO's discretion, but set out transparently in the OSM procedures and the *Spot market operations timetable*. This approach seeks to balance the need for flexibility as capabilities change over time with the strong call from stakeholders for transparency and clear governance of the mechanism. AEMO's decisions would be guided by the OSM objective - to maximise the expected value of spot market trading subject to achieving and maintaining security - as per draft clause 3.7G.11(a).
- Given the current engineering limitations, the OSM would procure security services in advance of real-time, focusing on the operational elements of security. This is needed to provide confidence the services will be available to manage the security of the system. Clauses 3.7G.7 to 3.7G.10 of the draft rule set out the parameters for scheduling through the OSM.
 - Bids into the OSM would be allowed from the same time as bids into the energy and FCAS markets (three weeks in advance).
 - Participants would be able to re-bid up to gate closure for the OSM. This would only apply to those participants who were participating in the OSM - the gate closure would not apply to the energy market. The time of OSM gate closure would be determined by AEMO. The Commission understands from discussions with AEMO that gate closure would be one to two hours before the final run of the OSM. The Commission would be concerned about an earlier gate closure time than this, given that this would likely result in less efficient decisions being made.
 - The OSM optimisation algorithm would run, with each run being the OSM simulation, and produce an OSM schedule based on energy, FCAS and OSM bids. The process would then iterate, with AEMO determining the frequency of iterations. Iterating the OSM simulations would produce updated OSM schedules at progressive intervals based on updated demand forecasts, generation forecasts and market bids. Iteration

is an important component of having efficient outcomes as forecasts and bids would be adjusted closer to real-time as more information is known.

- Participants would be enabled to provide security services in blocks, which are segments of the trading day. The length and granularity of the blocks would be at AEMO's discretion, considering efficiency, security and practicality principles as per the OSM objective. The Commission understands from the discussion with AEMO that the block length to be four to eight hours. The Commission would be concerned if the block length was longer than this as the longer the blocks, the greater the forecast uncertainty towards the end of the block. This means that scheduling of security services would be less reflective of the security requirements of the system.
- OSM enablement would be binding at the point of the final OSM run for a given block. The time of the final OSM run would be at AEMO's discretion, with regard to the principle that it is as close as reasonably practicable to spot market dispatch (draft clause 3.7G.9(f)). This principle would be set out in the rules. From this point, it would be the responsibility of the participant to bid into the energy and FCAS markets such that they could meet their OSM enablement.
 - The Commission understands from AEMO that the final OSM run would be two to eight hours before spot market dispatch. The Commission would be concerned if the time was towards the higher end of this spectrum due to the potential for inefficiencies to arise and is interested in stakeholder views on this as it should also be guided by participant response times to the final OSM schedule.
- Participants would receive the OSM price for their provision of security services when enabled through the OSM as detailed in chapter 8.
- The OSM schedule would be published such that participants are able to reflect expected market conditions in their bids and effectively position their assets. Draft clause 3.7G.9(a) sets out the principle for publishing the schedules - that is, that they be published as frequently as reasonably practicable to promote as much transparency as possible to participants.

This section covers the Commission's proposed approach to scheduling and timing considerations for the OSM, including:

- Section 7.1 - why clear and simple arrangements for OSM timing and scheduling are crucial
- Section 7.2 - how the OSM timing and scheduling arrangements have been designed to achieve efficiency and practicality.

7.1

Clear and simple arrangements for OSM timing and scheduling are crucial

The OSM would be a scheduling engine for defined services (draft clause 3.7G.3) with an objective function to maximise the value of trade as outlined in chapter 4 (draft clause

3.7G.2). Participants would bid into the OSM in real-time (rather than setting contract prices in advance as described in chapter 5) and the engine would decide which of these bids are needed, and over what timeframes, to maintain system security. Clarity on the scheduling process and timing arrangements for the proposed OSM is crucial to ensure participants and AEMO have the relevant information and sufficient time to make informed decisions on how to position plant.

Both rule change requests addressed scheduling issues:

- Hydro Tasmania⁶⁷ proposed that participants would bid and be paid for co-optimised real-time security services in the same way as for energy and FCAS.
- Delta Electricity's⁶⁸ proposed a day-ahead, ex-ante commitment market, where participants could be committed to provide security and reliability services for a whole day (for slow-start plant) or specific trading intervals (for faster-start plant). Providing participants with sufficient information in order to position their plant was the principle implicit to this design.

The Commission has considered these issues in the proposed OSM design. Scheduling and timing arrangements are set out in clauses 3.7G.7 to 3.7G.10 of the draft rule. Key concepts are explained in Box 12 and Figure 7.1 depicts the OSM scheduling process, which is explained in detail in subsequent sections.

In proposing these arrangements, the Commission has aimed to achieve efficiency and transparency which are crucial for the OSM to achieve its objectives and key assessment principles:

- Efficiency is promoted by:
 - requiring that scheduling decisions be made as close to real-time as reasonably practicable (to reduce forecasting error and accurately reflect likely market outcomes) and
 - having OSM iterate to give all participants an understanding of the likely outcomes of the OSM, and the opportunity to react.
- Transparency would be achieved by publication of the timing and scheduling arrangements in the OSM procedures and the *Spot market operations timetable*, both of which would be subject to stakeholder consultation.

The Commission is also mindful that practical factors would need to be taken into account in setting timings for the scheduling process, such as how long the OSM engine takes to run. Given work would be needed to design the OSM and understand the capabilities of the OSM engine in addition to these practical factors, flexibility would be provided to AEMO to determine aspects of timing and scheduling in consultation with stakeholders.

67 Hydro Tasmania, Synchronous services markets, Rule change request, 14 November 2019.

68 Delta Electricity, Capacity commitment mechanism for operational reserve and other system security services, Rule change request, 4 June 2020.

BOX 12: KEY OSM TIMING AND SCHEDULING CONCEPTS

This box summarises terminology which is used in Figure 7.1 and the remainder of this section.

Dispatch offers and dispatch bid: Offers and bids for energy and market ancillary services as used in the spot market and central dispatch process.

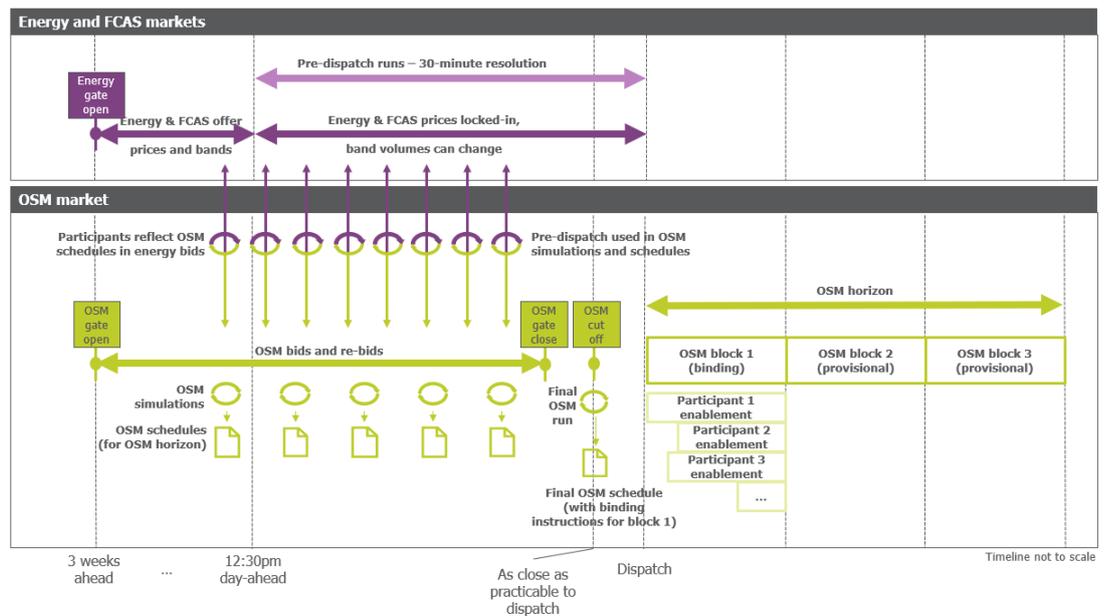
- **Final OSM schedule:** A schedule of OSM commitments for an OSM block that confers a must-run obligation on OSM units that are active in that schedule.
- **Indicative OSM schedule:** A schedule of OSM commitments that is determined and published as forecast information only.
- **OSM bid:** Multi-part bid prices submitted by OSM participants for use in the OSM simulation.
- **OSM block:** A segment of a trading day for which the OSM would make OSM enablements.
- **OSM cut-off time:** The time at which AEMO publishes and communicates the final OSM schedule for an OSM block. Decision-making in respect of this schedule (including running the OSM algorithm) would need to occur prior to this time.
- **OSM enablement:** Where AEMO has selected the relevant OSM facility for the provision of a security service and has notified the relevant OSM Participant accordingly (refer to *enable* in chapter 10 of the draft rule). This may be for a hydroelectric or thermal unit to be online and synchronised with the power system, or for a battery or other device such as a synchronous condenser to be in an operating mode so that it can provide services such as synthetic inertia.
- **OSM gate closure:** In respect of an OSM block, the last time for OSM participants to submit or revise OSM bids.
- **OSM horizon:** The set of time periods (or OSM blocks) that are included in the OSM simulation.
- **OSM simulation:** An execution of the OSM algorithm to determine an OSM schedule.
- **OSM run-time:** The time required to run the OSM algorithm, including any processing or review of the solution by AEMO operators. For the purpose of this document, it is assumed that this time is of the order of one hour.

7.2

OSM timing and scheduling arrangements have been designed to achieve efficiency and practicality

This section details the proposed approach to each timing and scheduling decision in the OSM. Figure 7.1 shows how all elements of scheduling fit together, with each one explained in the following subsections.

Figure 7.1: OSM scheduler - key components and interaction with pre-dispatch/dispatch



7.2.1 Gate opening for OSM bids would align with energy and FCAS

The Commission considers that it is important to align the timing for OSM, energy and FCAS bids as much as possible to allow participants to fully position their plant across energy and FCAS spot markets and the OSM and to minimise inefficiencies. To this end, participants would be able to start bidding into the OSM three weeks in advance, to align with energy and FCAS bids.⁶⁹ This is referred to as 'Gate open' in Figure 7.1.⁷⁰

7.2.2 Participants would be able to rebid into the OSM up until OSM gate closure

After submitting their first bid, participants would be able to re-bid into the OSM, with reasons, to allow them to reposition their plant as close to the time of dispatch. OSM gate closure would be the latest time that a participant could change its OSM bid before a final OSM run, as per draft clause 3.7G.7(c)(7).

The Commission considers that including a point of gate closure before dispatch is necessary because AEMO needs confidence that security services are available (see further discussion below). This would allow time for the OSM scheduler to run, based on the information provided through OSM bids, and for AEMO to produce an OSM schedule before dispatch. The

⁶⁹ AEMO, Guide to energy and FCAS offers, p. 8.

⁷⁰ The time for gate opening would not be prescribed in the rules, consistent with the approach for bidding into the energy and FCAS markets. AEMO would specify the time in the OSM procedures, as per the requirements in draft clause 3.7G.11(b)(3).

time of gate closure would be determined by AEMO and set out in the OSM procedures. The OSM procedures must be designed to meet the OSM objective⁷¹ - that is, to enable efficiency (draft clause 3.7G.2(b)) subject to maintaining a secure system (draft clause 3.7G.2(a)) - as per draft clause 3.7G.11(a).

This requirement is included to ensure that OSM gate closure would be as close as practicable to the final OSM run - an important principle to meet the key assessment criteria of efficiency.

Having gate closure close to the final OSM run would encourage efficiency by:

- allowing participants to respond to OSM iterations and changing market conditions until close to dispatch, allowing for the efficient re-positioning of plant across the OSM, energy and FCAS markets
- increasing the opportunity for competition between security services providers, capturing potential efficiencies through lower prices for these services closer to dispatch, and
- reducing the potential for forecast errors to affect the OSM.

Allowing participants to rebid OSM prices after 12:30pm the day ahead is different to the approach to rebidding energy in pre-dispatch - where participants can rebid their price bands until 12.30pm the day before and are only able to alter MW volumes within these price bands after this time.

There may be a risk of participants using late gate closure to their advantage.⁷² However, these concerns would be allayed by:

- the false, misleading or likely to mislead bidding provisions, requiring all bids and rebids to reflect participants' intentions. These already apply to bidding for energy and FCAS in the NEM and would also apply to OSM bids,⁷³ and
- the market power arrangements, where the mitigation measures, if implemented, may also mitigate the impacts of strategic bidding.

Gate closure is important for certainty that security would be achieved

Some stakeholders⁷⁴ raised significant concerns with AEMO having the ability to make decisions on behalf of participants ahead of dispatch (in this case, prevent them from rebidding into the OSM and schedule them to provide security services).

However, the Commission considers that gate closure in advance of dispatch is required for the OSM. AEMO would need time to run the OSM engine before dispatch and would need certainty at this time about the volume and prices for security services are available. System security is crucial, and lost efficiencies due to gate closure in advance are likely to be

⁷¹ The OSM objective is set out in draft clause 3.7G.2.

⁷² This could occur where participants initially bid low so that pre-dispatch shows low prices for security services, discouraging other participants from committing units, and then raise their prices when it is too late for this capacity to come online.

⁷³ These provisions are contained in clause 3.8.22A of the current NER. The draft rule includes OSM bids in these provisions. This clause is a tier 1 civil penalty provision that specifies that, at the time of making a bid, a participant must have a genuine intention to honour that bid or a reasonable basis on which to make such a bid.

⁷⁴ For example, stakeholder submissions to the directions paper: Hydro Tasmania, pp. 19-21; CEC, p. 5; the EUAA, p. 1; AGL, p. 3.

outweighed by the consequences of any security breaches that may occur due to participants altering bids (and thus adjusting the outcome of the final OSM run).

The Commission understands that AEMO would work to decrease run times and improve optimisation processes where possible over time, guided by the OSM objective and principles set out in the rules. This is a key differentiator between the OSM and the model put forward by Delta Electricity in its rule change request (a day-ahead model) - while there is some aheadness implicit in the OSM, the Commission understands from discussions with AEMO that gate closure (and OSM cut-off - see below) would be only a few hours before dispatch. This time should not be as long as a day ahead given that this would likely result in more inefficient decisions being made. Another differentiator is that the OSM would run on a continuous basis, instead of just on a day-ahead basis.

The proposed approach also has advantages for participants as the OSM would provide valuable revenue certainty in advance, as opposed to the energy and FCAS prices which are not known until dispatch. Participants would be able to reflect the risk of any residual opportunity costs in their OSM bids.⁷⁵

Participants would be able to continue to alter their energy volumes within their bid bands up until dispatch, as per existing processes, as long as this was consistent with their OSM bids. This would allow participants to account for changes in market conditions, for example, by changing the portion of their energy not required for security purposes.

7.2.3

OSM simulations would be run as frequently as practicable to produce the OSM schedules

Energy and FCAS bids and demand for energy and FCAS would be used as inputs to the OSM. The OSM optimisation algorithm would run, with each run being an 'OSM simulation', and produce an OSM schedule. The process would iterate, producing updated OSM schedules at progressive intervals (discussed in section 7.2.4) based on updated information on demand, generation forecasts and updated market offers.

To best incorporate this information, OSM would be run as frequently as practicable (as set out in draft clause 3.7G.8(c)) based on the latest available inputs (as per draft clause 3.7G.8(e)). AEMO would determine the exact timing through the OSM procedures, having regard to the OSM objective⁷⁶ and publish this in the *Spot market operations timetable* document.^{77 78}

Providing iterated OSM schedules would:

- promote **efficient dispatch** by allowing market participants to position and re-position assets (through the energy market) based on up-to-date market conditions and security

⁷⁵ For example, the energy price could spike between OSM cut-off and dispatch – participants would be expected to reflect their risk of missing these spikes in their OSM bid price.

⁷⁶ The OSM objective is set out in draft clause 3.7G.2. It sets out that the objective of the OSM is to achieve and maintain power system security and, subject to this, maximise the expected value of spot market trading.

⁷⁷ The *Spot market operations timetable* is an AEMO-administered document describing the timing of market information. AEMO is required to consult on updates to the *Spot market operations timetable*.

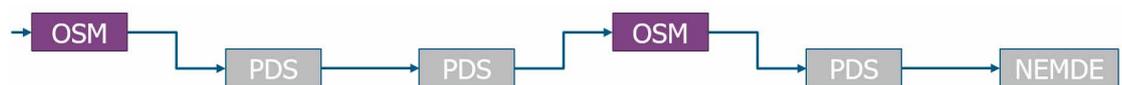
⁷⁸ Refer to clause 3.4.3 of the NER.

requirements. Both OSM participants and other market participants may wish to react to OSM schedules.

- promote **system security** by allowing AEMO to adapt quickly to changing market conditions, particularly as they relate to maintaining security.
- provide **transparency**, allowing participants to understand the likely outcomes of the OSM.

Given computational solve times and time for AEMO to validate the security of the OSM schedule, OSM simulations may occur less frequently than pre-dispatch runs (labelled 'PDS'), as shown in Figure 7.2 below.

Figure 7.2: Example of OSM simulation frequency



AEMO would have the flexibility under this approach to increase the frequency of OSM runs in future as:

- it develops its understanding of the power system
- there are improvements in computation times
- it develops confidence or efficiencies in the operational response to the mechanism, allowing for more automation.

Providing AEMO with the flexibility to determine the frequency of OSM runs (subject to the OSM objective) is different to the current approach to pre-dispatch, which sets out the timing for pre-dispatch runs in the NER. This is appropriate to accommodate improvements in AEMO's systems overtime. The Commission expects that AEMO would increase the frequency of OSM simulations, in line with the principle to run simulations as frequently as practicable, if and when run-times for the OSM improve.

7.2.4

The OSM and pre-dispatch would iterate to produce secure, efficient schedules

As described in section 7.2.3, each OSM run would use the most recent pre-dispatch information for energy and FCAS as an input into the OSM. The engine would use expected dispatch information to identify any expected security gaps in dispatch and expected pricing to identify whether there were opportunities to maximise the value of trade across the energy and FCAS markets and the OSM.

Pre-dispatch outcomes could also be affected by the OSM, because some plant being brought online in the OSM for security services can also provide energy. These participants would be required to reflect their expected OSM enablement (as shown in OSM schedules) in pre-dispatch by bid the quantity of energy required by the OSM into the energy market at the offloading price (<\$0 per MWh). This would ensure that the market can iterate towards efficient dispatch, by providing all market participants with visibility over the likely outcomes

of the OSM. Non-OSM market participants could then reposition energy offers in response to the OSM outcomes. Over multiple OSM runs, the energy market and OSM outcomes would iterate and converge to an efficient solution.

To avoid volatility in the market, it is important that this iteration can play out before OSM final enablements are made. It would therefore be important that all market participants understand the likely effect of the OSM on energy market outcomes so that they could position their plant accordingly across the OSM and energy and FCAS markets.

Draft clause 3.7G.11(b)(18) would require AEMO to set out in the OSM procedures how OSM enablements would interact with pre-dispatch and central dispatch, as well as directions, clause 4.8.9 instructions, and the RERT.

7.2.5

The OSM would optimise over a horizon and enable participants in blocks

Clauses 3.7G.8 and 3.7G.9 of the draft rule set out the parameters for the OSM simulation and schedule. Specifically:

- The OSM simulation would look ahead and optimise over a horizon (the OSM horizon). One horizon is shown in Figure 7.1. Draft clause 3.7G.8(b) requires that AEMO sets the horizon in the OSM procedures. The Commission expects the horizon length should be such that participants have sufficient foresight over the expected security schedule over the day.
- Facilities would be enabled to provide security services in segments of the trading day called OSM blocks. Several OSM blocks could be included in the OSM horizon (clause 3.7G.9(b) of the draft rule). Three blocks are shown in Figure 7.1.
- In a particular horizon, the first OSM block would be 'binding' (clause 3.7G.9(e) of the draft rule). At the OSM cut-off time, binding instructions would be issued to security service providers identified by the OSM for that block.
- The following blocks in each horizon would be indicative only (clause 3.7G.9(e) of the draft rule) and would provide a look-ahead to likely OSM outcomes, allowing participants to position their plant.

The length of OSM blocks and horizons would be left up to AEMO to determine and set out in the OSM procedures, as per draft clause 3.7G.8(b), and published in the *Spot market operations timetable* document, as per draft clause 3.7G.11(c).

The length of OSM blocks and horizons have trade-offs:

- Longer blocks provide more certainty for AEMO to achieve system security, as well as for participants to decide how to position their assets to interact with both the energy market and the OSM.
- However, longer blocks also come with inefficiencies because there is greater forecast uncertainty towards the end of the block, meaning there is greater uncertainty over the security requirements of the system. This may lead to added costs for consumers should forecasting errors reduce the accuracy of security requirements.

The Commission considers that AEMO is best-placed to make this trade-off, as it is able to understand both forecast uncertainties and security requirements. Therefore, the draft rule provides flexibility for AEMO to determine the length of OSM blocks and horizons. Nonetheless, the Commission expects the block length to be four to eight hours and would be concerned if the block length was longer than this due to the drawbacks of longer blocks outlined above.

AEMO would determine the granularity within OSM blocks for enablement

It is expected that each OSM block would be divided into more granular periods to allow flexible enablement within OSM blocks (represented in Figure 7.1 through the different enablement periods for participants 1, 2 and 3). This means that OSM providers could be enabled for shorter periods within a block if this was the efficient approach.

Flexible enablement periods have the advantage of efficiency and technology neutrality.

- They are more efficient because they allow for participants to bid within their plant's technical limitations (for example, start-up time, minimum run time etc.) and do not commit plant for longer than necessary.
- They are more technologically neutral than fixed blocks as they are more accommodating of fast start/stop technology, which may incur high costs or meet technological barriers to participating in long enablement blocks (for example, batteries). Flexible blocks would also be able to accommodate slow-start plant with longer minimum run times.

This would deliver lower costs to consumers.

Having flexible enablement periods within an OSM block is the Commission's preferred approach. However, under the draft rule, the granularity of enablements would be determined by AEMO and set out in the OSM procedures having regard for the OSM objective (as per draft clause 3.7G.11(b)(11)). The Commission considers this flexibility to be important as any minimum enablement and block granularity would be limited by the computational power and timing of the OSM simulation. This would not be known until the OSM engine is built and may improve in future so should have the flexibility to be altered.

7.2.6

Participants would consider opportunity costs in positioning their plant across energy, FCAS and the OSM before gate closure

The Commission considers that it is imperative to:

- incentivise participants to provide security services irrespective of the energy spot price
- reduce distortions in the energy and FCAS spot markets, and
- allow for representative price discovery across the energy, FCAS and OSM markets.

To achieve these aims, participants should be able to make commitment decisions regarding their plant close to dispatch. This aligns with feedback from stakeholders, discussed in section 7.2.2.

OSM participants would be able to position their plant by bidding into the OSM, energy and

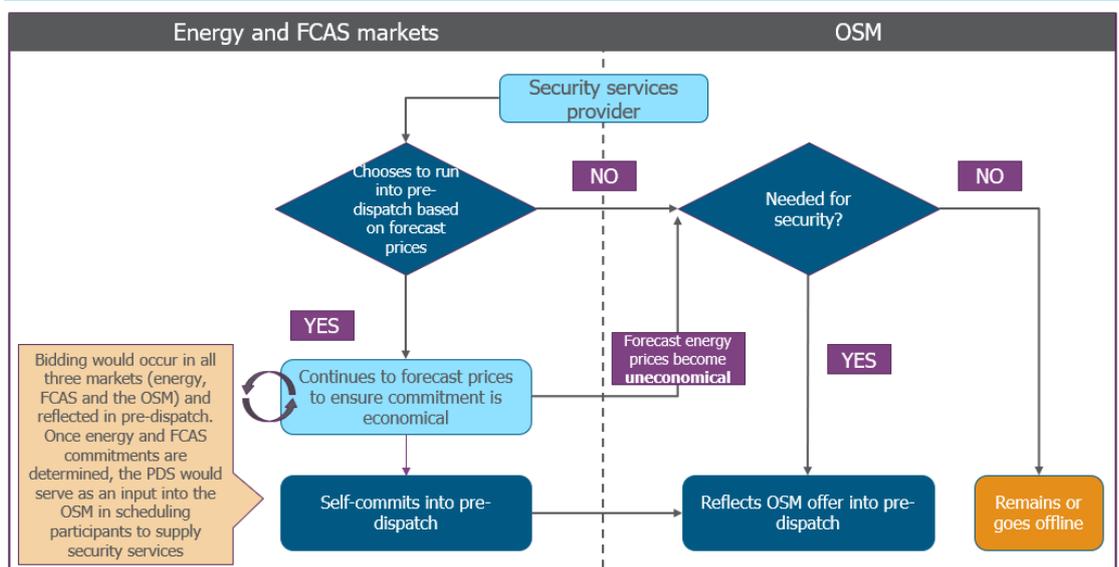
FCAS markets

As discussed in section 7.2.2, OSM gate closure would be the latest time for OSM participants to submit or revise their OSM bids and reflect their intention to be committed to provide security services. As discussed in section 7.2.2, the Commission expects that the time for OSM gate closure would be set with regard to security and efficiency principles and therefore occur as close to real-time dispatch as practicable (subject to OSM computational requirements). This would assist participants by providing good information on expected spot market outcomes. Participants could decide how to position their plant based on expected price outcomes of both the OSM and the energy and FCAS markets, providing the ability to weigh their costs more accurately.

In accounting for costs, OSM participants would be able to build opportunity costs into their OSM bids – for example, the risk of forgone energy or FCAS revenues. OSM participants would also have the choice to not commit into either the OSM or the energy market and remain offline.⁷⁹

Figure 7.3 below outlines how participants may choose to participate across the energy, FCAS and OSM markets prior to OSM cut-off time.

Figure 7.3: Choices available to participants prior to OSM gate closure and OSM cut-off time



⁷⁹ Regardless of their choice, OSM participants would be required to adhere to the false, misleading or likely to mislead bidding provisions in the NER and reflect their intention to commit into either energy or the OSM in pre-dispatch.

7.2.7 OSM participants would be enabled at the OSM cut-off time

The cut-off time would be as close as practicable to dispatch

The OSM's cut-off time would be the point at which a participant's OSM enablement for a specific block would bind. Under draft clause 3.7G.9(f), AEMO would have the flexibility to determine the cut-off time and be required to publish this in the *Spot market operations timetable*, on the condition that it is as close as reasonably practicable to dispatch.

It is critical to ensure that cut-off is close to dispatch to support economic efficiency, as:

- the most up to date information and forecasts can be taken into account, and
- only the required plant is committed by the OSM, keeping costs to consumers to a minimum.

However, there are also practical considerations that need to be accounted for, including the run time for the OSM, sufficient time for AEMO to ensure that security is being achieved, the need for AEMO to resolve any unintended violations that may occur, and the need to provide participants with sufficient notice to ensure that they are able to meet their OSM enablement.

A flexible approach to cut-off time would allow these factors to be balanced, and provide certainty that security requirements would be met.

AEMO has advised that the time between cut-off and dispatch would be two to eight hours. The Commission would be concerned if the time was towards the higher end of this spectrum due to the potential for inefficiencies to arise, and is interested in stakeholder views on this as it should also be guided by participant response times to the final OSM schedule.

A consistent cut-off time would support technology neutrality

Having a single cut-off time for all participants supports technology neutrality, as all technologies would receive binding instructions at the same time, regardless of start-up time.

The Commission acknowledges that this may introduce some security risk, as binding enablement may be issued later than the start-up time for slow-start plant. This may discourage slow-start plant from participating if there is significant uncertainty about whether they are likely to be committed. However, we consider that this risk is best managed by the participant by reflecting it in their bid prices. For example, the plant may bid slightly higher to reflect the risk that they are not required after starting up in anticipation of OSM enablement.

In addition, AEMO's latest ISP suggests that existing slower start thermal generation is likely to retire with increased frequency over the next five to ten years. Accordingly, the Commission expects that the materiality of this risk would decrease over time.

Enablements would be communicated through the OSM schedule

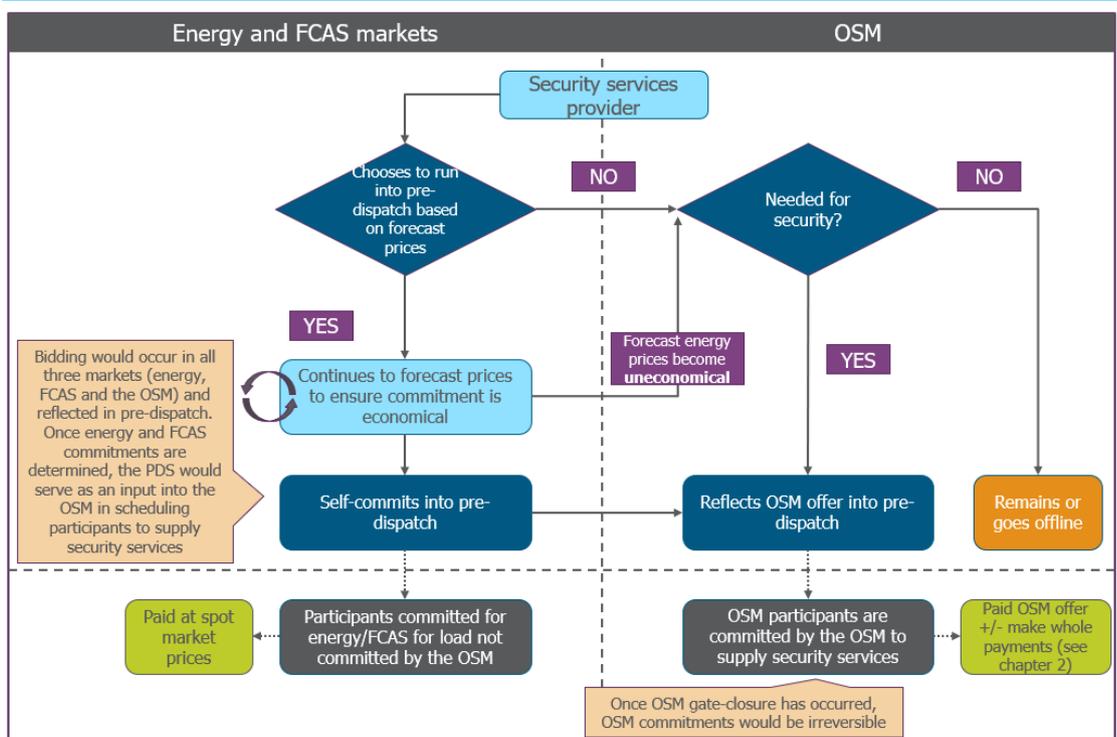
As explained in section 7.2.5, only the first OSM block would be binding in each run of the OSM simulation – subsequent blocks would provide an indicative look-ahead (draft clause 3.7G.9(e)).

Binding enablements would be communicated to participants through the final OSM schedule, which would be published at the cut-off time (draft clause 3.7G.9(e)). AEMO would also issue a dispatch instruction to enabled participants (draft clause 3.7G.10).

After the OSM cut-off time, participants would need to ensure that they were bidding into the energy market in such a way as to meet their OSM obligations for that block. Participants would not be able to re-position the OSM-enabled portion of their generation/load into the energy or FCAS markets. This would provide assurance that the security needs of the system would be met through OSM enablement. If a participant did not provide energy with its security services, it would simply need to ensure that its plant was positioned to deliver on its enablement.

Enabled participants would receive their OSM price for the period of their enablement in accordance with the arrangements set out in chapter 8. Participants would still be able to earn energy or FCAS revenue for any generation/load above the portion committed by the OSM (for example, above minimum generation), while also benefiting from the certainty of an OSM payment for providing security services. Figure 7.4 shows the choices available to participants following OSM gate closure and cut-off.

Figure 7.4: Choices available to participants following OSM gate closure and OSM cut-off time



7.2.8 **The OSM schedule would be published as frequently as practicable**

Transparency of the OSM schedule is important to allow OSM participants to reflect expected market conditions in their offers and all market participants to effectively position their assets.

As such, under draft clause 3.7G.9(a) AEMO would need to publish the output of each OSM run as an OSM schedule – either as a provisional schedule or a final schedule.

- The final schedule would show binding OSM enablement – it would reflect the last OSM run before the cut-off time.
- All other OSM runs would produce a provisional schedule showing likely OSM outcomes, published as forecast information only.

Publishing both the provisional and final OSM schedules would:

- notify OSM participants of their (likely) enablement,
- ensure OSM competitors can respond quickly to changing OSM information; and,
- provide information to ensure the broader market understands the outcomes of the OSM and can make decisions accordingly.

Publication of OSM runs is also consistent with the Rules requirements for AEMO to 'regularly' publish pre-dispatch results, in accordance with the *Spot market operations timetable*.⁸⁰

AEMO would be required to describe when it would publish OSM schedules in the *Spot market operations timetable*. This should be in the same timeframe as pre-dispatch, which is currently used to communicate expected energy and FCAS market outcomes.

AGL⁸¹ considered that having the OSM separate to the central dispatch process would result in less transparent scheduling relative to a co-optimised approach (such as the MAS). The Commission considers that the OSM can have equal levels of transparency relative to a MAS approach by the publication of scheduling decisions through the OSM.

7.2.9 **Participants would be required to bid into pre-dispatch consistent with OSM enablement, if applicable**

The draft rule would place obligations on participants to ensure that OSM outcomes are reflected in pre-dispatch. Draft clauses 3.7G.9(g) and 3.7G.10(b) require that participants change their inputs into central dispatch, if necessary, to achieve their OSM enablement as indicated in both indicative and final OSM schedules. This means:

- a participant that provides security services alongside the provision of energy (for example, a synchronous thermal generator) would change its pre-dispatch bids to reflect its provisional or final OSM enablement as per the provisional or final OSM schedules. This participant would bid the quantity of energy required into the energy market at the offloading price (<\$0 per MWh).⁸²

⁸⁰ Refer to clause 3.4.3 of the NER.

⁸¹ AGL, Submission to the directions paper, p. 3.

⁸² Refer to clause 3.8.6(a) of the NER.

- a participant that provides security services without also providing energy (for example, a battery operating in virtual machine mode) would ensure that it maintains the necessary headroom or other requirement as per its OSM accreditation to meet its OSM obligations as per the provisional or final OSM schedule.

This approach aligns with the false and misleading bidding provisions for the energy market. By reflecting expected OSM outcomes in energy offers, the participant would be upholding its obligations under the NER to not bid in a misleading manner.⁸³ The AER would need to monitor compliance with OSM bidding requirements which would be consistent with its current bidding monitoring.

⁸³ Under clause 3.8.22A of the NER, any market participants must not make a dispatch offer, dispatch bid or rebid that is false, misleading or likely to mislead.

8 HOW PARTICIPANTS WOULD EARN REVENUE FROM THE MECHANISM

BOX 13: KEY POINTS IN THIS SECTION

- Participants have raised concerns about the current compensation process under directions. Therefore, given the OSM is designed to be an improvement on the directions process, it is important that the revenue earned from participants under the OSM addresses those concerns by being more transparent, reflective of costs and more predictable for participants.
- Participants would be able to choose whether to participate in the OSM; and if so, would receive revenue by providing security services that are valuable to the power system.
- Participants would be able to submit bids with both a variable component allowing them to reflect running costs, and a fixed enablement component allowing them to reflect fixed costs (for example, startup costs). Variable bids would be expressed in \$/MWh if the participant provided energy with their security services; otherwise in \$/h.
- Including both a fixed and a variable component in bids would allow participants to best reflect their costs in their bids and for the most cost-effective bids to be selected. This would lead to lower costs for consumers.
- A participant enabled by the OSM would receive their variable bid over their period of enablement. The OSM would provide enablement revenue to reflect any enablement costs (or savings) incurred due to the OSM - participants would:
 - receive their fixed enablement bid if the OSM causes them to come online and incur enablement costs
 - not receive their enablement bid if they are already self-committed in the energy market and the OSM simply extends their time online
 - have their enablement bid deducted from their overall revenue if the OSM enables them between two periods of self-commitment to reflect the saving in enablement costs.
- AEMO would use dispatch information, and could require participants to submit further information, to determine when participants receive enablement costs. AEMO would recover revenue if a participant has not delivered the service that they were enabled for.
- An OSM settlement process would ensure that participants received their OSM price and any energy revenue was 'zeroed out' through a make whole payment.
- Both market participants and customers would benefit from the OSM's provision of security services. OSM costs would be allocated to market customers, taking into account regional benefits and the customer's proportion of load. This is because customers would ultimately benefit from the efficient price outcomes. Market participants would benefit to

varying degrees - for example, some participants would benefit by being able to dispatch more lower-cost energy where the OSM has alleviated a security constraint while others benefit more generally from the maintenance of a secure system. Benefits to market participants would be complex. Given that engineering understanding is still evolving as described in chapter 2, the Commission considers that it is not currently possible to accurately identify the degree to which market participants benefit in order to allocate costs to them.

- The benefit of the OSM is that the revenue that participants would receive through this mechanism would be more transparent, more certain, and better able to reflect the full costs of providing a security service than any existing revenue that they may receive through the ad hoc directions process. This would provide price signals to innovators and market participants about what services are needed in the market and so what investment, operational and retirement decisions participants should make to respond to those signals.
- OSM revenue arrangements have been designed to not distort spot market outcomes.

This section discusses:

- Section 8.1 — Participants' revenue
- Section 8.2 — Cost allocation and settlements.

8.1 Participants' revenue

Participants that choose to participate and bid into the OSM would be 'enabled' to provide security services where AEMO has selected the relevant OSM facility for the provision of a security service and has notified the relevant OSM Participant accordingly (refer to *enable* in chapter 10 of the draft rule). For example, an OSM enablement may be for a thermal unit to be online and synchronised with the system or a battery to maintain a certain level of headroom so that it can provide security services.

When a participant is enabled through the OSM, it would receive revenue according to its OSM bid as outlined below. As explained in chapter 5, bids would generally comprise two components: a variable component (the 'OSM variable price') and a fixed enablement component (the 'OSM enablement price') (draft clause 3.7G.7(c)).

8.1.1 Variable costs would be reflected in the OSM variable price

The variable price allows participants to reflect their variable costs, and would be:

- in \$/MWh if the participant produces energy along with security services or
- in \$/h if the participant does not produce energy when providing the security services.

Participants would earn revenue equal to their variable bid, multiplied by their enablement time and any output parameters. For example, if a participant had a minimum loading level of 2MW through which it provided security services, and a variable offer of \$100/MWh, it would earn \$200/hour when enabled through the OSM.

8.1.2 **Fixed enablement costs would be reflected in the OSM enablement price**

Participants would also be able to include a bid component reflecting their fixed enablement costs.

Under the draft rule, a participant would only earn OSM enablement revenue when the OSM causes a participant to come online and incur enablement costs. This would ensure that consumers are only paying costs that reflect the true value of supplying security services.

A participant would not earn enablement revenue if they are already self-committed in the energy market and the OSM simply extends the participant's time online (draft clause 3.15.6C(b)). In this case, the participant would have already made a commercial judgement that incurring enablement costs was worthwhile, and would have incurred these costs even without the OSM. It would not be appropriate for the OSM to provide revenue for enablement in this case, because consumers would be paying through the OSM for costs that were not actually incurred due to the provision of security services.

If the OSM causes the participant to *avoid* an enablement cost that they would otherwise have incurred, this would be reflected by deducting the avoided cost from its OSM revenue (draft clause 3.15.6C(b)). Participants would avoid enablement costs where they would have been offline for a period prior between self-commitments if the OSM had not kept them online. Awarding enablement costs in this scenario would:

- distort a participant's offers into the spot market and reduce price discovery as offers would no longer reflect the costs of its commitment.
- not be technology-neutral, as inflexible plant with enablement costs would be given an advantage over flexible plant in the spot market.

Deducting enablement costs from OSM revenue recognises that the OSM has 'saved' the participant those enablement costs, which the participant would otherwise have judged worthwhile to incur in re-committing into the energy market. Consumers should not pay these costs - the costs that flow through to consumers should reflect this 'saving'.

These arrangements would keep costs for consumers to a minimum as consumers would only pay where a unit has genuinely incurred enablement costs because of the OSM. It is important to note that this differs from the energy market's current arrangements which does not have a two-part bidding system. Participants in the energy market are expected to recover their fixed costs (for example, start-up costs) through their energy bids and manage the risk of not being dispatched after they decide to start up. While this is suitable for market participants that can determine their own commitment timeframes, the OSM's scheduling of security services does not lend itself to this approach. This is because it is the OSM scheduler, not the participant, that would be determining the commitment period and timeframe. As a result, it is difficult for a participant to accurately manage risks because they are unable to determine when or for how long they would be committed to provide security services. This approach ensures that participants are compensated accurately, to ensure they are not worse off from participating in the OSM while also ensuring consumers do not pay more than necessary.

It would also maintain competitive neutrality between energy market and OSM participants, by ensuring that OSM participants do not gain an unfair advantage by having enablement costs covered that they would have otherwise been willing to cover themselves.

AEMO would describe in the OSM procedures how it would determine whether a participant is entitled to recover its enablement price (draft clauses 3.7G.11(b)(19)(ii) and (iii)). It is envisaged that to determine enablement revenue for participants, following dispatch AEMO would look at the periods adjoining an OSM enablement on either side (shown in the diagram below). Essentially:

- if the participant is not self-committed on either side of its OSM enablement, it would receive enablement costs and variable costs
- if the participant is self-committed on one side, it would not receive enablement costs but would receive variable costs
- if the participant is self-committed on both sides, it would receive variable costs minus enablement costs.

Participants would take these revenue arrangements into account when bidding into the energy and FCAS markets. For example, in deciding whether to self-commit in a period adjoining an OSM commitment, they would take the foregone enablement costs into account. This would incentivise participants to make efficient offering decisions that reflect their underlying costs – they would still stay online if it is profitable to do so – and the approach ensures consumers do not pay costs that participant would have considered commercially justifiable to incur through the spot market.

These scenarios are described in Figure 8.1.

Figure 8.1: Example start up cost compensation

Scenario	Revenue outcome	Example
Brought online just for the OSM	Participant earns the start-up cost	Offline Activated in the OSM Offline
Self-commitment is brought forward or pushed back	Participant does not earn the start-up cost	Offline Activated in the OSM Self-committed in the energy market OR Self-committed in the energy market Activated in the OSM Offline
Kept online between two self-commitments	OSM compensation reduced by start-up cost	Self-committed in the energy market Activated in the OSM Self-committed in the energy market

The Commission considers that revenue arrangements would influence how participants engage with the OSM. As such, the Commission is interested in stakeholder views on whether the proposed approach to revenue would provide adequate incentive for participants to engage with OSM and if there are any potential issues.

8.1.3 Certain commitment information would be required to determine OSM revenue

AEMO may need to record commitment information from participants to determine OSM revenue. Specifically, the approach to enablement revenue would require an understanding of whether a participant is in the following states at different times:

- activated by the OSM
- self-committed in the energy market, or
- offline or idle.

This information could be provided both by:

- AEMO – when it enables an otherwise idle participant through the OSM, and
- the participant, through its bidding system when it self-commits into the spot market.

The OSM procedures would outline any information AEMO requires from participants to determine revenue (draft clause 3.7G.11(19)(iv)). AEMO would also be able to use its binding OSM schedules and dispatch instructions to determine a participant's adjacent self-commitments, and therefore the revenue it would be entitled to receive.

8.1.4 AEMO would be able to recover payments if participants do not deliver on an enablement

It is possible that participants would be scheduled by the OSM and receive revenue for providing a security service, but not in fact provide that service. For example, a battery could be enabled to provide headroom which it in fact does not reserve. AEMO would outline in the OSM procedures how it would determine whether the participant has provided the security service, and any amount of revenue to be recovered if the participant fails to provide the service (draft rule 3.7G.11(b)(19)(i)).

8.2 Cost allocation and settlements

8.2.1 OSM settlements would include the participant's OSM bid plus a make whole amount to adjust for energy revenue

As discussed in section 8.1, when a participant is enabled through the OSM, it would receive the relevant OSM price, but would not be exposed to the energy price for its provision of security services.

The introduction of the OSM would not modify current energy settlement procedures. As such, when a participant that generates energy is enabled through the OSM, the participant would receive the energy price through the existing settlement process.

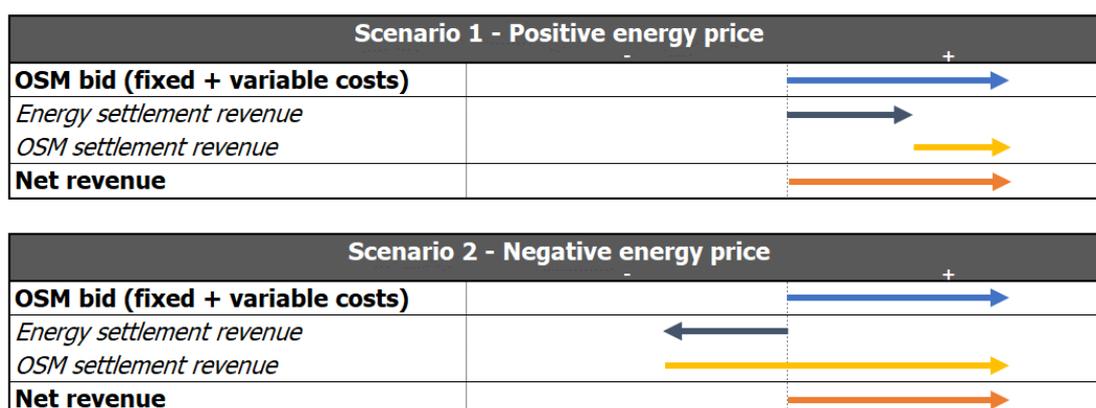
To ensure OSM participants receive the OSM price, there would be an additional OSM settlement process. In this process, the participant would receive:

- its OSM bid over the enablement period (variable costs and enablement costs, as applicable) (draft clause 3.15.6C(b) - definition of security services payment (SSP_{EP}))
- adjusted by a make whole amount equal to its energy exposure for security services so that the resource is not exposed to the energy price (draft clause 3.15.6C(b) - definition of $ETA_{EP,CP}$).

The make whole payment could be positive or negative and would essentially 'zero out' the energy revenue received by the participant. The make whole payment would only apply to the energy production associated with the unit's provision of security services – which would usually be its minimum generation level. This level would be agreed ahead of time as part of the accreditation process. A participant would be able to earn energy revenue as usual for any other generation.

Figure 8.2 illustrates how make whole payments would work through two scenarios.

Figure 8.2: Make whole payments in OSM settlement



- In Scenario 1 (where the participant earns positive energy revenue over the enablement period) — the participant earns its OSM variable and start up offers and a negative make whole payment that negates the energy revenue over the enablement period
- In Scenario 2 (where the participant earns negative energy revenue over the enablement period) — the participant earns its OSM variable and start up offers and a positive make whole payment that negates the energy revenue over the enablement period.

Hydro Tasmania noted in its submission to the directions paper, the MAS approach would not require make whole payments, as any energy exposure could be reflected in OSM offers.⁸⁴

Participants such as Shell identified that the possibility of distorting spot market price signals is a concern and that the OSM should not diminish price discovery in the spot market.⁸⁵

⁸⁴ Hydro Tasmania submission to the directions paper, p. 26.

⁸⁵ Shell submission to the directions paper, p. 2.

The Commission agrees that each of these elements are important considerations when designing the market structure. The Commission has developed the OSM settlement process to minimise distortions in the spot market.

8.2.2

Cost recovery and allocation to market customers

The Commission considers it is generally most efficient, and practical, to allocate the costs of security services to parties who use and directly benefit from them.

The OSM would provide broad benefits to:

- all market participants to a degree, by helping to ensure the power system remains secure
- specific market participants that can be dispatched to a higher level due to the OSM addressing security constraints
- consumers who benefit from a secure system and less costly dispatch due to the OSM alleviating constraints on lower cost dispatch.

The Commission notes that some stakeholders, including EUAA, Shell and MEU, considered that the costs of security services should be recovered on a beneficiary pays basis, rather than imposing all costs on consumers.⁸⁶

However, due to the nature of security services and current understanding of the system, it is difficult to accurately isolate beneficiaries and determine the degree to which they benefit. For example, the enablement of an OSM participant may:

- alleviate a binding security constraint – enabling an increase in the energy output of certain market participants, and
- simultaneously, contribute to meeting a minimum system configuration – benefiting all market participants by maintaining system security.

It is clearer that all energy consumers would benefit from procurement through an OSM, because the OSM would help ensure a secure supply across the NEM. The OSM would also help reduce costs of dispatch through alleviating constraints and allowing for a more efficient dispatch, all of which ultimately flow through to consumers. The Commission also notes that currently, the use of directions for security result in costs which are recovered from market customers and ultimately consumers. The OSM's proposed approach is similar.

As such, the Commission considers that it would be most practical to recover the costs of OSM payments from market customers, given that the benefits flow to market customers, and given this approach would continue the current cost allocation arrangements for directions.

The amount recovered from each market customer would be a portion of total OSM costs. Amounts would be adjusted according to the size of that customer's load and any specific benefits flowing to that customer's region from the OSM.

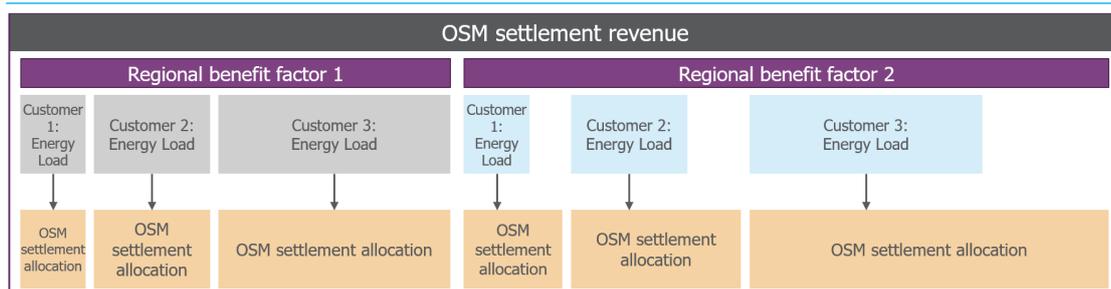
⁸⁶ Submissions to the directions paper: Shell, p. 6; EUAA, p. 1; MEU, p. 2.

Cost recovery from each market customer over an enablement period would be calculated as follows:

- The sum of all OSM enablement costs applicable to the customer’s region, that is:
 - total OSM costs across the region for security services (consisting of variable costs, enablement costs, make whole payments and any other applicable cost parameters) multiplied by the regional benefit factor, if applicable,
- multiplied by the the customer’s load expressed as a proportion of the regional load (draft clauses 3.15.6c.(g)-(h)).

An example of this calculation is shown in Figure 8.3. As demonstrated in Figure 8.3, customers would be allocated the costs of security services based on the amount of energy consumed and their regional benefit factor. Region 2 receives higher benefits and so consumers in this region are allocated a great proportion of costs.

Figure 8.3: Allocation of OSM settlement to market customers



Regional benefit factors (RBFs) would allow the cost of security services to be allocated differently among regions according to the benefits received from security services (see Box 14 for an example). AEMO would be required under the Rules to develop and publish the regional benefit security services procedures which would set out RBFs for each OSM security service for each region (draft clauses 3.15.6C(a); 3.15.6C(d)-(f)). This aligns with the existing process for ancillary services in the regional benefit ancillary services procedures.⁸⁷ The RBFs for each region, and any changes to them, would be subject to consultation in accordance with the draft rules consultation procedures (draft clause 3.15.6C(d)).

Using regional benefit factors allows for flexibility in cost allocation, as RBFs can be adjusted over time to reflect new technologies and improved understanding of security needs and benefits.

⁸⁷ AEMO, Regional benefit ancillary services procedures, June 2015.

BOX 14: EXAMPLE OF REGIONAL BENEFIT FACTORS IN THE OSM

- If enabling an OSM resource manages a voltage issue in South Australia and Victoria only, AEMO could determine the following RBFs for the security service provided:
 - SA : 0.5
 - Victoria: 0.5
 - NSW, QLD and Tasmania: 0.
- If enabling an OSM resource manages a security risk in South Australia only, AEMO could determine the following RBFs for the security service provided:
 - SA: 1
 - Victoria, NSW, QLD and Tasmania: 0.

Source: AEMO, Regional benefit ancillary services procedures, June 2015, p. 6.

It is possible that the OSM costs for a particular period would be negative. This is theoretically possible if a unit that produces energy has been enabled by the OSM, and after enablement (i.e. the unit has been committed), the energy spot price subsequently moves higher than the unit's OSM price. In this situation, AEMO would recover energy revenue that is greater than the OSM enablement costs. Should this situation arise, these savings would be distributed to market customers in the same way as costs are allocated. However, it is likely that participants would generally aim to avoid this situation through positioning their plant across the OSM and energy markets to receive the greatest revenue according to anticipated prices. .

The Commission considers the proposed approach to OSM cost recovery is both efficient and practical given the current engineering understanding of the system, the broad benefits offered by security services and the physical nature of these services. Given the complexities involved in cost allocation, the Commission is particularly interested in stakeholder feedback on the proposed cost allocation approach.

8.2.3

Settlement timing

AEMO currently settles the energy and FCAS spot markets weekly, with daily analysis of customers' financial exposure to ensure customers remain within credit limits.

To ensure that the OSM settlement process is consistent with these timings, OSM revenue would be calculated:

- over each contiguous period that a participant is enabled through the OSM, and
- to the extent that enablement spans multiple trading days, separately for each trading day (draft clause 3.15.6C(a) - definition of 'enablement period').

This would allow OSM settlements to be aligned with current market processes, including daily analysis of customers' financial exposure and weekly settlement of OSM revenue.

9

OSM INTERACTIONS WITH THE PLANNING TIMEFRAME FRAMEWORKS

BOX 15: KEY POINTS IN THIS SECTION

- The OSM is an operationally focused mechanism that would manage operational system security outcomes in the NEM more efficiently than they are currently managed, such as through directions.
- However, under the current frameworks, there are a number of ways in which NSPs can enter into planning timeframe based contracts with service providers that help manage system security.
- One such example is the arrangements put in place through the Commission's recent System strength rule, which allowed NSPs to potentially contract with a non-network solution (such as a privately owned synchronous condenser or an existing synchronous generator) to provide system strength to meet the system strength standard.
- Another example is the Network Support and Control Ancillary Services (NSCAS) contracts that may be delivered to maintain power system security and reliability or to maintain or increase the power transfer capability of the transmission network
- Such planning timeframe contracts with service providers in the market would have the option of being scheduled through the OSM to better marry the investment and operational timeframes. This would allow contracts to be used most effectively and result in lower cost outcomes for consumers.
- As explained in chapter 4, in addition to these contracts entered into in the planning timeframes, AEMO can also *procure* additional security services in the operational timeframe in order to maximise the value of trade to consumers. This may include procurement of additional contracts for system strength - to the extent that the estimates of system strength in planning timeframes is different to what is needed in operational timeframes.
- Importantly, regardless of how or when these contracts were procured, under the draft rule, the OSM's scheduling process would not prioritise any of these contracts procured by NSPs above other resources scheduled through the OSM. This is because artificially constricting the number of possible outcomes would likely result in a less efficient outcome.
- In relation to how parties in the system strength contracts would receive revenue, the draft rule arrangements would see units compensated by the OSM for variable costs, and by system strength service providers (SSSPs) for any further costs under the contract (for example, availability payments). SSSP cost recovery would build on the system strength framework to prevent SSSPs from being compensated twice for providing the same service.

- In addition, in order to build in flexibility as the power system transitions and the understanding of the power system evolves, the draft rule allows – but does not require – NSCAS contracts to be scheduled through the OSM. It is up to AEMO’s discretion to determine if individual contracts share the OSM’s objective and are suited to being scheduled through the OSM.
- Regulated network equipment scheduled and managed outside of the pre-dispatch process (such as network controlled synchronous condensers) would not be eligible to participate in the OSM as such investments have separate cost recovery frameworks already in place.

This section outlines:

- Section 9.1 - The OSM would allow scheduling of planning-timeframe contracts in the operational timeframe
- Section 9.2 - The role for the OSM in the system strength framework
- Section 9.3 - Optimisation of SSSP-procured contracts and AEMO operational procurement would not use a hierarchy
- Section 9.4 - Contractual and settlement arrangements under the OSM for system strength contracts
- Section 9.5 - Ensuring adequate cost-recovery and preventing over-compensation
- Section 9.6 - The interaction of NSCAS and the OSM
- Section 9.7 - The OSM as an input to help justify long term network investments.

9.1 The OSM would allow scheduling of planning-timeframe contracts in the operational timeframe

The OSM has been designed to better manage system security in the operational timeframe, because by optimising the procurement and scheduling of security services alongside energy and FCAS, the OSM would be able to maximise value for consumers while managing security.

In addition to operational procurement, the OSM would be able to schedule security services procured under contracts in the planning timeframe, such as TNSP-procured system strength and NSCAS contracts, to help with this outcome.

The rule change requests from Delta Electricity⁸⁸ and Hydro Tasmania⁸⁹ do not specifically propose to allow scheduling of planning timeframe contracts in the operational timeframe. Rather, they highlight the need for a market for security services that would potentially alleviate the need for expensive network investments by TNSPs. Hydro Tasmania - in its submission to the consultation paper - does note that “there may be benefits in using a

⁸⁸ Delta Electricity, Capacity Commitment Mechanism for Operational Reserve and Other System Security Services, Rule change request, 4 June 2020.

⁸⁹ Hydro Tasmania, Synchronous services markets, Rule change request, 14 November 2019.

related market-based mechanism”, as intended by the OSM framework, “to contribute system strength *above* minimum levels”.⁹⁰

9.2 The role for the OSM in the system strength framework

9.2.1 The System strength rule change was designed to alleviate security challenges posed by the decarbonisation of the NEM

The System strength rule change created a framework to coordinate the supply and demand of system strength throughout the NEM.⁹¹

The system strength framework addressed the need for a more forward-looking, coordinated solution for the supply and demand of system strength in the NEM. It did this through a three-pronged approach:

- **Supply side:** a new transmission planning standard for system strength service providers (SSSPs), which are TNSPs in most regions except for Victoria, to provide system strength when and where it is needed.⁹²
- **Demand side:** new access standards for relevant generators, loads and market network service providers. These access standards ensure that connecting parties efficiently use system strength by using high-quality plant.
- **Coordination:** a charging mechanism so parties who use system strength services pay for them – the *system strength charge*. Connecting parties will have the choice of paying the charge or opting out by providing their own system strength to remediate their own impact.

The framework leverages the considerable economies of scope and scale of SSSPs, which will contribute to greater coordination and more efficient outcomes for consumers in the investment timeframe. The forward-looking approach also ensures system strength is available when and where it is needed, facilitating the connection of IBR and reducing the need for market-distorting interventions. The evolved system strength framework will go live on 1 December 2025.

9.2.2 The OSM would schedule system strength contracts in the operational timeframe

The System strength rule envisaged that the OSM would help schedule system strength in the **supply side** of the framework, if an OSM was to be implemented.⁹³ Under this component, in the planning timeframe, SSSPs must meet the system strength standard as set by AEMO. The system strength standard comprises two parts:⁹⁴

- the minimum fault level requirement, and
- the stability component (voltage waveform) representing the efficient level of system strength to host projected IBR.

90 Hydro Tasmania, Submission to the consultation paper on system services rule changes, 13 August 2020, p. 4.

91 AEMC, Efficient management of system strength on the power system, Rule determination, October 2021.

92 In Victoria, AEMO has declared network functions and as such is obligated to plan to meet system strength obligations under the System strength rule framework.

93 Ibid., p. 9.

94 Refer to clause S5.1A.9 of the NER.

The supply side arrangements allow SSSPs to meet this standard through whatever solution is least cost. For example, they could use a network option such as investment in synchronous condensers; or non-network options such as contracting with third party providers of system strength such as a privately owned synchronous condenser or a synchronous generator or potentially a battery operating in grid forming mode.

In the operational timeframe, the System strength rule envisaged that there should be flexibility in activating these arrangements to respond to the needs of the day in the power system and minimise costs for consumers.⁹⁵ The System strength rule determination set out that the OSM could:

- schedule the contracted resources to provide system strength in the operational timeframe in an optimal way,⁹⁶ and
- procure and pay for additional system strength that may be needed – for example, if there was a difference in the planning forecast versus the real-time operational need.⁹⁷

The ENA in its submission to the directions paper supported the Commission providing clarity through this determination on how the system strength contracts would be scheduled in operational timeframes, as well as implementation costs.⁹⁸ The Commission has provided this clarity on how this would occur through this draft determination and rule, as outlined below.

9.2.3

The OSM would schedule system strength to maximise the value of trade

As explained in chapter 4, the OSM would schedule system strength (alongside other security services) in the operational timeframe to maximise the value of trade (draft clauses 3.7G.2 and 3.7G.10(e)).

This approach would ensure that system security is achieved, because the OSM scheduler would always ensure that it solves for a secure outcome. This would also minimise administrative burden on system strength service providers, participants and AEMO, through allowing for streamlined legal arrangements that do not require extra contractual arrangements above what is envisaged in the system strength arrangements, as explained below in section 9.4.

The OSM would schedule existing SSSP contracts, and any extra procurement by AEMO, to maximise the value of trade without a hierarchy between the two sources as explained in section 9.3.

9.2.4

The OSM would not guarantee any particular level of system strength

This approach would mean that OSM scheduling does not guarantee any particular level of system strength in the operational timeframe. Rather, it would schedule the level of all

⁹⁵ AEMC, Efficient management of system strength on the power system, Rule determination, October 2021, p. 101.

⁹⁶ Specifically, the System strength rule determination noted that AEMO would enable system strength services for the minimum three-phase fault level required to maintain system security (the first limb of the standard. How system strength services are enabled to meet the second limb of the standard (the stability component) was best dealt with through the OSM rule change process, noting that even in the absence of an OSM, incentives existed to make sure any units contracted to provide system strength to meet this limb had sufficient incentives to offer into the energy market.

⁹⁷ Ibid., p. 9.

⁹⁸ ENA, Submission to the consultation paper, p. 16.

security services - including system strength - that would maximise the value of trade across the OSM, energy and FCAS markets, weighing up the costs and benefits of scheduling security services (see chapter 4). For example similar to other aspects of system security, scheduling additional system strength could have the benefit of alleviating constraints and allowing low-cost IBR to be dispatched. In effect, the OSM would manage the trade-off between the cost of procuring system strength with these benefits, thereby ensuring that the outcome is in the best interests of consumers.

An alternative approach would be to guarantee that the originally forecast levels of system strength (set 3 years ahead in the planning timeframe) are available in the operational timeframe. The Commission considers this is not appropriate, because investment decisions may have played out differently than expected in the interim, resulting in higher or lower day-to-day demand for system strength in the operational timeframe. Therefore, a firm guarantee of the planning standard level of system strength in the operational timeframe may result in increased costs for consumers or miss opportunities to reduce costs where they exist.

This rule change would not change the SSSPs' planning timeframe obligations

Irrespective of the level of system strength that is scheduled in operational timeframes, the introduction of the OSM would not change the SSSPs' obligations to ensure an efficient level of system strength in the planning timeframe. The obligations on the SSSP to meet the planning standard will ensure that a sufficient level of resources is available in the operational timeframe.

In addition, the OSM would not change current arrangements and requirements for how planned outages are considered in the Regulatory Investment Test for Transmission (RIT-T). That is, if a SSSP wanted to include a planned outage as a scenario to be considered in the assessment of options under the RIT-T it could. The practicality of managing planned outages would occur as usual, including the fact that SSSPs nominate to AEMO when planned outages occur and AEMO coordinates these outages.

AEMO's procurement of security services would increase competition and improve system security

The Commission notes that the draft rule would more broadly allow for AEMO's operational procurement of security services to manage the security of the system. Security services are currently managed in a 'bundled' way and system strength may be a component of the services procured. As discussed in chapter 4, the Commission considers it appropriate for AEMO to be able to procure further system strength through the OSM in operational timeframes as AEMO needs the ability to manage the security of the system according to operational needs. Allowing extra AEMO procurement of security services that includes system strength could also:

- improve competition by increasing the number of security services suppliers able to participate in the OSM
- improve system security by increasing the number of available suppliers.

The ENA emphasised the importance that any approach needs to align with the commencement of SSSPs' obligations to meet system strength obligations in 2025.⁹⁹The Commission proposes an OSM start date of 1 October 2025 (see chapter 11), which ensures the OSM is in place in time to schedule system strength. Further, the Commission considers that the draft rule would provide SSSPs and system strength providers with the necessary clarity to set up contracts for system strength provision. Therefore, the Commission considers that the existing timeframes for the implementation of the system strength framework can still be achieved and it should not impact on any of the participant obligations, for example, NSPs submitting their amended pricing methodology documents to the AER by 30 November 2022.¹⁰⁰

9.3 Optimisation of SSSP-procured contracts and AEMO operational procurement would not use a hierarchy

The OSM would not prioritise SSSP-procured contracts above other resources when deciding which resources to enable in the scheduling process.

This is because if SSSP-contracts were prioritised, all available SSSP contracts would have to be exhausted before other resources could be considered. Without a hierarchy, the OSM would be able to fully optimise available security services based on the operational circumstances.

The Commission considers that not using a hierarchy would best meet the NEO as it would result in:

- increased availability of contracts to contribute to security outcomes, and
- increased competition, placing downward pressure on costs and improving outcomes for consumers.

It is essential that the incentives are maintained for participants to contract with SSSPs to meet the system strength framework planning timeframe requirements. In many cases, the same participants would be able to enter system strength arrangements to help SSSPs meet their requirements and offer security services into the OSM in the operational timeframe. Participants would be making choices about which mechanisms and revenue streams to target.

Sufficient incentives for system strength providers to enter contracts with SSSPs would be present without a hierarchy. SSSPs would have more options for how to compensate participants than the OSM payment structures, such as including availability payments or other incentives. There is also a certainty benefit in entering longer-term arrangements which set out levels of system strength to be provided over time, as opposed to day-to-day bidding into the OSM. If participants choose to wait and only enter the OSM, SSSPs would still need to meet the planning standard and would likely choose to invest in network infrastructure – potentially obviating the need for the participants' services.

⁹⁹ ENA, Submission to the directions paper, p. 2.

¹⁰⁰ AEMC, Efficient management of system strength on the power system, Rule determination, 21 October 2021, p. 29.

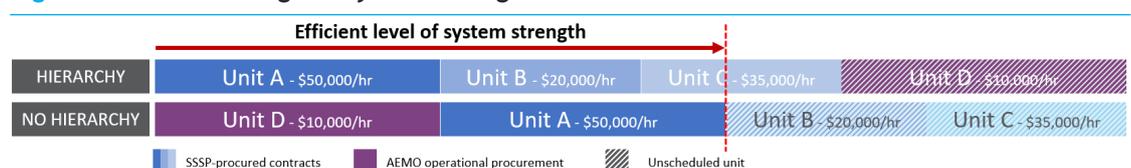
9.3.1 Stakeholders reinforced the importance of maintaining incentives to sign long-term system strength contracts

The Commission received feedback to the directions paper that Stanwell was concerned that the introduction of the OSM may disincentivise plant from offering long-term system strength contracts in favour of pursuing short-term arrangements.¹⁰¹

However, there is also the potential to inefficiently incentivise security services suppliers to enter SSSP contracts if a hierarchy were used – as these suppliers would have more certainty that they would be activated and receive revenue through the OSM. Should a hierarchy be adopted it would artificially constrain the OSM’s flexibility by requiring certain security services to be scheduled, even if a cheaper option were available, resulting in inefficient outcomes with higher costs to consumers. The Commission does not consider either concern likely to materialise. We have not adopted a dispatch hierarchy, ensuring the lowest-cost resources can be selected; and the system strength framework provides sufficient incentives through the increased certainty provided by longer-term contracts and possibility of availability payments.

Figure 9.1 below provides an example of how a hierarchy could increase costs as units are artificially constrained from participation if SSSP-procured contracts are prioritised. By enforcing a hierarchy, the OSM would artificially constrain AEMO operational procurement from fully participating. In the example, Unit D is not scheduled despite being the most cost-effective in the operational timeframe as there are sufficient SSSP-procured contracts available, resulting in a total cost of \$105,000 per hour to maintain system security. Without a hierarchy, the OSM would be able to optimise in the best interests of consumers by enabling Unit D in the operational timeframe as it is the most cost-effective solution at \$60,000 per hour to ensure a secure system.

Figure 9.1: Maintaining the system strength framework incentives



9.4 Contractual and settlement arrangements under the OSM for system strength contracts

9.4.1 SSSP-contracted units would be obligated to offer into the OSM based on contractual terms

Under the System strength rule, an SSSP can contract with a system strength provider to meet its system strength obligations. AEMO is not envisaged to be a party to these contracts.

The Commission considers that the best way for AEMO to enable a system strength service is by requiring the provider to offer services into the OSM. To achieve this, these contracts

¹⁰¹ Stanwell, Submission to the directions paper, p. 3.

would be set up to require the system strength provider to bid into the OSM as a means of providing the necessary system strength (draft clause 5.20C.4(b1)). Under the draft rule, the system strength provider would need to bid into the OSM in accordance with contract requirements which would be envisaged to set out levels and timings of required system strength in the operational timeframe (draft clause 3.7G.7(b)). This would give AEMO the power to 'enable' or schedule the resource, without requiring AEMO to be a party to any contract or legal arrangement with the SSSP or the participant. The requirement for the provider of system strength to bid into the OSM would be a tier 2 civil penalty provision.¹⁰² This reflects the importance of the provider being available to provide the agreed level of system strength, and allows the AER to enforce the requirements agreed in the contract.

Although the contracts between the SSSPs and participants may vary in terms of duration and cost, they need to be set up in a way that allows them to be scheduled through the OSM consistently with other security services. To ensure consistency, these contracts would also require the system strength provider to be accredited in the OSM, and pricing in the contract would need to be consistent with OSM pricing requirements (draft clause 3.7G.7(c)).

The draft rule would require the provider to offer into the OSM at a price that is no higher than the pricing agreed in the contract. The provider could offer lower than this pricing if it chooses to – it may choose to do this to remain competitive on the day (draft clause 3.7G.7(b)). The AER's consideration of caps for market power would take these contracted prices into account, as discussed in chapter 6 (draft clause 3.7H.2(e)(5)). This would lead to efficient outcomes, as the agreed contract pricing would represent the best value option for meeting the SSSP's system strength obligations – as determined under the RIT-T process.

Other ongoing payments, rights, and obligations – such as requirements to be available to provide system strength at necessary times and availability payments – would be entirely dealt with and enforced in the contract between the SSSP and the provider.

The System strength rule change recognised that for AEMO to 'enable' or schedule these resources in the operational timeframe, AEMO would need information on the arrangements between SSSPs and providers. The NER requires SSSPs to provide information to AEMO on system strength contracts, including technical information about the service and the provider, the availability of the service, and relevant timings (for example, notice periods for the service to be enabled).¹⁰³ SSSPs would also be required to provide any information required under the OSM Procedures to AEMO (draft clauses 5.20C.4(c)(1)(vii) and (2)(iii)). This information would help AEMO run the OSM optimisation.

9.4.2

Payments between AEMO, SSSPs and the security services provider

To ensure that system strength contracts scheduled through the OSM are managed consistently with other OSM resources, the Commission has proposed the following settlement procedure:

¹⁰² As defined by the National Electricity (South Australia) Regulations under the *National Electricity (South Australia) Act 1996*. As of August 2022, Tier 2 maximum penalties are up to \$1,435,000 (plus \$71,800 per day for continuing breaches).

¹⁰³ Refer to clause 5.20C.4 of the NER.

- OSM bid costs would be paid and settled directly by AEMO with the provider, under the same arrangements as for other participants (see chapter 8). This would result from the provider being an OSM participant and the settlement arrangements outlined in draft clause 3.15.6C (b).
- Any availability costs, or other non-OSM costs, would be paid and settled through the contract directly between the SSSP and the participant as intended under the cost recovery arrangements of the system strength framework.

9.5 Ensuring adequate cost-recovery and preventing over-compensation

To ensure that contracted resources are appropriately compensated when a contracted resource is activated through the OSM, the Commission has developed a cost recovery process to ensure that:

- SSSPs and contracted units recover adequate compensation but are not compensated twice for the same service
- there is transparency for participants
- the administrative burden on SSSPs, contracted units and AEMO is minimised.

To achieve this, the framework described above would separate costs incurred directly under the system strength contract from OSM costs.

Any costs directly incurred by the SSSP under the contract with the system strength provider would be reimbursed to the SSSP using the existing system strength framework mechanism. These would generally be fixed and predictable costs, such as availability payments. This approach would ensure that the variability of payments is minimised and SSSPs can have confidence in their long-term financial liabilities.

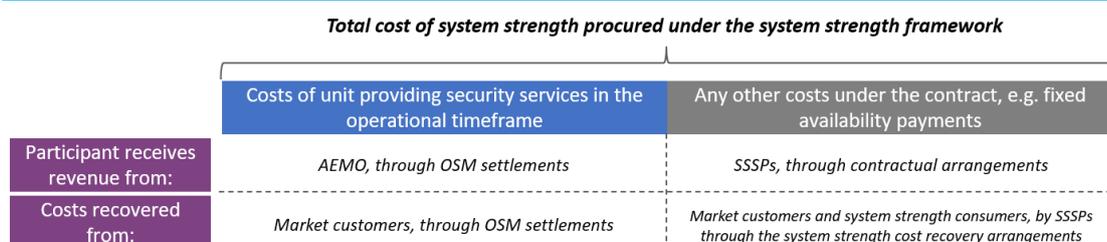
Any costs incurred through the OSM would be recovered through the OSM framework, aligning with payment mechanisms for AEMO operational procurement. Enabled units would be directly compensated by AEMO according to their bid into the OSM (as above).

The combination of the fixed payments from SSSPs and OSM enablement payments would result in the contracted unit being fully compensated.

Figure 9.2 below illustrates the proposed approach to splitting up the costs between the system strength and OSM frameworks in the planning and operational timeframe. Costs incurred in the operational timeframe due to the activation of SSSP contracts are compensated by AEMO through the OSM settlement process, with costs recovered from market customers. Any remaining costs incurred under the contracts, such as fixed availability payments, are recovered through the cost recovery arrangements outlined in the system strength framework.¹⁰⁴

¹⁰⁴ AEMC, Efficient management of system strength on the power system, Draft determination, 29 April 2021, p. 151.

Figure 9.2: Compensation arrangements for system strength units



The proposed approach leverages the existing arrangements in the NER, including those recently put in place for the system strength framework, and is designed to minimise the administrative overhead and complexity for all market participants. The system strength compensation framework is explained in more detail in Box 16 below.

BOX 16: COMPENSATION ARRANGEMENTS UNDER THE SYSTEM STRENGTH FRAMEWORK

There are two fundamental components to the compensation arrangements of the system strength framework:

- the **system strength charge**, which is an amount that reflects an estimate of the forward-looking cost the connecting party imposes on a SSSPs in meeting the system strength standard
- the **prescribed TUOS charges**, as the system strength transmission service has been defined as a prescribed TUOS service, the costs of providing the service (that have not already been recuperated through system strength charges) is allocated to the annual service revenue requirement and charged to market customers.

Any costs incurred by SSSPs from the scheduling of system strength contracts through the OSM, that have not been compensated by AEMO, would be recuperated by the SSSP through this compensation arrangement.

Source: AEMC, Efficient management of system strength on the power system, Rule determination, 21 October 2021.

The Commission received feedback to the directions paper from Shell Energy stating that there needs to be a strong degree of transparency surrounding the activation, costs, and timing of system strength contracts.¹⁰⁵ The Commission has paid close attention to the transparency arrangements of the OSM to provide market participants and observers with clear and consistent economic signals thereby providing clarity surrounding the activation, costs, and requirements for system strength contracts. Any other costs incurred under system strength contracts outside of OSM payments, such as availability payments, would be

¹⁰⁵ Shell Energy, Submission to the directions paper, p. 5

compensated through the system strength framework, and as such, would adhere to the existing transparency arrangements under that framework.

9.6 The interaction of NSCAS and the OSM

Given that SSSP-procured system strength contracts would be scheduled through the OSM, the Commission has considered whether other TNSP-procured contracts, such as those procured under the NSCAS framework, should also be scheduled through the OSM.

The Commission considers that there may be situations where it is efficient to schedule these contracts through the OSM, but not all of these contracts may be appropriate for OSM scheduling. This is for a variety of reasons, for example:

- the contract may not share the same objective function as the OSM, or
- the contract timeframes and pricing structure may not be suitable.

Therefore, the draft rule allows – but does not require – contracts other than system strength contracts to be scheduled through the OSM.¹⁰⁶ The same requirements would apply to these contracts as to system strength contracts (see section 9.4) – that is, participants would need to be OSM accredited and pricing would need to be consistent with OSM pricing.

9.7 The OSM as an input to help justify long term network investments

For resources that are not contracted through system strength or other long-term arrangements, the OSM may produce outcomes in certain situations that show a pattern of regular enablement, or particularly costly outcomes. This could indicate instances where planning timeframe investment solutions may be more cost-effective in meeting a system security need than operational procurement through the OSM.

If this is the case, AEMO could use this as an input into the ISP or other related planning reports such as the Generalised Power System Risk Review or documents that set out inertia shortfalls which may look at potential solutions. Alternatively, TNSPs could look at potential solutions in their Annual Planning Reports (APRs) or a subsequent RIT-T. The OSM could provide valuable information into these processes, for example, costs incurred through the OSM may provide the justification for additional network investments that alleviate costly constraints, thereby reducing the OSM's operational costs. For example, if maintaining system security in a certain region is particularly costly, the OSM may provide justification to install network equipment that may alleviate the need to schedule expensive units. In such a situation, a longer-term investment may be in the best interests of consumers compared to continuing to operationally manage the system security issues.

AEMO may consider declaring an NSCAS gap if it considers appropriate needs or solutions to address this issue have not been progressed.¹⁰⁷ If an NSCAS gap is declared, then the TNSPs have primary responsibility for having arrangements in place to address the gap.¹⁰⁸

¹⁰⁶ See definition of 'security services agreement' in clause 3.7G.1 of the draft rule.

¹⁰⁷ Network Support and Control Ancillary Services (NSCAS) are non-market ancillary services that may be delivered to maintain power system security and reliability of supply of the transmission network, or to maintain or increase the power transfer capability of the transmission network.

If the TNSP does not appropriately address the NSCAS gap, then AEMO can acquire NSCAS directly from providers by entering into contracts to ensure power system security and reliability. These contracts have not been used frequently to date, but this could change in the future. The Commission has therefore put in place the optionality for such contracts to be scheduled through the OSM if that would be beneficial. The Commission hopes that NSCAS contracts would eventually be scheduled through the OSM to minimise the duplication and number of methods to manage system security.

Regulated network equipment which is scheduled and managed outside of the pre-dispatch process (for example network controlled synchronous condensers) would not be eligible to participate in the OSM as the costs of such equipment is already allocated through existing frameworks.

108 Under the NER an NSCAS need is required to maintain power system security and the reliability of the transmission network. However, any service that is also capable of providing system strength to address a fault level shortfall is not an NSCAS need.

10 OSM TRANSPARENCY AND GOVERNANCE ARRANGEMENTS

BOX 17: KEY POINTS IN THIS SECTION

- Stakeholders have been clear with the Commission throughout this process that if changes are made to the management of system security in the NEM, then transparency and governance of any new mechanisms are key. This has been recognised by having transparency as a key assessment criteria as set out in section 2.1.2 and has been a key consideration of the Commission in the design of the mechanism.
- The OSM's transparency and governance arrangements would help facilitate the transition in the longer-term to unbundled services by:
 - providing clear signals to the market on what security services are needed, where, and their value to encourage investment and innovation by potential or current market participants to increase the number of providers in future, as well as assisting market participants make efficient operational decisions including retirement decisions
 - providing information and helping improve understanding of the way we deliver system security to evolve as knowledge and technology develop.
- The OSM would include the following arrangements to achieve transparency and clear signals on what system services are needed and their value:
 - AEMO would develop a **Security services guideline** (draft clause 3.7G.4) to describe the security services procured through the OSM. The preparation of the original guideline and any major updates must be prepared using the Rules consultation procedure.
 - **AEMO's security services list** (draft clause 3.7G.5) would complement the guideline and be updated, with reasoning, on a more regular basis without the need for consultation.
 - The **OSM procedures** (draft clause 3.7G.11) would explain the accreditation, bidding, simulation and scheduling processes for the OSM. This document would be prepared by AEMO and must be updated to capture changes over time to how AEMO procures and schedules security services (both as system configurations and separate services). The preparation of the original procedure and any major updates will use the Rules consultation procedure.
 - AEMO would conduct **day-to-day reporting** (draft clauses 3.7G.9, 3.13.4(p) and 3.13.4(q)) on key inputs and outputs for the OSM and prepare an **annual report** (draft clauses 3.7G.13(b)-(d)) to comment on the OSM's performance and progress towards unbundling security services. This will provide transparency and predictability

to promote price discovery and efficient operational and investment signals for participants.

- The AEMC would also commit to perform a holistic **review** of the OSM on a four-year cycle using its existing review powers. This will be used to monitor the OSM's performance and opportunities for unbundling to ensure that the mechanism remains fit-for-purpose in the long-term.
- The arrangements would also allow AEMO to procure and schedule separate security services through the OSM to gain operational experience with those services as we gain more knowledge of the system. AEMO's obligations to update the Security services guideline and OSM procedures using the Rules consultation procedure and its annual reporting obligations would ensure accountability in this process. This adds resilience and agility, ensuring that the way we deliver security services evolves as knowledge and technology develop.

This section discusses:

- Section 10.1 - Facilitating the transition by providing transparency over what services the system needs, and their value
- Section 10.2 - Facilitating the transition by accommodating new engineering knowledge and evaluating progress.

10.1 Facilitating the transition by providing transparency over what services the system needs, and their value

As part of its post-2025 market design initiative, the ESB outlined a vision for the power system of services that are individually defined, managed and valued – that is, 'unbundled'. However, as discussed in chapter 3, full unbundling is not yet possible due to current engineering knowledge. Therefore, the OSM is designed to accommodate both 'bundled' services (that is, system configurations) and unbundled services which can be added as engineering knowledge improves.

The Commission considers it is crucial that the OSM helps facilitate the transition to a service-led power system and does not simply remain a mechanism to manage system configurations. This would not be consistent with the long-term vision, and would not provide the investment signals that are needed for market participants to innovate and invest in new services. This means that the OSM would need to:

- provide incentives for the provision of security services by revealing their value to the system,
- contribute to an improved understanding of system needs and technical specification of services, and
- incorporate evolving engineering understanding of system needs, where possible.

Improving the transparency of the arrangements for procuring and scheduling security services in the NEM would help provide certainty to participants over system needs and the value of security services to the system by providing improved operational and investment signals for ESS.

Stakeholders have consistently requested more transparency over the system's needs for security services and how these can be provided. Throughout the rule change process, stakeholders have emphasised that the OSM provides an opportunity to improve transparency over current arrangements on the management of system security services. Greater understanding can assist stakeholders in managing their plant and make investment and operational decisions in ways that help to provide system security in the most efficient way possible.¹⁰⁹

This was viewed as a key component of delivering the ESB's long-term vision of the power system, as discussed in chapter 2.

The rule change requests from Delta Electricity¹¹⁰ and Hydro Tasmania¹¹¹ did not propose specific transparency and governance arrangements. However, both emphasised the need to allow participants to make efficient operational and investment decisions and the need to address the unpredictable nature of interventions for security. Delta Electricity noted the importance of "providing price transparency to foster the potential entry into the market of new providers and technologies qualified to provide the service".¹¹²

10.1.1

An overview of the transparency and governance arrangements for the OSM

To increase transparency on system services, the draft rule includes robust governance and transparency arrangements which would ensure the OSM:

- provides consistent information to the market so that there are clear signals for what security services are needed, where, and their value – which contributes to meeting the transparency, predictability and simplicity assessment principle, and
- is fit for purpose and facilitates unbundling, which requires the way we deliver system security to evolve as knowledge and technology evolve – which contributes to meeting the flexibility assessment principle.

Governance and transparency arrangements are incorporated in draft clauses 3.7G.4, 3.7G.5, 3.7G.11 and 3.7G.13. Figure 10.1 shows an overview of OSM governance and transparency arrangements, which are explained in more detail in the following sections.

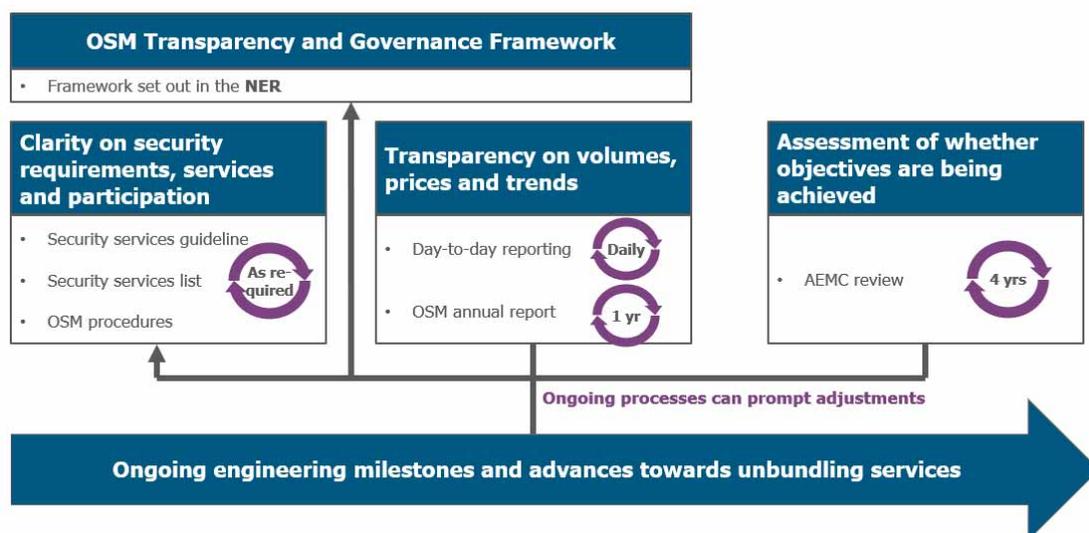
¹⁰⁹ In submissions to the consultation paper, some stakeholders, including the AEC, Scheduling and ahead markets attachment, p. i; EnelX, p. 4; ARENA, p. 2; highlighted issues with price discovery under the status quo and the need to provide price signals for delivering essential system services. Transparency is a key component of this.

¹¹⁰ Delta Electricity, Capacity commitment mechanism for operational reserve and other system security services, Rule change request, 4 June 2020.

¹¹¹ Hydro Tasmania, Synchronous services markets, Rule change request, 14 November 2019.

¹¹² Delta Electricity, Capacity Commitment Mechanism for Operational Reserve and Other System Security Services, Rule change request, 4 June 2020, p. 6.

Figure 10.1: Transparency and governance arrangements for the OSM



10.1.2

The Security services guideline and Security services list would provide transparency on the need for security services

The Commission agrees with stakeholders that transparency is important and considers the proposed approach would provide significantly more transparency over system security needs than is available currently. It would require new information to be published outlining the specific security services that are needed to maintain security, and AEMO’s processes for determining configurations. It would also require stakeholders to be consulted on service definitions. The Commission understands this transparency is important to stakeholders, as this has been highlighted numerous times in stakeholder submissions to this rule change request, as well as in the rule change requests themselves.

It will be important for the success of the OSM for participants to understand the system configurations and constraints that exist and how they are created so they can be informed when making investment and operational decisions.

The Security services guideline

Draft clause 3.7G.4 would require AEMO to publish the **Security services guideline** (‘Guideline’), which would detail the security services that could be procured through the OSM.

- As per draft clause 3.7G.4(b)(1), system configurations would require a technical description of AEMO’s criteria for determining system security requirements (for example, the process and modelling used by AEMO to determine secure system configurations and related constraints). AEMO would also be required to describe how the configuration will

assist to achieve and maintain the technical envelope. Section 4.1 provides further discussion on the existing system configuration arrangements.

- As per draft clause 3.7G.4(b)(2), individual unbundled services ('separate security services') would require a technical description of the service and any technical parameters that a facility must meet in order to provide that service.

For both types of service, AEMO would need to set out the technical security need that is being met. For example, for system configuration services, AEMO may specify that a particular combination of facilities are required to maintain inertia requirements above some level of IBR penetration.

As technical knowledge of the system evolves, AEMO could update and create service definitions by updating the Guideline. The ability to define new services would mean the OSM can assist the transition from an asset-based to a service-based system. For example, the OSM could be used transitionally for a newly defined service if the long-term approach is complex to implement; to help AEMO and participants learn from a transitional period; or to encourage the development of a mature market using a known mechanism. The OSM itself may also potentially be identified as the best long-term approach for some system services.

As discussed in chapter 4, AEMO would be required to consult on the Security services guideline when it is created and every time it is updated using the Rules consultation procedures (as per the transitional arrangements for preparing the Security services guideline in chapter 11 and draft clause 3.7G.4(e)).¹¹³ This would enable participants to provide input and feedback into how services are described. Stakeholders could also request amendments to the guidelines (draft clauses 3.7G.4(c)-(d)).

Service definitions would also be informed by consultation with TNSPs (as per requirements placed on TNSPs under draft clause 3.7G.8(g)), as well as AEMO's operational experience and technical work through the Engineering Framework, ISP, GPSRR, system and inertia reports and other processes.

The information and stakeholder consultation requirements for the guideline are broadly consistent with the approach to ancillary services, where detailed technical information is provided through the Market ancillary service specification document.¹¹⁴

The Security services list

In addition to the guideline, a **Security services list** ('List') would detail the specific system configurations and constraints that AEMO determines using the criteria (draft clause 3.7G.5). The list would be reviewed and updated at least every 12 months (draft clause 3.7G.5(c)), regularly incorporating new configurations and new providers as they are accredited for the OSM.

Where the Guideline provides overall service descriptions, the List would provide participants with visibility over precisely what is being procured, and in what circumstances. For example,

¹¹³ The requirements for the Rules consultation procedure were updated on 11 August 2022 under the *Improving consultation procedures in the rules* rule change.

¹¹⁴ The requirements for the market ancillary service specification are set out under clauses 3.11.2(b)-(d).

in a system configuration comprising three units, the List would need to identify each unit and identify the scenarios and circumstances in which each configuration contributes to maintaining system security - which may involve describing constraints. For a separate security service, the List could include sets of constraints that contribute to meeting the service. Unlike the existing NEMDE constraint library, the Security services list would not need to list every power system constraint. Instead, it would focus on constraints that are key to meeting a specific security need.

In contrast to the Guideline, AEMO would not be required to consult on the Security services list because the List would be compiled based on the Guideline, which is already subject to consultation. It is also intended that this list exists primarily to provide transparency to market participants over how the service descriptions in the Guideline translate to specific configurations that are present due to current engineering knowledge. Therefore, the Guideline is the pertinent aspect for stakeholders to engage with.

The Commission considers that the approach to preparing and consulting on the Guideline and List would add to investment predictability by providing transparency to participants on if and how their facilities would contribute to maintaining security.

In addition, update and consultation requirements for the guideline document (and the procedure document described in section 10.1.3 below) provide consistent oversight from stakeholders to ensure that useful information is visible and evolves over time, as discussed in chapter 4.

Transparency over system security constraints

NSPs develop limit advice that is used by AEMO to prepare network constraints for use in the central dispatch process, for example, constraint equations for use in NEMDE. This advice can take various forms, including equations, rating and allowable generating unit combinations that allow AEMO to determine and operate the power system within the technical envelope.

The Commission notes that specific changes to improve the transparency of this process are not proposed in the OSM. However, the Guideline and List would provide increased transparency over system configurations, as well as some further transparency over how limits advice is translated for the purpose of setting system configurations, constraints or meeting specific security needs.

The Commission is interested in stakeholder views on this approach and whether the proposed OSM arrangements would provide adequate transparency over system configurations.

10.1.3 The OSM procedures would provide information on how to engage with the OSM

The Commission considers information on how to engage with the OSM is critical to inform participants in engaging with the OSM. Publishing this information adds predictability, and consultation requirements add accountability to ensure that the information included in the procedures is fit-for-purpose. Predictability promotes competition by encouraging more providers to enter the OSM and provide security services, and therefore contributes to better long-term outcomes for consumers.

Draft clause 3.7G.11 would require AEMO to prepare the **OSM procedures**. This would detail:

- **Accreditation:** how participants can be accredited for inclusion in system configurations or as a security service provider through the OSM, including the technical parameters and testing that must be met by a facility to participate in the OSM and information required by AEMO to assess a facility.
- **Bidding:** how participants would bid into the OSM, including the requirements and parameters for OSM bids, timing, OSM gate closure and cut-off times, and re-bidding allowances.
- **OSM simulations:** key information for participants to understand the iterated OSM simulations, including the period of OSM blocks and horizons and frequency of simulations, and minimum commitment periods.
- **OSM schedule and enablement:** key information for participants to interact with the OSM schedule, including the timing of publication of the OSM schedules, the content of the schedules, how these schedules interact with existing processes (for example, pre-dispatch and directions/RERT) and how AEMO will determine settlements and compliance for OSM providers.

AEMO would be required to consult on the OSM procedures when it is created and every time it is updated using the Rules consultation procedures (draft clause 3.7G.11(f)).¹¹⁵ This would enable participants to provide input and feedback into the information included in the procedures. Stakeholders could also request amendments to the procedures (draft clauses 3.7G.11(d)-(e)).

10.1.4 Day-to-day reporting would reveal demand, supply and prices for security services

Consistent with the current frameworks in the rules for reporting spot market outcomes,¹¹⁶ AEMO would publish the volume and prices of security services enabled. This would support price discovery and help participants make informed investment decisions by revealing the value of security services.

In response to the directions paper, some stakeholders were concerned that the NMAS design for the OSM may not reveal contract costs, services provided and scheduling in real-time. These included Shell (p. 5), the South Australian Government (p. 2) and AGL (p. 3), who considered the NMAS was likely to decrease the predictability of the OSM schedule as the design does not inherently produce a common price, merit order or volume surplus/shortfall to inform participant decisions due to the separation of the optimiser from pre-dispatch.

The day-to-day reporting arrangements have been designed to address this specifically:

- The draft rule adds OSM bid prices and quantities to the existing provisions in clauses 3.13.4(p) and (q). Under these provisions, AEMO would be required to publish details of

¹¹⁵ The requirements for the Rules consultation procedure were updated on 4 August 2022 under the *Improving consultation procedures in the rules* rule change.

¹¹⁶ Refer to clause 3.13.4 of the NER.

final OSM bid prices and quantities of dispatched security services (where that quantity was dispatched as energy) each day alongside energy and FCAS bid information.

This would be complemented in close-to real-time by publication of the OSM schedules, as discussed in chapter 7. Clause 3.7G.9 would require AEMO to publish OSM schedules (both provisional and final) as frequently as practicable. The schedules would include the volume of services enabled (or provisionally enabled) and enablement periods to help participants position their plant efficiently in operational timeframes.

10.1.5 **Annual reporting would evaluate the performance of the OSM**

AEMO would be required to report at least annually on the performance of the OSM and comment on its work towards unbundling individual services, including how the OSM is contributing to unbundling. This would create transparency for policymakers, stakeholders and the industry generally about the operation of the OSM, and how it is contributing to the unbundling of services (the ESB's long-term vision).

The Commission considers that AEMO should report annually rather than more frequently to reduce administrative burden. The proposed annual reporting timeframe would allow benefits and longer-term trends to be identified and managed, while minimising costs.

The **OSM annual report** is described in clauses 3.7G.12(b)-(d) of the draft rule and would include:

- An assessment of the OSM's performance against the objective of the OSM.
- Information on the performance of the OSM, including aggregated information on the previous year for:
 - volumes of security services procured by the OSM
 - binding system configurations and associated constraints
 - aggregate costs of the OSM
 - trends in these outcomes, and
 - how often directions were used to maintain security and why.
- Commentary on updates to services, system configurations and constraints that have occurred in the previous year, and potential future updates to this information.

The report would be released by 30 September of each year for the previous financial year. There are no consultation requirements as the report would be backwards-looking commentary on information already released through day-to-day reporting. In this sense, it is similar to other reporting requirements that AEMO has, such as reporting on reviewable operating incidents or on the use of the RERT.

If the OSM annual report highlights potential issues with the OSM's operation or possible improvements, then there are multiple actions that could be taken, including:

- AEMO could update the OSM procedures if it was a matter that related to the OSM procedures
- AEMO could submit a rule change request to amend the rules relating to the OSM, and

- stakeholders could submit a rule change request or procedure update request as appropriate.¹¹⁷

Actions resulting from annual reporting may also be informed by other AEMO publications, including the General power system risk review or Quarterly energy dynamics reports. The Commission expects that trends identified through other processes could guide information included in the OSM annual report and the rules would provide the flexibility for AEMO to include additional commentary on interactions if relevant.

The Commission is interested in stakeholder feedback on this approach to reporting, including whether the proposed arrangements would provide information on prices, costs and trends with sufficient detail to be useful while remaining practicable.

10.1.6

A holistic four-year review would provide an avenue to recommend updates to the OSM in line with knowledge developments

The AEMC recognises that the transition underway is occurring fast and the NEM is at the leading edge of global thinking about how to run large, interconnected systems with significant amounts of inverter-based resources. Given this, the AEMC would commit to undertaking a review of the OSM within four years, and on an approximately four-year cycle after that. This review would assess whether the OSM is delivering the intended benefits and whether it is contributing to unbundling system services.

In particular, the AEMC would expect to look at:

- Is the OSM achieving its objectives?
 - Is the mechanism achieving security outcomes?
 - Is the mechanism reducing the need for interventions - that is, are directions for security being used as a last resort?
 - Are price signals being sent to the market for the provision of security services over the medium- to long-term?
 - What investment is being made to provide security services in response to these signals?
- Are outcomes being delivered efficiently?
- What are the costs of the mechanism to consumers?
- Are specific OSM settings correctly calibrated to deliver efficient and secure outcomes (cost allocation, optimisation approach, objective function, scheduling and timing, etc)?
- What progress has been made towards unbundling services?
- Recommendations for unbundling.

The AEMC considers that a four-year timeframe is appropriate to allow sufficient time for the OSM to operate so that trends or issues could be identified. Of course, the AEMC could choose to conduct the review sooner than four years if major issues are identified through AEMO's daily or annual reporting processes.

¹¹⁷ The NEL allows any individual or group to submit a rule change request - Refer to s. 91(1) of the NEL.

Any issues or opportunities identified in the review could be addressed by updates to the OSM procedures by AEMO or rule change requests submitted by any individual or group including AEMO itself.¹¹⁸ The AEMC would work closely with AEMO and the AER and seek stakeholder feedback in undertaking the review.

The AEMC has the power to conduct reviews into the operation and effectiveness of the Rules or any matter relating to the Rules.¹¹⁹ As such, this review is not included in the draft rule.

10.2 Facilitating the transition by accommodating new engineering knowledge and evaluating progress

To facilitate the transition towards unbundled services, the OSM needs not only to provide clear signals for investment in security services, it also needs to be flexible enough to incorporate new technical understanding of services, and facilitate the individual management of these services as knowledge develops.

Transitioning to a service-based model was central to the ESB's recommendations in its post-2025 market design recommendations. Stakeholders have also emphasised the need for the OSM to facilitate, rather than hinder, the transition.

In submissions to the directions paper, stakeholders¹²⁰ emphasised the need to provide AEMO with an imperative to shift to a service-based model for procuring and scheduling ESS. However, some stakeholders¹²¹ also explicitly acknowledged AEMO's bundling approach using system configurations as a transitional measure to ensure system security, allowing time for engineering understanding to improve and services to be separated over time.

While not specifically addressing the shift to a service-based future, the rule change requests from Delta Electricity¹²² and Hydro Tasmania¹²³ both proposed solutions that aimed to facilitate the provision of security services over the long-term.

10.2.1 The OSM would be able to accommodate unbundled services as understanding evolves

To help achieve the long-term vision and address stakeholder feedback, the Commission has designed the OSM so that it could directly facilitate unbundling of services. This builds in resilience and agility, which is particularly important given the significant transition underway.

AEMO has work programs underway, for example, the Engineering Framework,¹²⁴ which will contribute to an understanding of how to unbundle and individually define new security services, in order to move away from system configurations and develop new markets as appropriate.

118 Refer to s. 91(1) of the NEL.

119 Refer to s. 45 of the NEL.

120 Including stakeholder submissions to the directions paper: CS Energy, p. 12; CEC, p. 5; Tesla, p.1.

121 Such as submissions to the directions paper: Origin, p. 1; Delta Electricity, p. 15; ENA, p. 1; Alinta, pp. 1-2; AGL, pp. 1-2.

122 Delta Electricity, Capacity commitment mechanism for operational reserve and other system security services, Rule change request, 4 June 2020.

123 Hydro Tasmania, Synchronous services markets, Rule change request, 14 November 2019.

124 See: <https://aemo.com.au/en/initiatives/major-programs/engineering-framework>.

To facilitate this, AEMO would be able to incorporate new definitions of services in the Security services guideline and OSM procedure documents (draft rule clauses 3.7G.4 and 3.7G.11), after which the OSM could procure them from participants and schedule them. This flexibility to accommodate new services would have two main advantages:

- it would provide **price signals** for the new services, encouraging their provision and developing the capability of participants to provide them, and
- it would provide a **flexible approach** for AEMO to test how to operate the system securely with new services, within a known operational tool, and develop its knowledge and understanding of the best enduring approach for the new service.

This approach provides more flexibility for technical descriptions of services to be provided and updated as understanding evolves than if a rule change was required to define new services. It also recognises that AEMO is best-placed to provide technical definitions of services.

The Commission envisages this ability could be used as a transitional approach to managing a new service, while AEMO develops its operational understanding of the best tool to manage the new service in the long-run, whether that be through the OSM or another approach (for example, a separate market, procurement by NSPs, or technical and performance standards).

Providing this flexibility to incorporate a new service in the OSM would allow the sector to respond more quickly to any new services or technical requirements that may emerge, rather than using the rule change process which can be lengthy.

Flexibility is complemented by robust governance arrangements

Given this flexible approach, the governance arrangements for including new services are crucial to ensure that the OSM is indeed the right approach for trialling new service definitions. To provide transparency to stakeholders and to ensure accountability for evolving the OSM to incorporate new services, AEMO would be required to consult on the inclusion of new services as per the requirements set out in section 10.1.2 and section 10.1.3 above, including providing detailed reasoning as per the Rules consultation procedures. Stakeholders would have the opportunity to engage with both the definition of the new service and the reasoning for why it was appropriate to manage through the OSM.¹²⁵ The AEMC would also have oversight over the OSM through its four-yearly review.

If the OSM was not found to be justified as an appropriate tool for managing a new service, other approaches would need to be considered and rule changes potentially progressed.

The Commission also understands that AEMO will continue to discuss and update the AEMC and broader industry on matters concerning system security and unbundling of services through avenues such as the General power system risk review. This will contribute to knowledge that can be used by AEMO and industry to develop enduring approaches to managing services.

¹²⁵ The consultation requirements under the Rules consultation procedure are outlined in clause 8.9 of the NER.

11 IMPLEMENTATION TIMING AND COSTS FOR THE OSM

BOX 18: KEY POINTS IN THIS SECTION

- The **implementation timing** arrangements for the OSM would be set out in the transitional arrangements in chapter 11 of the NER.
 - The OSM would start on **1 October 2025**, to allow time for AEMO to develop, test and implement the details of the OSM engine and scheduling process, and for participants to implement changes to systems. This date also balances the urgency of reform with what AEMO and the Reform Delivery Committee consider to be efficient sequencing given other post-2025 initiatives.
 - The first contract for system strength could be required to be scheduled from 2 December 2025 - the first date for compliance under the System strength rule. A start date of 1 October 2025 allows any of these contracts to be readily integrated into the OSM from that date.
- Key processes for participants to engage with would occur in advance of OSM start.
 - The first Security services guideline and OSM procedure document (draft clauses 3.7G.4 and 3.7G.11) would be published at least nine months in advance of the OSM start date. This would ensure participants have sufficient time to prepare their systems to participate in the OSM and that AEMO can progress processes that rely on the procedure.
 - Technical accreditation would also begin from this date, in accordance with the OSM procedures.
 - The first Security services list (draft clause 3.7G.5) that defines allowable configurations would need to be published three months in advance to allow sufficient time for participants to understand the list before OSM start.
 - The AER would complete its first OSM market power review by 1 July 2025 (with a draft published by 1 May 2025). If the AER recommends any mitigation measures, AEMO must set this by 1 September 2025.
- It is estimated that AEMO's costs to implement the OSM would be **\$11.4 million ± 40%**. These cost estimates do not include costs to participants. The Commission designed the OSM in such a way that the bulk of the implementation costs would be on AEMO, and that the only costs for participants would be for those wishing to participate in the OSM. Service providers who choose to participate in the mechanism may incur costs of updating systems and processes in order to participate in the OSM, as well as participating in relevant consultants. However, the Commission expects these to be relatively modest, with the decision made to participate based on an individual

assessment of the costs and benefits of doing so. The Commission is interested in stakeholder views on the costs to participants of participating in the OSM.

- The OSM is a critical tool to manage security through the transition and facilitate better understanding of the system's needs. As set out in chapter 2, the Commission considers the OSM would deliver significant benefits promoting the long-term interests of consumers, which would outweigh the expected implementation costs set out above.

The pace of transition in the market means it is crucial to implement new solutions to promote the efficient procurement of security services in a timely and coordinated manner. While the need is urgent, we also need to ensure that we allow adequate time for testing and can deliver the intended benefits to consumers over and above the costs of implementing new solutions. This section outlines the implementation considerations for the OSM, including:

- Section 11.1 - The OSM would start in October 2025 and the rules would include dates for key interim milestones
- Section 11.2 - Implementation costs to AEMO and participants have been considered alongside the criticality of reform.

11.1

The OSM would start in October 2025 and the rules would include dates for key interim milestones

The rule change requests from Delta Electricity¹²⁶ and Hydro Tasmania¹²⁷ both raise concerns about the need to minimise the use of directions for meeting security requirements and address concerns of missing markets. This informed the Commission's rationale for progressing and implementing the OSM as quickly as possible, within the constraints noted below.

The OSM would start on 1 October 2025, with AEMO scheduling and procurement of security services beginning from this date. This date balances the urgency of reform with what AEMO and the Reform Delivery Committee consider to be efficient sequencing and feasible implementation timeframes given other post-2025 initiatives.¹²⁸

System strength contracts would need to be able to be scheduled through the OSM from 2 December 2025 – the same date as the first compliance date for system strength service providers in the System strength rule.¹²⁹

¹²⁶ Delta Electricity, Capacity commitment mechanism for operational reserve and other system security services, Rule change request, 4 June 2020, pp. 6-7.

¹²⁷ Hydro Tasmania, Synchronous services markets, Rule change request, 14 November 2019, p. 1.

¹²⁸ For further details on the Reform Delivery Committee and its work on the NEM Reform Implementation Roadmap, see <https://aemo.com.au/initiatives/major-programs/nem-reform-implementation-roadmap>.

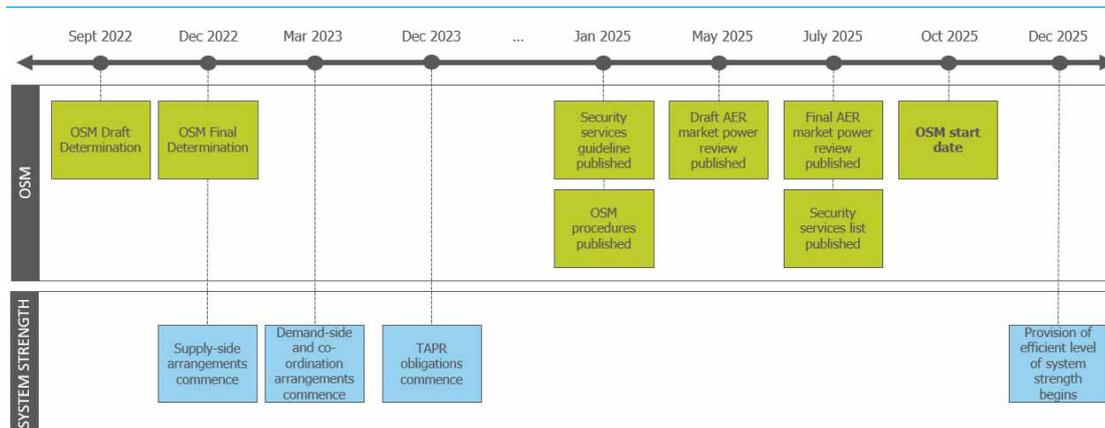
¹²⁹ In its submission to the directions paper, the ENA (p. 2) suggested the alignment of the implementation timing for an OSM with the System strength rule implementation.

To ensure that participants can engage early with the OSM and prepare their systems and processes, the draft rule includes the following key interim dates:

- The Security services guideline and OSM procedures (draft clauses 3.7G.4 and 3.7G.11) would need to be published nine months in advance of OSM start (1 January 2025), including completing all consultation requirements.
- Technical accreditation of units to participate in the OSM (as per the OSM procedures in draft clause 3.7G.11) would also begin from the release of the OSM procedures, nine months in advance of OSM start.
- The first Security services list (draft clause 3.7G.5) would be published three months in advance of OSM start (1 July 2025) for participants to consider the list before the OSM start date.
- The AER would complete its first annual OSM market power review by three months in advance (1 July 2025), with a draft released by 1 May 2025. If the AER recommends any mitigation measures, AEMO must implement these by one month in advance of OSM start (1 September 2025).

Figure 11.1 provides the proposed dates for the OSM. It also shows how these dates interact with the key dates for the System strength rule.

Figure 11.1: Timing interactions with the implementation of the System strength rule



11.1.1

Implementation timing would balance urgency with practicality

In submissions to the consultation paper, the majority of stakeholders that commented on the interactions between the system services rule changes¹³⁰ suggested prioritisation and staging of the reforms, including considering how they interact with the ESB post-2025 reforms. The Commission agrees and continues to take a staged approach to the progression and implementation of the system services rule changes. The AEMC is also contributing via

¹³⁰ Including Australian Aluminium Council, p. 3; CS Energy, p. 26; CleanCo QLD, p. 1; EnelX, p. 6.

the Reform Delivery Committee to the NEM Reform Implementation Roadmap¹³¹ for the optimal staging of the post-2025 reforms.

In the directions paper, stakeholders¹³² generally agreed that a change to the status quo arrangements for managing security in operational timeframes should be progressed (although with mixed views on the best approach).

The Commission agrees with stakeholders that there is a need for reform. The Commission considers that the timeliness of the OSM implementation is important because:

- **We need a new mechanism that efficiently delivers security services as soon as possible:** The issues identified in section 2.2.1 are critical to address as soon as possible so that we can reduce reliance on directions for meeting security needs. This is a key drawback of the current market design noted by the rule change proponents and stakeholders. The Commission's choice of the NMAS design for the proposed OSM, discussed in chapter 3 and appendix C of this draft determination, also reflects the need to do something now to recognise the transition underway.
- **We need a framework in place to respond to emerging issues:** The NEM is evolving rapidly, and we need the right tools to manage changing power system dynamics, encourage alternative sources of supply and better understand the capabilities of new technologies.¹³³
- **Certainty on the operation of the OSM would help progress other important reforms:** For example, the AEMC's pending *Efficient provision of inertia* rule change, which addresses issues relating to the provision of inertia.¹³⁴ As discussed in the joint AEMC and AEMO paper on essential system services and inertia,¹³⁵ the OSM could act as a vehicle to help progress the definition of inertia as a service, among other security services, via operational procurement and encourage market participants to develop capacity to deliver this service.
- **We need a way to schedule planning timeframe contracts, including system strength contracts:** The first compliance date for system strength service providers in the System strength rule is 2 December 2025. That final rule enables more efficient procurement of system strength in the planning timeframe. While not essential to the operation of the final system strength rule, the OSM would complement its objectives by scheduling the system strength procured under the system strength framework in operational timeframes and should be in place by this date.¹³⁶

However, there are some key timing constraints that take time for both AEMO and participants to work through, including:

131 See: <https://aemo.com.au/initiatives/major-programs/nem-reform-implementation-roadmap>

132 Including submissions to the directions paper: Origin, p. 1; AEC, p. 3; AGL, p. 1; Tesla, p.1; Shell, p. 1; AEMO, p. 22; Delta Electricity, p. 11, CEC; p. 3.

133 AEMO emphasised this in its submission to the directions paper, p. 22. It stated "Introduction of a market based mechanism as soon as practicable will support the market operating securely and efficiently through this period, while this understanding develops. It is this understanding that should allow the transition to procuring unbundled system services that can be relied on to support secure operation of the NEM".

134 See: <https://www.aemc.gov.au/rule-changes/efficient-provision-inertia>.

135 AEMC and AEMO, Essential system services in the NEM, June 2022.

136 AEMC, Efficient management of system strength on the power system, Rule determination, 21 October 2021.

- implementation activities, such as designing, prototyping, building, integrating and testing IT infrastructure and developing operational and business processes
- developing and consulting on guideline and procedure documentation, including time for participants to engage with AEMO on documents prepared as per the arrangements in chapter 10, and
- Readiness activities, such as evaluating and accrediting plant to participate in the OSM.

The Commission considers that the implementation dates in the draft determination would balance urgency with ensuring that AEMO and participants have sufficient time for updating systems and processes.

11.2 Implementation costs to AEMO and participants have been considered alongside the criticality of reform

The costs associated with AEMO's implementation of the OSM have been estimated at **\$11.4 million ± 40%**. This estimate has been developed in concert with the Reform Delivery Committee's NEM Reform Implementation Roadmap, which has considered the optimal implementation timing and processes to streamline and minimise costs for critical reforms. It is based on a set of assumptions consistent with the design presented through this draft determination and will continue to be refined and updated as the detailed design is progressed.

These cost estimates do not include costs to participants. The Commission designed the OSM in such a way that the bulk of the implementation costs would be on AEMO, and that the only costs for participants would be for those wishing to participate in the OSM. Service providers who choose to participate in the mechanism may incur costs of updating systems and processes in order to participate in the OSM, as well as participating in relevant consultations. However, the Commission expects these to be relatively modest, with the decision made to participate based on an individual assessment of the costs and benefits of doing so. We are interested in stakeholder views on the costs of the draft determination to participants participating in the OSM and whether the assumption above is correct.

11.2.1 It is not straightforward to weigh implementation costs against benefits

In submissions to the consultation paper and directions paper, some stakeholders¹³⁷ noted the need to weigh up the costs and benefits of the OSM and provide quantitative justification. As discussed throughout this draft determination, and most notably in chapter 2, the Commission considers that the OSM would deliver significant benefits in accordance with the NEO. The draft determination approach has been designed specifically to minimise potential drawbacks by promoting key market design principles and considering stakeholder feedback. The Commission considers the OSM would deliver significant benefits promoting the long-term interests of consumers, which would outweigh the expected implementation costs set out above.

¹³⁷ Including AEC, Submission to the consultation paper, p. 6; and submissions to the directions paper: AGL, p. 3; MEU, p. 2; Stanwell, p. 2; AER, p. 2.

However, the Commission has not performed a full, quantitative cost-benefit analysis for the following reasons:

- **It would not be possible to meaningfully quantify the benefits of the OSM:** The OSM would deliver benefits through operational coordination of system security resources alongside the provision of energy and FCAS. As discussed in chapter 2, this would promote productive, allocative and dynamic efficiencies above and beyond the use of directions for security. The Commission explored options to quantify dispatch efficiencies and compare these with the current approach (dispatch plus directions) as part of the OSM rule change process however determined that the assumptions required would be significant. This would decrease how meaningful the results would be, negating the intent.
- **The benefits of the OSM are likely to be realised over time:** AGL and Origin considered the existing arrangements (that is, directions) could persist until a MAS approach can be implemented, because the inefficiencies of intervention for security are relatively low and/or because it is not worthwhile to incur the costs of an interim approach.¹³⁸ The Commission does not agree with AGL and Origin's view that the inefficiencies of intervention for security are relatively low or costs of an interim approach are not worthwhile. As discussed in chapter 2, we understand that there are efficiencies to be gained by facilitating the transition to services that meet power system requirements. The OSM would increasingly promote these benefits over time by incentivising technological advances in new approaches to meeting the security requirements of the system. These benefits are also difficult to meaningfully quantify and so does not allow quantitative modelling to be performed at this time.
- **Implementing a new tool is in the long-term interest of consumers:** section 2.2 discusses the criticality of reform given the lack of current arrangements to allow for optimised scheduling of security services. Accordingly, the Commission considers that something must be done to address the security challenges of the transitioning system and the costs of doing nothing are likely to be significantly greater than the implementation costs of the OSM. These costs are difficult to assess and would need to be accounted for in any quantitative analysis.

The Commission will continue to explore options for quantitative analysis of costs and benefits of the OSM to the extent that this would be valuable. The Commission will also continue to work with stakeholders and AEMO to finalise the cost estimates for the OSM and ensure that the implementation costs for the suite of critical reforms required to help manage the transition are at a minimum.

¹³⁸ Submissions to the directions paper: AGL, p. 2; Origin, p. 2.

12 INTERACTION OF THE OSM WITH OTHER SYSTEM SECURITY ELEMENTS OF THE NER

BOX 19: KEY POINTS IN THIS SECTION

The OSM - as described in chapter 3 - is designed to deliver system security more efficiently than the current operational and planning timeframe tools available to AEMO, including directions, constraints, network planning processes, technical standards, and AEMO's planning and risk management processes.

- The OSM has been designed in such a way that it complements other work underway, such as AEMO's engineering framework.
- Recognising the significant transition that is underway, the OSM has been designed to provide maximum flexibility for the framework to adapt, while still having a focus on transparency so that participants have certainty and knowledge to inform their investment and operational decisions.
- While it aims to deliver system security more efficiently than currently, the draft rule does not amend the current directions process. The introduction of the OSM would allow the directions framework to be used as it was intended to - as a backstop arrangement to ensure the security and integrity of the energy market. Accordingly, under the draft rule, directions would be retained as a safeguarding mechanism to help maintain security.
- The OSM would also be able to work in concert with other existing and proposed security reforms in the NEM, as part of a holistic approach to meeting the security needs of the system in the future.

This section provides more details on how the OSM would interact with other mechanisms, including:

- Section 12.1 - The OSM would add to the suite of operational tools for managing security
- Section 12.2 - The current directions process would be maintained as a last resort mechanism
- Section 12.3 - The OSM would be designed to work in concert with other security reforms.

12.1 The OSM would add to the suite of operational tools for managing security

The rule change request from Delta Electricity¹³⁹ and Hydro Tasmania¹⁴⁰ both noted that current tools (specifically, directions) are not transparent, not delivering efficiencies, and not

¹³⁹ Delta Electricity, Capacity commitment mechanism for operational reserve and other system security services, Rule change request, 4 June 2020, p. 6-7.

¹⁴⁰ Hydro Tasmania, Synchronous services markets, Rule change request, 14 November 2019, p. 1.

a fit-for-purpose tool to maintain security in the long term. Neither request proposed specific changes to the existing provisions to address this. Rather, they proposed new mechanisms to maintain security.

There are a broad range of tools and frameworks in place in the existing NER to manage system security. This includes:

- Tools that act predominantly on an investment timescale, such as NSP planning obligations to provide a safe, secure network in accordance with requirements set out in the NER and in local jurisdictional frameworks, the analysis and information provided by AEMO in its planning reports, such as the ISP and inertia shortfall reports, as well as the technical requirements that plant that connect to the network need to meet.
- Tools that act predominantly in the operational timescale, such as the frequency control markets, the use of constraints in NEMDE to result in a secure dispatch of the system, market notices issued that provide information on system services are required, and then, as a last resort interventions such as directions, instructions and the use of the RERT.

However, as discussed in chapter 1, the OSM would be an additional tool introduced, decreasing the use of interventions and encouraging greater efficiency and transparency. Other existing mechanisms would be maintained as important tools alongside the OSM. In particular, the directions process would be unchanged as described below.

12.2 The current directions process would be maintained as a last resort mechanism

As outlined in appendix B.2, there are a number of aspects of the current NER that work in conjunction to maintain the security of the power system, with ultimate responsibility for security sitting with AEMO. A key component of this framework is the directions process. However, as outlined in section 2.2.1, the directions process is being used significantly more, especially in South Australia.

The introduction of the OSM would reduce the reliance on the directions process, instead having AEMO procure and schedule system services for security directly through the mechanism.

However, the Commission considers it is important to continue to leave the directions provisions in the rules as a backstop, if unexpected security issues arise close to dispatch. For example, directions may still be needed if an OSM unit is unable to run due to safety reasons. Using directions as a backstop mechanism also aligns with comments made by some stakeholders in the directions paper.¹⁴¹

This means that AEMO would retain the power to direct participants and there would be no changes to the compensation or transparency arrangements for directions.

Consistent with this, AEMO's obligations under the existing clause 4.8.9 of the NER would be retained, whereby AEMO may direct participants if it is necessary to maintain or re-establish

¹⁴¹ For example, submissions to the directions paper: AEC, p. 3; Origin, p.1; Hydro Tasmania, p. 11.

a secure operating state (clause 4.8.9(a)(1) of the NER) but must use reasonable endeavours to minimise any cost related to directions or related compensation (clause 4.8.9(b)(1) of the NER). The Commission considers the existing obligations and principles to be sufficient to ensure directions are used appropriately and as a last resort alongside OSM operation.

12.2.1

The Commission does not propose changes to the directions process itself

Stakeholder submissions to the directions paper¹⁴² also raised issues with the transparency and compensation arrangements for directions. The CEC¹⁴³ proposed updating the directions compensation frameworks to incorporate regulated, cost-plus prices to send more efficient price signals to participants and improving the reporting and transparency requirements of the directions process to provide better operational signals to the broader market. Similarly, AGL¹⁴⁴ noted that the discretionary nature of directions is opaque and compensation for directions is inadequate for participants to recoup their costs.

The Commission agrees with stakeholders' concerns that the compensation and transparency arrangements of the directions process do not provide sufficient operational and investment signals to encourage the provision of security services. However, rather than altering the directions framework, the Commission considers that a market-based approach like the OSM is the best way to provide these transparent signals. As discussed in chapter 10, the OSM has been specifically designed to promote price discovery and value security services where directions are unable to. Directions are market interventions that do not allow participants to compete to provide a particular service and are therefore not the best means to provide these signals.¹⁴⁵

In summary, the Commission considers that the OSM would reduce the materiality of the issues identified with the directions process, as the number of directions issued would decrease and there would be greater transparency over the need for, and value of, security services. Accordingly, the Commission has not proposed changes to the direction process in the implementation of the OSM.

Nonetheless, ongoing monitoring arrangements would allow issues arising in future to be tested. Aggregate information on the ongoing use of directions would be monitored in AEMO's annual reporting processes and assessed in the AEMC's four-yearly review (discussed in chapter 10). Changes to compensation or transparency for directions could be considered separately in future as a result of these processes, once there is more operational experience with the OSM and its effect on directions for security.

142 For example, submissions to the directions paper: MEU, p. 2; AGL, p. 2; AEMO, p. 29; CEC, pp. 6-7.

143 Submission to the directions paper, pp. 6-7.

144 Submission to the directions paper, p. 2.

145 Stakeholder concerns on transparency and predictability – such as those raised in the CEC's proposal – have also been considered in-depth by the Commission in the proposed transparency and governance arrangements for the OSM, set out in chapter 10.

12.3 The OSM would be designed to work in concert with other security reforms

The OSM would work alongside other ongoing and potential reforms to maintain the security of the power system. It would have the flexibility to accommodate emerging solutions as crucial reforms and work programs are progressed by the AEMC, ESB and other market bodies.

The OSM is one part of a suite of existing and proposed mechanisms for managing security in the NEM. The reform program is significant and is being progressed in a staged manner. The staged approach has been supported by stakeholders in consultation. For example, in response to the consultation paper released in 2020, several stakeholders¹⁴⁶ noted the need to prioritise and structure the system services reforms. There was general support for staging the reforms, with the system strength rule change and work on frequency prioritised first and others such as scheduling services (for example, the OSM) and operating reserves progressed later.

Some of the other reforms would likely interact with the OSM directly or may provide additional cashflows to participants and affect market dynamics in the market for ESS that the OSM would create.

The Commission's approach to the draft determination focuses on ensuring that the OSM works with the current market design but has flexibility to accommodate future market changes. The OSM has been designed to accommodate the current market structure and the approved reforms (even if they are not yet fully implemented, for example, system strength). However, many of the suite of reforms are still under consideration (for example, inertia and reserve services), and it would be premature to make decisions on exactly how they may interact with the OSM. For reforms that are currently under consideration, the relevant policy development processes would consider how interactions with the OSM draft (and potential final) rule would be accommodated.

Table 12.1 provides further details on some of the key interrelated reform programs.

Table 12.1: Interrelated security reform and (potential) interactions with the OSM

EXISTING OR PROPOSED REFORM	STATUS	(POTENTIAL) INTERACTIONS WITH THE OSM
The System strength rule change	Rule change made in October 2021	The OSM would schedule system strength procured in the planning timeframe under the system strength rule change. The rule change and its interactions with the OSM are described in detail in section 9.2.

¹⁴⁶ See submissions to the consultation paper: Australian Aluminium Council, p. 3; Neoen, p. 1; CS Energy, p. 26; ARENA, p. 34; Energy Australia, p. 24.

EXISTING OR PROPOSED REFORM	STATUS	(POTENTIAL) INTERACTIONS WITH THE OSM
		<p>The timing for implementing the OSM would also be guided by the implementation milestones for the system strength rule change (as discussed in section 11.1).</p>
<p>The Operating reserve services rule change requests (ERC0295 and ERC0307)</p>	<p>Draft determination due by 30 June 2023</p>	<p>The Commission has not yet formed a view on whether the introduction of an explicit unbundled mechanism to procure operating reserves would promote the NEO. However, the Commission considers that the design of any operating reserve mechanism could complement an OSM. Participants would make decisions between an OSM and reserve mechanism in a similar way to how they trade off opportunity costs between energy and FCAS.</p> <p>The Commission notes that Delta Electricity proposed that its approach would procure both operating reserve services/ramping capability and security services. The OSM rule change process is considering issues pertaining to security, while reserve services are more so related to reliability. The Commission is conducting a separate process considering two rule changes from Delta Electricity and Iberdrola (previously Infigen Energy) on reserve services. Refer to appendix D for further details on the AEMC's response to Delta Electricity's proposal.</p>
<p>The Efficient provision of inertia rule change request</p>	<p>Rule change request not yet initiated</p>	<p>This rule change request addresses the efficient provision of inertia. It proposes an inertia spot market in the NEM (a MAS approach), in line with the ESB's post-2025 recommendations.</p> <p>The OSM could help manage system inertia needs until an enduring solution for inertia is determined. The OSM could also help progress the definition and 'unbundling' of inertia as a service. For example, the OSM could allow a new description of an inertia service to be tested for operational procurement; and could encourage market participants to develop the capacity to deliver this service in advance of an enduring solution like a spot market. Further detail on how the OSM could accommodate this is provided in section 10.2.</p>
<p>The General power system risk review (GPSRR)</p>	<p>Rule change made on 3 June 2021.</p>	<p>The GPSRR is a tool for AEMO to monitor system risks over time. Through this process, AEMO identifies priority risks and suggests means to address them. Information from operational experience with the OSM could also be used as inputs to the GPSRR. It is also possible that some risks identified through</p>

EXISTING OR PRO- POSED RE- FORM	STATUS	(POTENTIAL) INTERACTIONS WITH THE OSM
		the GPSRR could be addressed through the OSM.

ABBREVIATIONS

AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
APR	Annual planning reports
Commission	See AEMC
DNSP	Distribution network service provider
ESB	Energy Security Board
ESS	Essential System Services
FCAS	Frequency control ancillary services
GPSRR	General power system risk review
GW	Gigawatt
GWh	Gigawatt hour
IBR	Inverter based resource
ISP	Integrated System Plan
MAS	Market ancillary services
MCE	Ministerial Council on Energy
MVA	Megavolt amperes
MW	Megawatt
MWh	Megawatt hour
NEL	National Electricity Law
NEM	National Electricity Market
NEMDE	NEM dispatch engine
NEO	National Electricity Objective
NER	National Electricity Rules
NMAS	Non-market ancillary services
NSCAS	Network support and control ancillary services
NSP	Network service provider
OSM	Operational security mechanism
RBF	Regional benefit factor
RERT	Reliability and emergency reserve trader
RIT-T	Regulatory investment test for transmission
SSM	Synchronous services markets
SSP	Security services payment
SSSP	System strength service provider
TNSP	Transmission network service provider
TUOS	Transmission use of service
UCS	Unit Commitment Scheduler

A RULE CHANGE REQUESTS AND THE RULE MAKING PROCESS

BOX 20: KEY POINTS IN THIS SECTION

This section includes an overview of the two rule change requests received, including:

- Hydro Tasmania's rule change request that proposed a **MAS** solution to efficiently procure and schedule system services, whereby:
 - System services would be procured within the spot market
 - The need for system services would be determined by binding constraints within NEMDE
- Delta Electricity's rule change request that proposed an **NMAS** solution to efficiently procure and schedule system services, where:
 - System services would be scheduled ahead of time with a mechanism outside of the spot market
 - Required system services would be identified through the short term projected assessment of system adequacy process, allowing participants to make offers reflecting the value of services provided
- This section also includes an outline of the rule making process as well as key dates of the OSM rule change.

The Commission received two rule change requests which both propose solutions to better value system services to deliver a secure system more efficiently. This chapter gives background on the two rule change requests and the rule making process:

- Appendix A.1 - Hydro Tasmania's rule change request.
- Appendix A.2 - Delta Electricity's rule change request.
- Appendix A.3 - The rule making process.

A.1 Hydro Tasmania's rule change request

On 19 November 2019, Hydro Tasmania submitted a rule change request to address the shortage of inertia and related services through the creation of a new market for the procurement of 'synchronous services'.¹⁴⁷ Hydro Tasmania noted that these synchronous services include inertia, voltage control and fault level/system strength.¹⁴⁸

This rule change request was part of seven rule change requests that the AEMC consulted on relating to the arrangements in the NER for the provision of services that are necessary for

¹⁴⁷ Hydro Tasmania, Synchronous services markets, Rule change request, 14 November 2019.

¹⁴⁸ Hydro Tasmania, Synchronous services markets, Rule change request, 14 November 2019, p. 1.

the secure and reliable operation of the power system. These are outlined in the System Services rule changes consultation paper, published by the AEMC on 2 July 2020.¹⁴⁹

A.1.1 Hydro Tasmania's rule change request

Hydro Tasmania noted that system services have historically been provided by synchronous generators in abundance and without compensation as a by-product of electricity generation through synchronous machines being online. It also noted the transformation of the power system is seeing a reduction of these services being provided. Hydro Tasmania noted that, while these system services are currently not valued explicitly, they are still required for the secure operation of the power system. As such, there has been a corresponding increase of directions for generators to come online and provide these services to address the shortfall, which Hydro Tasmania noted is not a long-term solution that is consistent with the NEO.¹⁵⁰ Hydro Tasmania also noted that more efficient outcomes for the utilisation and operation of resources could be achieved if a mechanism was introduced to incentivise the provision of synchronous services.¹⁵¹

A.1.2 Solution proposed in Hydro Tasmania's rule change request

Hydro Tasmania's proposed solution is to introduce a mechanism that would:¹⁵²

- explicitly value the provision of these system services
- provide dispatch targets for resources to provide these services, and
- coordinate the provision of these services along the dispatch of the energy and FCAS markets.

Specifically, Hydro Tasmania's proposed solution would:¹⁵³

- alter NEMDE to shift generators' online status from the input side (the right-hand side - which is currently exogenous and cannot be optimised) of system security constraint equations to the output side (the left-hand side) to allow NEMDE to produce commitment targets for resources
- require resources to provide two additional bid parameters indicating the cost and availability to commit to be online, and
- allow NEMDE to produce dispatch targets for resources to commit online in an efficient manner.¹⁵⁴

Following the release of the Commission's directions paper in 2021, Hydro Tasmania updated its original rule change request considering feedback received from stakeholders. Under the

149 AEMC, System services rule changes, Consultation paper, 2 July 2020.

150 Hydro Tasmania, Synchronous services markets, Rule change request, 14 November 2019, p. 3.

151 Hydro Tasmania, Synchronous services markets, Rule change request, 14 November 2019, p. 4.

152 Hydro Tasmania, Synchronous services markets, Rule change request, 14 November 2019, pp. 2-3.

153 Hydro Tasmania, Synchronous services markets, Rule change proposal, 14 November 2019, p. 2.

154 Hydro Tasmania's rule change proposal noted that a resource would be efficiently committed if it lowered the regional reference price. However the current objective function of the dispatch engine is to maximise the gains of trade of dispatch. Refer to clause 3.8.1(a) and (b) of the NER. Conversations with staff from Hydro Tasmania subsequent to the submission of the rule change request have confirmed that its preferred objective function of the proposed mechanism is maximising the gains of trade of dispatch, consistent with the current objective function of the dispatch engine.

Rules, we must respond to the rule change request itself. However, we have given significant weight to this submission to inform this draft rule determination.

BOX 21: HYDRO TASMANIA REVISED APPROACH

On 21 October 2021, Hydro Tasmania provided a revised model in response to the Commission's directions paper.

The submission maintains the position that a MAS approach using co-optimisation in the spot market is more economically efficient than an NMAS approach and better fits into the NEM's decentralised design philosophy and the AEMC's long term vision for system services.

However, Hydro Tasmania identified revisions to the model in response to feedback from the Commission and AEMO. These revisions included:

- Discussion on how system security constraints that are non-linear could be incorporated into the approach with piece-wise linear approximations – including system configuration
- Rules for managing partial commitment decisions, and
- Examples on how the approach would create marginal prices for system security constraints, and how participants would earn revenue through this system.

According to Hydro Tasmania, these revisions meant that the MAS approach could be implemented immediately with the current version of NEMDE with the inclusion of some additional generic constraints.

The Commission has considered these revisions in its considerations on the OSM, particularly in considering the feasibility of the MAS approach.

Source: Hydro Tasmania, Submission to the directions paper, pp. 2, 14, 14-16, 21.

Hydro Tasmania's initial proposal states that that generators that come online be paid based on a pay-as-bid framework based on each resource's individual bid, rather than on a market clearing price (that is used for energy and FCAS markets).

Hydro Tasmania states that, through this proposed approach, the cost of implementation could be minimised by focusing on the system security constraints that bind most frequently in the initial implementation, with the change to the remaining constraints occurring on an ongoing basis.¹⁵⁵

Hydro Tasmania notes that its rule change proposal contributes to achieving the NEO by supporting a more efficient utilisation and operation of resources, with less need for AEMO to manage system security through directions.¹⁵⁶

¹⁵⁵ Hydro Tasmania, Synchronous services markets, Rule change request, 14 November 2019, p. 3.

¹⁵⁶ Hydro Tasmania, Synchronous services markets, Rule change request, 14 November 2019, p. 4.

A.2 Delta Electricity's rule change request

On 4 June 2020, Delta Electricity submitted a rule change request relating to capacity commitment for system security and reliability services in the NEM.¹⁵⁷

As with Hydro Tasmania's proposal, this rule change request was part of seven rule change requests received by the AEMC that relate to the arrangements in the NER for the provision of services that are necessary for the secure and reliable operation of the power system. These are outlined in the System Services rule changes consultation paper, published by the AEMC on 2 July 2020.¹⁵⁸ This rule change proposes changes to the NER to introduce a day ahead, ex-ante capacity commitment mechanism and payment to provide access to operational reserve and other required system security and reliability services.

A.2.1 Rationale for the rule change request

In order to maintain a secure and reliable system, a range of technical and operational needs must be met at all times. As set out in its rule change request, Delta Electricity considers that the current tools for managing the procurement of system services are not sufficient.¹⁵⁹ Delta Electricity sets out in its rule change request its view that current market design is incomplete, with increasing levels of intervention from AEMO to achieve or maintain a required level of generation investment.¹⁶⁰ Delta Electricity considers that a key question is how the market can deliver efficient price signals to deliver the optimal level of system security services and reliability while allowing for the continuation of the evolution in the generation fleet of the NEM.¹⁶¹

A.2.2 Solution proposed in Delta's rule change request

Delta Electricity proposes to introduce a "day-ahead ex-ante market for capacity commitment" mechanism to address any or all of the system services for which AEMO has forecast a shortfall.¹⁶²

Delta Electricity considers that the proposed solution offers a number of benefits over the status quo, including technology neutrality, price transparency, price discovery and competitive pressures in relation to the procurement of system services.¹⁶³

157 Delta Electricity, Capacity commitment mechanism for operational reserve and other system security services, Rule change request, 4 June 2020.

158 AEMC, System services rule changes, Consultation paper, 2 July 2020.

159 Delta Electricity, Capacity commitment mechanism for operational reserve and other system security services, Rule change request, 4 June 2020 pp. 5-6.

160 Delta Electricity, Capacity commitment mechanism for operational reserve and other system security services, Rule change request, 4 June 2020, p. 6.

161 Delta Electricity, Capacity commitment mechanism for operational reserve and other system security services, Rule change request, 4 June 2020, p. 7.

162 Delta Electricity, Capacity commitment mechanism for operational reserve and other system security services, Rule change request, 4 June 2020, p. 10.

163 Delta Electricity, Capacity commitment mechanism for operational reserve and other system security services, Rule change request, 4 June 2020, pp. 27-28.

Delta Electricity proposes that as part of the day-ahead pre-dispatch process, AEMO should determine the amount of operational reserve and other system services required to meet regional stability and reliability standards.¹⁶⁴

The day-ahead timetable would allow all current providers of system services to participate. Eligible generators under Delta's proposal are scheduled generators, irrespective of technology type, that can provide the required system services. Delta also proposes that eligible generators are most likely (in the absence of the proposed rule change) to be subject to a direction.

Delta Electricity considers that these are "more likely to be generators that cannot fast start and have a non-zero minimum load on their primary fuel source but could be any generator type".¹⁶⁵ The proposed changes would allow slow-start thermal generators to take into account the value of the system services they provide in their operating decisions, and may allow them to remain committed and dispatched at their minimum stable operating level, avoiding consequences for system security and reliability.

Under Delta Electricity's proposal, operators of generators may classify one or more of their generating units as a capacity commitment generating unit. Delta Electricity proposes that the ability of this generating unit to provide the relevant system security services would be assessed by AEMO at the time of registration.

Delta Electricity proposes that AEMO would monitor the short-term projected assessment of system adequacy and pre-dispatch schedule outcomes to identify the system services requirements on a regional basis.¹⁶⁶ Delta Electricity does not expect that market participants would be required to provide any additional information to this process.¹⁶⁷

Delta Electricity proposes that market participants that have registered generating units as capacity commitment generating units would have "the opportunity but not the obligation to provide operational reserve offers". Delta Electricity is of the view that offers would fall into two fundamental categories:

- offers to commit capacity for the entire day (slow start), and
- offers to commit capacity for specific trading intervals in the day (fast start).¹⁶⁸

The offer to commit capacity for the entire day would "allow AEMO to secure grid formation security services that span the entire day" well in advance of system needs. The offer to commit capacity for a specific trading interval could provide AEMO with access to system security services at particular times when shortfalls are identified.¹⁶⁹

164 Delta Electricity, Capacity commitment mechanism for operational reserve and other system security services, Rule change request, 4 June 2020, p. 15.

165 Delta Electricity, Capacity commitment mechanism for operational reserve and other system security services, Rule change request, 4 June 2020, p. 10.

166 Delta Electricity, Capacity commitment mechanism for operational reserve and other system security services, Rule change request, 4 June 2020, p. 11.

167 Delta Electricity, Capacity commitment mechanism for operational reserve and other system security services, Rule change request, 4 June 2020, pp. 13-14.

168 Delta Electricity, Capacity commitment mechanism for operational reserve and other system security services, Rule change request, 4 June 2020, p. 14.

169 Delta Electricity, Capacity commitment mechanism for operational reserve and other system security services, Rule change request, 4 June 2020, p. 14.

The combination of the offers accepted would provide a clearing price for capacity commitment for each trading interval in the day ahead. Delta proposes that any offer accepted by AEMO would obligate the following:

- the generator to remain committed and available for dispatch for the entirety of the period to which the offer applies
- generators committed under this process would not re-bid energy offers for the entirety of the period to which the offer applies
- AEMO would dispatch the generator at no less than its minimum stable operating level (MSOL) for all trading intervals in the period of the offer, and
- AEMO would pay to the generator the trading interval clearing price for the operational reserve capacity for all time intervals in the period in the offer.¹⁷⁰

Delta proposes that each capacity commitment generating unit would provide an offer to participate in the operational reserve market that represents the minimum price in \$/MWh that a market participant is prepared to accept to maintain the electrical output of that generating unit at the MSOL during the entire period to which the offer applies.¹⁷¹ Delta notes that the generators would face the risk that the actual prices clear at lower levels than forecast.¹⁷²

Delta proposes that AEMO would select the capacity commitment generating units that would deliver the required capacity commitment at lowest cost. This would occur in the following fashion. Firstly, AEMO would consider the time frame of the system services shortfall. If system services, including grid formation services, are required for the entire day, AEMO would first consider the "all day" offers to commit capacity and select the offers in order of lowest cost to highest cost until the system security objectives are met for all trading intervals where no specific offers are made.¹⁷³

For all trading intervals where system services shortfalls remain, AEMO would then select specific trading interval offers from lowest cost to highest cost until system security objectives are met for each trading interval.

Delta Electricity notes that in the event that more than one specific security service is needed for a day, then AEMO would co-optimize a solution to meet all required system services at least cost.¹⁷⁴ Delta Electricity notes that offers to provide other security services would reflect the cost to provide the service in appropriate units, for example, inertia offers would be on a \$/unit basis for the period of the offer, given the particular properties of that service.

170 Delta Electricity, Capacity commitment mechanism for operational reserve and other system security services, Rule change request, 4 June 2020, p. 14.

171 Delta Electricity, Capacity commitment mechanism for operational reserve and other system security services, Rule change request, 4 June 2020, pp. 14-15.

172 Delta Electricity, Capacity commitment mechanism for operational reserve and other system security services, Rule change request, 4 June 2020, p. 15.

173 Delta Electricity, Capacity commitment mechanism for operational reserve and other system security services, Rule change request, 4 June 2020, p. 16.

174 Delta Electricity, Capacity commitment mechanism for operational reserve and other system security services, Rule change request, 4 June 2020, p. 16.

Delta Electricity also notes that no intervention pricing would apply to capacity commitment generating units dispatched under the proposed mechanism. Instead, the clearing price of the mechanism would be applicable to the MW capacity that is successfully bid into the ex-ante operational reserve market.¹⁷⁵

A.3 The rule making process

The following outlines the key dates for the rule change process:

- Rule change request received – Hydro Tasmania – **19 November 2019**
- Rule change request received – Delta Electricity – **2 July 2020**
- Consultation paper published – **17 July 2020**
 - Submissions due – **13 August 2020**
- Directions paper published – **9 September 2021**
 - Submissions due – **21 October 2021**
- Rule change requests consolidated pursuant to s. 93 of the NEL – **2 February 2022**
- Draft determination and rule published – **22 September 2022**
 - s. 107 extension of time granted to publish draft determination and rule (due to complexity of issues) – **24 September 2020, 9 March 2021, 17 June 2021, 24 November 2021, 22 June 2022, 17 August 2022**
 - s. 108A report published giving reasoning for a rule not being made within a year of initiation – **17 June 2021**

¹⁷⁵ Delta Electricity, Capacity commitment mechanism for operational reserve and other system security services, Rule change request, 4 June 2020, p. 18.

B BACKGROUND AND CONTEXT

The energy transition has presented a number of challenges and opportunities in ensuring that the NEM has the right mix of equipment to meet energy needs in a secure and reliable way. One of these issues is the need to ensure that the essential services required (such as frequency, inertia, and system strength) are available to maintain system security. This appendix provides more detail on this, including:

- Appendix B.1 - The long-term vision for the power system and the nature of 'bundled' services
- Appendix B.2 - Current mechanisms used to manage security.

B.1 The long-term vision for the power system and the nature of 'bundled' services

B.1.1 The long-term vision for the power system and the ESB process

The long-term vision for the power system is an efficient, secure and reliable power system. As agreed by the market bodies and as set out in the ESB's post-2025 market design advice, the best way to achieve this includes explicitly valuing and pricing essential system services where possible such that they provide adequate investment and scarcity signals for participants.¹⁷⁶

The ESB's post-2025 market design advice was to develop a long-term reform package with the focus on providing advice on long-term, fit-for-purpose market design options that could apply from the mid-2020s.

The ESB also set out that in considering changes to the NEM, ideally spot market arrangements combined with co-optimisation should be used where possible, and the market should progressively move towards spot market provision for services. However, there are some services that may be better suited to structured procurement where spot market arrangements may not be appropriate (either now or ever).

The ESB then made a number of recommendations relating to essential system services.

Of particular relevance to these rule changes, were those recommendations relating to structured procurement and scheduling mechanisms.

With the changing power system and resource mix, there are some supporting system services that are currently provided predominantly as a by-product of synchronous generation. At this stage of the transition, these services may not be easily disaggregated, quantifiable or specifically able to be defined, to allow for the formation of a spot market and may be best addressed through structured procurement.

¹⁷⁶ ESB, Post-2025 Market Design: Final Advice to Ministers, Part A, 2021, <https://www.datocms-assets.com/32572/1629944958-post-2025-market-design-final-advice-to-energy-ministers-part-a.pdf>.

The ESB therefore recommended operational and short-term procurement mechanisms be considered through these rule changes. Such mechanisms would allow AEMO to value, procure and schedule specific services and resources to help keep the system secure.

- New market-based arrangements to value the services needed to support the changing mix of resources in the NEM. These capabilities are currently 'bundled' in the provision of energy by the existing thermal generation fleet. Four essential system services were identified for initial focus: frequency, inertia, system strength and operating reserves.
- New market mechanisms to support efficient scheduling and dispatch by AEMO. Learnings from the operation of these new markets and mechanisms will be important to understand how new technologies and resources with capabilities can continue to deliver these essential services.
- A range of supply and demand based technologies and resources with capabilities to deliver these essential services.

The rule change requests received by Hydro Tasmania and Delta Electricity therefore formed part of the ESB's ESS Scheduling and Ahead Mechanisms (SAM) workstream.¹⁷⁷ This consolidated rule change process is the avenue by which further consideration of issues raised through the development of the above recommendation is being progressed.

B.1.2

Moving from asset-based to a service-led provision of security services

The current market arrangements do not explicitly unbundle individual system services and, consequently, do not appropriately value them. Therefore, we need new ways to actively source these essential system services as the power system continues to transition.

The NEM was designed based on a power system consisting primarily of synchronous generation and the mechanical characteristics of these machines. Historically, system services have been provided by synchronous generators as a by-product from generating electricity. Synchronous generators (coal-fired, gas-fired and hydro generators) are electro-magnetically coupled to the power system, and inherently provide system services like inertia, reactive power support and system strength as a by-product of energy generation when they are committed into service.

However, the NEM is now transitioning to a power system with a higher number of non-synchronous generators, and fewer synchronous generators. These non-synchronous generators do not, without modification, produce all of these system services as a by-product of energy generation, mainly because they are connected by inverters to the NEM. Inverter-based resources (IBR), which typically include solar PV and wind generators, are connected to the power system through power electronics. This means that while IBR can be configured to provide some services that were provided by synchronous generators, they do not necessarily do so automatically as a by-product of their generation. IBR can also provide some services separately to producing energy which is a capability different to that of many synchronous machines.

¹⁷⁷ ESB, Post-2025 Market Design final advice to Ministers, July 2021, <https://energyministers.gov.au/energy-security-board/post2025>.

The extent to which it is possible to completely separate all power system requirements and translate these requirements into services is unknown. The shift to a service-based model involves further work to unbundle and define the core fundamental physical requirements that keep the power system secure, and what system operators need to do in order to keep the power system stable and operable. Understanding these core requirements, in addition to understanding the capability of new emerging technologies, will enable progress towards a services-based future, where system services can be provided from a range of technologies with confidence.

To date, the lack of markets or other means of valuing security services means AEMO is intervening in the market to procure these essential capabilities. The ESB's Health of the NEM report noted that system security remains the most critical issue at present, and that AEMO's interventions have increased markedly in recent years as changing market conditions has reduced the number of synchronous generators remaining online.¹⁷⁸ Based on the current level of analysis and knowledge of operating the transitioning generation fleet and power system, AEMO intervenes to ensure that particular units and generating resources are online to maintain a secure and stable grid. To date, these interventions have been location specific (e.g. in South Australia) and steps have been taken to address immediate challenges (e.g. via investment in synchronous condensers). However, similar challenges are emerging across the NEM and are likely to increase in future given the changing composition of resources on the grid.

There is a need for an architecture for valuing, scheduling and procurement of security services in operational timeframes. Valuing security services would provide appropriate investment and disinvestment signals to market participants that provide these services. The nature of our current understanding of system services means that any architecture needs to be flexible to accommodate both bundled and unbundled services as engineering knowledge improves, and to manage the increasing complexity and uncertainty of market needs and outcomes.

B.2 Current mechanisms used to manage security

There are a number of mechanisms outlined in the National Electricity Rules which AEMO can use to ensure the NEM remains secure at all times. These include, but are not limited to:

- **Generator performance standards** – the NER sets out technical requirements for generators (and other equipment) connecting to the power system which help support power system security. Access standards are set for connecting generators. These relate to a wide range of technical requirements (Refer to Schedule 5.2 to the NER) to support power system needs during normal operating conditions, during disturbances, and immediately following disturbances. Technical requirements cover, for example, active and reactive power, voltage, and system strength.

¹⁷⁸ ESB, Health of the NEM Report, <https://esb-post2025-market-design.aemc.gov.au/32572/1608714620-the-health-of-the-national-electricity-market-volume-1-the-esb-health-of-the-nem-report.pdf>, p. 23-25, January 2021.

- **Technical capability of future plant** – the technical capability of future plant is forecast over a 10-year horizon to assess system strength requirements. As per clause 5.2.5.15(b) of the NER, asynchronous generating units must have the capability to operate stably.
- **Inertia framework** – the AEMC introduced a framework in 2017 to ensure security critical inertia when regions are at risk of ‘islanding’ from the rest of the NEM.¹⁷⁹ Under this framework, AEMO is required to assess the minimum and secure operating levels of inertia for each region, the projected level of inertia in that region over the following five years, and the likelihood of the region becoming islanded. If AEMO identifies a projected shortfall in a region at risk of islanding, the relevant TNSP is required to procure the inertia or alternative frequency control service (including FFR) to meet this shortfall. Proposed investments by the TNSPs to provide inertia network services are subject to a regulatory investment test for transmission, as are any proposed inertia service payments.
- **System strength framework** – the AEMC’s Efficient management of system strength on the power system Rule allowed NSPs to potentially contract with a non-network solution (such as a privately owned synchronous condenser, or an existing synchronous generator) to provide system strength to meet the system strength standard.
- **Ancillary services** – are used by AEMO to manage the power system safely, securely, and reliably. There are a range of different services to maintain key technical characteristics of the system processes:
 - **FCAS** – FCAS are used by AEMO to maintain the frequency on the electrical system, at any point in time, close to fifty cycles per second as required by the NEM frequency standards. There are a range of different responses available to maintain the frequency within the NEM frequency standards including generator governor response, load shedding, rapid generation, rapid unit unloading and automatic generation control.
 - **NSCAS** – non-market ancillary services that may be delivered to maintain power system security and reliability of supply of the transmission network, or to maintain or increase the power transfer capability of the transmission network. AEMO is required to assess NSCAS needs in the NEM for the upcoming five-year period. When AEMO identifies a NSCAS gap, the NER give transmission network service providers the primary responsibility for having arrangements in place to address the gap. AEMO may be required to acquire NSCAS only to ensure power system security and reliability of supply of the transmission network in cases where AEMO considers that the gap will remain after receiving advice from the transmission network services provider about its proposed arrangements to address the gap.
 - **SRAS** – are reserved for contingency situations in which there has been a major supply disruption or where the electrical system must be restarted. The available services for SRAS are general restart source and trip to house load.

¹⁷⁹ Refer to clause 4.4.4 of the NER.

- **Integrated System Plan (ISP)** – AEMO publishes a whole-of-system plan every two years that provides an integrated roadmap for the efficient development of the National Electricity Market (NEM) over the next 20 years and beyond. It serves the regulatory purpose of identifying actionable and future ISP projects for TNSPs (which can address security issues), as well as the broader purposes of informing market participants, investors, policy decision makers and consumers.
- **Other system planning processes** – AEMO collects information from market participants and publishes a range of reports which address issues related to security of the power system. These include the Electricity Statement of Opportunities (ESOO), Energy Adequacy Assessment Project (EAAP), Short-term and Medium-term Projected Assessment of Adequacy (ST PASA and MT PASA), and the Summer Readiness report. Beyond this, there are also several publications related specifically to renewables and their impact on the power system.
- **General Power System Risk Review** – monitors risks over time through the publication of an annual review identifying and assessing risks to power system security. The review is developed by AEMO in collaboration with NSPs. Only a limited number of priority risks will be assessed in depth through each GPSRR.
- **Protected events** – is a non-credible contingency event the Reliability Panel has declared to be a protected event. The category of protected event was introduced in 2017 to give AEMO additional tools to manage certain high consequence non-credible contingency events. AEMO may use a mixture of ex-ante actions to manage a protected event declared by the Reliability Panel. These actions include the purchase of FCAS, constraining generation dispatch, and the use of an Emergency Frequency Control Scheme in order to maintain the frequency operating standards applicable to protected events.
- **Constrained optimisation process** – AEMO determines generation schedules and regional prices in the NEM through an optimal solution to maximise the value of trade using the 'least cost' combination of generation (or demand response) available. The solution supports a secure and sustainable operation by solving linear constraint equations that represent the system's physical restrictions.
- **Mandatory frequency response** – is a mandatory obligation for all scheduled and semi-scheduled generators in the NEM to help control power system frequency by activating existing capability to provide primary frequency response when a dispatch instruction is received.
- **Primary frequency response incentive arrangements** – is a recent rule change to provide incentive arrangements that encourage generation and load to help control power system frequency.
- **Interventions** – one key intervention mechanism is the use of directions, with AEMO has been using significantly in South Australia. Other interventions such as the Reliability and Emergency Reserve Trader (RERT) and instructions are also available to AEMO to

return the NEM to a secure operating state. AEMO may issue directions to participants to maintain or re-establish the power system to a secure operating state.¹⁸⁰ Directions are a tool primarily intended to be used as a last resort mechanism.

¹⁸⁰ Refer to clause 3.14.4(e)(1) of the NER.

C KEY CHOICE BETWEEN MAS AND NMAS

This appendix covers the Commission's consideration of both the MAS and NMAS approaches to determine which approach best meets the NEO, including:

- Appendix C.1 - The Commission outlined two broad approaches in the directions paper
- Appendix C.2 - The MAS option is not currently feasible.

C.1 The Commission outlined two broad approaches in the directions paper

The Commission outlined two broad approaches to the design of a mechanism to value, procure and schedule security services in the directions paper:

- a **market ancillary services (MAS) approach** — which would introduce new services to be scheduled through the pre-dispatch engine to allow it to produce dispatch schedules that would be guaranteed to result in secure dispatch. The Hydro Tasmania rule change request can be considered an example of this.
- a **non-market ancillary services (NMAS) approach** — which would introduce new services to be procured and scheduled in an optimisation engine outside of the spot market, to ensure secure dispatch in a more efficient manner and allowing the operational actions that AEMO undertakes to be more transparent at a lower cost.¹⁸¹ The Delta Electricity rule change request can be considered as an example of this.

Both these approaches are optimisation-based mechanisms designed to meet system requirements not currently procured through existing ancillary services categories to support the security of the system. Both approaches would explicitly aim to value the security services provided by market participants.

C.1.1 The proposed MAS approach

Under the MAS approach, the scheduling and procurement of security services would be brought into the NEMDE pre-dispatch and dispatch engines to allow their explicit valuation in addition to energy and FCAS for every 5-minute interval.

This would allow a resource that is able to provide security services to make scheduling decisions within the market scheduler based on the expected price signals of providing these services. In addition, it would allow resources that have a TNSP-procured contract (for example, for system strength) to be scheduled for this purpose via the current market scheduler.

This would create an explicit valuation for providing security services within the spot market to supplement contracts procured in the planning timeframe (such as contracts for system strength, inertia and NSCAS, as well as potentially other services that might be procured by TNSPs in the future).

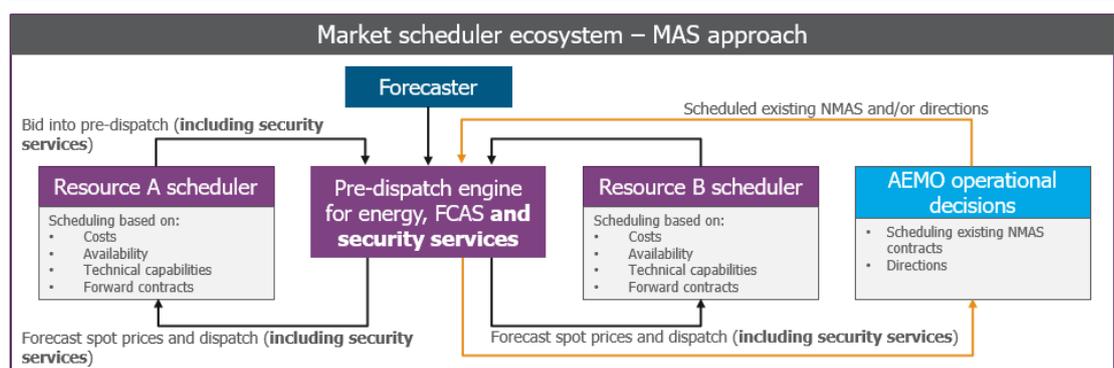
¹⁸¹ Note: AEMO already schedules NMAS contracts to meet some power system needs. See, for example, AEMO, Network Support and Control Ancillary Services (NSCAS) description and quantity procedures

The pre-dispatch and dispatch engines would be updated to:

- allow the scheduling of commitment variables in security constraints, so that the solution derived by the pre-dispatch engine is likely to result in secure dispatch outcomes
- for a given interval, determine optimal dispatch targets not only for energy and FCAS but also for the provision of security services, and
- base the optimisation not only on existing energy and FCAS bids, but also on bids for the provision of security services.

The structure of this approach is added and highlighted within the market scheduler ecosystem in Figure C.1 below.

Figure C.1: Diagram of the MAS approach



Source: Adapted from Creative Energy Consulting, Scheduling and ahead markets, June 2020, p.26.

AEMO would maintain its ability to schedule resources through existing non-market ancillary services mechanisms and make directions to ensure that the power system remains secure. However, the intent of the MAS approach is that the market scheduler ecosystem would converge sufficiently rapidly to a secure solution such that AEMO would not have to intervene.

The solution proposed by Hydro Tasmania is consistent with this overarching approach as it would implement the scheduling of security services through the pre-dispatch engine through a continuous, linear formulation.¹⁸² However, the Hydro Tasmania solution did not propose to include all system requirements within the pre-dispatch engine, focusing on security constraints that are currently binding frequently, and so would not allow for scheduling to meet transitional system configuration requirements.¹⁸³

¹⁸² Hydro Tasmania, Synchronous services markets, Rule change request, 14 November 2019.

¹⁸³ Hydro Tasmania, Synchronous services markets, Rule change request, 14 November 2019, pp. 2–4.

Stakeholder views on the benefits of full co-optimisation

Generally, stakeholders, such as Hydro Tasmania, Tesla and the AEC, agreed that the advantages of the MAS are that it co-optimises the procurement of security services with FCAS and energy dispatch.¹⁸⁴ This could lead to the efficient maximisation of the value of trade across all the NEM's spot markets. The Commission agrees with this theoretical benefit and considers that co-optimisation of services in the spot market, where possible, is likely to generate additional benefits over a NMAS approach.

In addition, stakeholders raised a variety of potential drawbacks of the NMAS approach:

- The NMAS would have a degree of non-cooptimisation as the NMAS schedule would be solved outside of the spot market.
- The NMAS would introduce additional forecast errors as the NMAS scheduling would inherently be done ahead of time.
- The NMAS would not generate transparent and efficient prices as it would not produce marginal clearing prices.

The Commission agrees that each of these drawbacks could arise in the design of the NMAS approach. The Commission is cognisant of each of these issues and has designed the NMAS approach to minimise the effect of each of these, as described in chapter 4, chapter 7 and chapter 8.

Stakeholder views on transparency requirements

A number of stakeholders, such as Hydro Tasmania, Tesla, the AEC, CS Energy, considered that the MAS provided a better level of transparency when compared to the NMAS.¹⁸⁵

The Commission agrees in principle that the co-optimisation of the MAS approach with the current spot market may have transparency benefits compared to the NMAS approach. However, as discussed further below, this approach is not feasible at the current time and so the Commission has kept transparency at the heart of the draft rule, particularly when compared to the status quo as reflected by AEMO in its submission.¹⁸⁶

C.1.2

The proposed NMAS approach

Under a NMAS approach, the procurement of security services would be undertaken through an optimisation approach outside the spot market to:

- procure and schedule security services through structured contracts in the operational timeframe, thereby replacing the frequent use of directions
- facilitate the optimal scheduling of resources alongside TNSP-procured contracts (eg, those of system strength and NSCAS), and
- implement an explicit optimisation approach to the scheduling of NMAS contracts entered into by AEMO and called upon in the operational timeframe.

¹⁸⁴ Submissions to the directions paper, Hydro Tasmania p. 6, Tesla p. 6, and the AEC p. 4.

¹⁸⁵ Submissions to the directions paper, Hydro Tasmania p. 6, Tesla p. 4, the AEC p. 4, and CS Energy p. 13.

¹⁸⁶ AEMO, submission to the directions paper, p. 28.

This would allow a resource that is able to provide security services an opportunity to enter into a contract with AEMO to participate in the market based on its offered price, in the operational timeframe.

These contracts could be scheduled to commit resources over multiple, consecutive intervals. In contrast to the MAS option discussed above, this optimisation engine would itself be an inter-temporal optimiser that produces schedules based on the bids submitted by resources to AEMO.

The use of structured procurement through the OSM engine would allow the optimiser to determine the cost of committing contracted resources to provide security services that are difficult to define, measure and include in linear constraints (for example, transitional system configuration requirements). As such, under the NMAS approach, the scheduler could optimise and schedule:

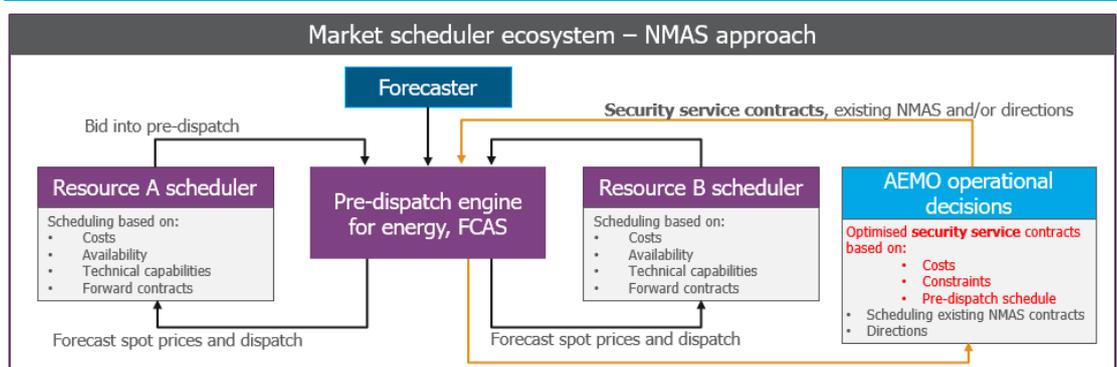
- known security service procurement (for example, system strength or inertia), and
- bundled security services (provided through system configurations).

While this approach would not make changes to the pre-dispatch engine, resources procured and scheduled for security services through the NMAS scheduler would update the broader market through re-bids, allowing NEMDE to converge to a secure solution.

Implementing an NMAS approach to procuring and scheduling security services would involve developing an optimisation engine that formally adopts binary system security constraints that are able to reflect the physical characteristics of the system. Such an optimisation engine may take longer than the 5-minute dispatch interval to optimise, thereby resulting in the multiple consecutive NMAS dispatch intervals to ensure that system security is maintained with a high degree of confidence.

The structure of the NMAS approach is added and highlighted within the market scheduler ecosystem in Figure C.2 below.

Figure C.2: Diagram of the NMAS approach



Source: Adapted from Creative Energy Consulting, Scheduling and ahead markets, June 2020, p.26.

C.2 The MAS option is not currently feasible

The OSM draft rule is based on a NMAS approach, while drawing on key elements from the MAS where these are feasible. This is because given technical limitations of the current central dispatch solver and our current understanding of power security requirements, the MAS approach is infeasible as explained in chapter 2.

To date, AEMO has been able to identify and develop specific configurations that represent a secure technical operating envelope within which a secure power system can be modelled and operated. Such system configurations are used to inform AEMO's direction of generators to support system security. Given the current understanding of power system engineering, the continued use of system configurations will continue to be required transitionally, as opposed to fully unbundling and individually valuing security services.

The below elaborates further on why the MAS is currently infeasible.

Several stakeholders, such as AGL and AEMO, considered that the NMAS should be implemented if it is clear that the MAS approach is unfeasible.¹⁸⁷ AGL recommended that the NMAS would be preferable over the status quo, with the MAS being the favourite solution if practicality concerns are solved.¹⁸⁸

C.2.1 Given current technical understanding, the proposed MAS would require manual adjustments

While the Commission considers that further work and consideration may allow the MAS approach to incorporate security requirements, and this is the long-term vision we are working towards, given current technical understanding, it is difficult to linearise inherently binary system security constraints.

At the current level of understanding, the MAS approach may be unable to reflect the physical reality of the system, thereby potentially resulting in the dispatch of insecure system configurations. This is due to the fact that many system security constraints are underpinned by physical relationships that are:

- binary¹⁸⁹, non-linear or non-convex
- rely on the status of the plant and may require long start up times, or
- show negative contribution factors if partially committed.

This contrasts with energy provision or FCAS in which plant can bid energy or FCAS a plant into the market in essentially a linear way.

A MAS approach, such as the Hydro Tasmania proposal,¹⁹⁰ would need to linearise these binary system security constraints to optimise the provision of security services through NEMDE. This would not accurately represent the physical reality that underpins system security, and could lead to dispatch of insecure configurations due to the partial commitment

187 Submissions to the directions paper, AGL p. 3, AEMO p. 3.

188 AGL, Submission to the directions paper, p. 3.

189 That is, the service is either providing the service or not, for example, inertia provided by a synchronous plant.

190 Hydro Tasmania, Synchronous services markets, Rule change request, 14 November 2019.

of units which could distort outcomes and make the system insecure, that is, the activation of units due to any non-zero coefficient resulting from the linear optimisation engine.

Even if these were to be overcome, given the above, it is likely that significant manual adjustments of system security constraints to account for the linearisation would occur. These ad-hoc adjustments would reduce the transparency and simplicity while increasing the expected administrative burden.

Additionally, given current solving times, the 5-minute MAS dispatch interval would not provide AEMO with sufficient time to take action in the case of network instability due to the partial commitment of units.

In contrast, the OSM's binary approach can be implemented now and would provide the optimisation with sufficient time over which to run the calculation with no manual adjustments.

C.2.2

System configurations would be impossible to allocate to individual units

As the OSM is likely to be procuring and scheduling bundled security services, given current engineering understanding, it would be impractical to calculate the contribution of individual units that form parts of system configurations. As such, price as bid would be a transitional solution until individual system security services can be unbundled. Given the binary nature of many power system requirements, the Commission does not consider that these marginal prices would reflect the real cost of procuring such services. Moreover, the alignment with the NEMDE 5-minute dispatch interval may result in better co-optimisation with energy and FCAS dispatch but could also exacerbate the concerns of system security providing AEMO with insufficient time to react to contingency events.

This problem does not exist under the draft rule, where clear prices can be found.

D SUMMARY OF OTHER ISSUES RAISED IN SUBMISSIONS

This appendix sets out the issues raised in submissions to the consultation paper and directions paper for this rule change request and the AEMC’s response to each issue. If an issue raised in a submission has been discussed in the main body of this document, it has not been included in this table.

Table D.1: Summary of other issues raised in submissions

ISSUE	DESCRIPTION AND KEY STAKEHOLDERS	AEMC RESPONSE
Defining the nature of services	<p>In submissions to the directions paper, several stakeholders, including CS Energy (p. 11), CEC (p. 8) and Stanwell (p. 2), supported waiting until new services were defined before deciding on a solution to procure and schedule system services.</p> <p>For example, the CEC (p. 8) suggested that the AEMC and AEMO should work together to better define and understand the nature of the services that are needed in an increasingly non-synchronous power system. The CEC acknowledged that this was a complex area but emphasised its criticality in upholding the long-term vision for the power system and allowing for the development of a MAS approach.</p>	<p>Exploring and defining new services is consistent with the ESB’s long-term vision for the power system. The Commission agrees with the CEC that this is both a complex and critical area and is engaging with AEMO and other industry members on an ongoing basis to better understand and contribute to the work being done in this area, for example, by engaging with AEMO’s Engineering Framework work program.</p> <p>The AEMC does not define the exact nature of specific essential services in this draft determination as it considers that this requires better learning of power system requirements by AEMO, networks and participants that will occur over time. As discussed in chapter 2, there is a critical need for a solution to procure and schedule system services and, as such, an NMAS approach has been proposed as a mechanism to assist with better understanding and meeting the security needs of the system.</p> <p>While it does not define specific services, the determination has been informed by ongoing work and current understanding of service definitions. The AEMC’s draft rule would confer powers and obligations on AEMO to define the nature of services and ensures that AEMO has accountability to update service definitions as it gains new knowledge.</p>

ISSUE	DESCRIPTION AND KEY STAKEHOLDERS	AEMC RESPONSE
		<p>This would ensure that new services are accommodated as they are better defined and understood, which we consider to be of critical importance. Refer to chapter 10 of this draft determination for further detail.</p>
<p>Concerns relating to centralised decision-making by AEMO</p>	<p>In submissions to the directions paper, CS Energy (p. 2), CEC (p. 8), Hydro Tasmania (p. 6) and Shell (pp. 4-5) expressed concern with the shift to centralised decision-making that was considered to be implicit in the directions paper, specifically the NMAS approach.</p> <p>For example, Hydro Tasmania’s submission (p. 6) suggested that proposals for committing ESS in advance were incompatible with the NEM’s decentralised design principles. Specifically, it referenced the energy market design principles in existing clause 3.1.4(a)(1) of the NER, which speak to the “minimisation of AEMO decision-making to allow Market Participants the greatest amount of commercial freedom to decide how they will operate in the market”.</p> <p>Shell (p. 4) also recommended that the AEMC include express provisions in the rules to prevent discretionary actions from</p>	<p>The Commission’s primary objective when considering rule change requests is the NEO, which is upheld with reference to the market design principles in clause 3.1.4 of the NER.</p> <p>The Commission’s approach to the OSM draft determination preferences participant decision-making as much as possible. For example:</p> <ul style="list-style-type: none"> • The scheduling and timing arrangements (refer to chapter 7) allow participants the flexibility to manage their bids across the energy and FCAS markets and the OSM as close as practicable to real-time. • The revenue arrangements (refer to chapter 8) place operational risks on participants, encouraging them to consider the opportunity costs of participating in the OSM and allowing them to incorporate these costs into their bids. • The transparency arrangements (refer to chapter 10) aim to encourage participants to make informed operational and investment decisions with respect to ESS. <p>However, the Commission considers there are matters where more operator discretion is warranted given AEMO’s role as the market operator. AEMO has technical expertise and operational experience with system operation and is therefore best-placed to make decisions with respect to maintaining system security. For the avoidance of doubt, the Commission has taken a largely principles-based approach, ensuring that the</p>

ISSUE	DESCRIPTION AND KEY STAKEHOLDERS	AEMC RESPONSE
	<p>AEMO, specifically relating to pre-emptive, “just in case” actions.</p>	<p>appropriate guidance is in place for AEMO.</p> <p>We are interested in stakeholder views on how well the draft determination strikes a balance between encouraging participant decision-making and risk-management and practically meeting the needs of the system.</p>
<p>Meeting operating reserve, ramping and essential system services needs using one mechanism.</p>	<p>In its rule change proposal (pp. 10-22) and submissions to the consultation paper (pp. 14-15) and directions paper (p. 1), Delta Electricity proposes a mechanism to incentivise the provision of essential system services, operating reserves and ramping capability.</p>	<p>The Commission considers that the issues pertaining to security services, as explored in the OSM rule change, are different to those relating to operating reserves and ramping capability.</p> <p>As such, it has made the decision to address ramping capability and operating reserves through a separate process concerning two rule changes from Delta Electricity and Iberdrola (previously Infigen Energy). More information on the reserve services rule changes can be found on the AEMC’s website: https://www.aemc.gov.au/rule-changes/operating-reserve-market.</p> <p>Details on the potential interactions between a reserve service and the OSM are detailed in chapter 12.</p>
<p>Changing the market price cap to address security issues</p>	<p>In its submission to the directions paper, PIAC (pp. 2-3) proposed creating a market for ‘flexibility services’ through flexibility payments and changes to the market price cap instead of a MAS or NMAS approach to procuring and scheduling security services.</p>	<p>The Commission has not considered changes to the market price cap within the OSM rule change as this is the role of the Reliability Panel’s Reliability Standards and Settings Review.</p> <p>The purpose of the 2022 review was to consider whether the existing form and level of the reliability standard and settings remain appropriate for the expected market conditions from 1 July 2025 to 30 June 2028. The reliability settings include the Market Price Cap, Cumulative Price Threshold, Administered Price Cap and the Market Floor Price.</p>

ISSUE	DESCRIPTION AND KEY STAKEHOLDERS	AEMC RESPONSE
		<p>The Reliability Panel published its 2022 review on 1 September 2022. It made multiple recommendations that will be submitted as rule change requests to the AEMC. The review can be found here: https://www.aemc.gov.au/market-reviews-advice/2022-reliability-standard-and-settings-review.</p>
<p>Suggestions for immediate, interim reforms</p>	<p>In its submission to the directions paper, Tesla (pp. 4-5) suggested the AEMC begin immediate reforms in the area of system security by:</p> <ul style="list-style-type: none"> clearly defining additional services to be procured (with a service requirement focus), establish system service procurement guidelines, and revising AEMO’s RIS to reduce synchronous/inertia safety nets as knowledge improves with continuous iteration/improvements. <p>CS Energy (Submission to the directions paper, p. 14), also noted that the AEMC could take immediate steps to improve the transparency of information to the market for essential system services, including:</p> <ul style="list-style-type: none"> performing an audit on the rules to ensure they reflect evolving role of system services, 	<p>The Commission does not propose any immediate reforms in the interim before the start date for the OSM (beyond the relevant processes, such as the preparation of the OSM procedures, that are required to be implemented in advance - discussed in section 11.1).</p> <p>However, the Commission has deliberately included provisions relating to issues raised by Tesla and CS Energy in the OSM draft rule, including:</p> <ul style="list-style-type: none"> Requiring AEMO to define services and communicate updates to the market. Promoting transparency of information to the market through publication and consultation requirements. <p>These provisions are discussed in chapter 10.</p> <p>The Commission also notes that there are a number of interrelated work programs underway at the AEMC and AEMO to consider issues relating to the need for system services (such as inertia) in the NEM as it transitions. This includes the suite of essential system services rule changes (which are at varying stages of completion), the inertia rule change (currently pending initiation) and AEMO’s Engineering Framework program. Interactions between these processes and the OSM are discussed in chapter 10 and chapter 12.</p>

ISSUE	DESCRIPTION AND KEY STAKEHOLDERS	AEMC RESPONSE
	<ul style="list-style-type: none"> ensuring frameworks intended to inform the market (for example, ST PASA, ESOO) capture and report system services, and considering requirements on AEMO to enhance the information provision of re-dispatch to include system service requirements and how procured services have met the metric. 	
<p>TNSP coordination of system services</p>	<p>In its submission to the directions paper, the South Australian Government (p. 2) had significant concerns with a TNSP-led coordination solution for system strength, such as that proposed in the Efficient Management of system strength on the power system rule change. SA's experience is that TNSPs face significant challenges in delivering the necessary investment to address system strength gaps in a timely manner. The existing regulatory framework adds a considerable time barrier to the process.</p> <p>Energy Australia (Submission to the directions paper, p. 2) considered it was not clear that using an AEMO-controlled</p>	<p>The Commission has not proposed any updates to the fundamental obligations of TNSPs under the system strength framework. The draft rule would not impact the implementation or seek to delay the implementation of the system strength rule. This means existing obligations on TNSPs under that rule, for example, submitting pricing methodologies to the AER by 30 November 2022, would not be impacted,</p> <p>The Commission considers that the OSM would provide AEMO with the necessary tools to co-optimize the scheduling of system strength contracts alongside other forms of ESS, energy and FCAS. The OSM would schedule these assets to maximise the value of trade and thereby result in the best outcomes for consumers.</p> <p>As discussed in chapter 9, the OSM has been designed to ensure the effectiveness of the system strength framework by providing a mechanism by which SSSP-procured contracts can be optimized alongside energy and FCAS. The OSM would not change the planning timeframe obligations of SSSPs, rather it would allow for the operational procurement of further</p>

ISSUE	DESCRIPTION AND KEY STAKEHOLDERS	AEMC RESPONSE
	<p>NMAS approach for scheduling system strength contracts is possible, required or desired.</p> <p>The CEC (Submission to the directions paper, p. 7) considered that an NMAS approach may weaken existing system strength mechanisms and that there is no need for measures in the operational timeframe.</p>	<p>system strength if the long-term forecasts of IBR were exceeded and demand was greater than expected.</p>

E 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.

E.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 Hydro Tasmania and Delta Electricity.

The Commission's reasons for making this draft rule determination are set out in chapter 2.

A copy of the more preferable draft rule is attached to and published with this draft rule determination. Its key features are described in chapter 3.

E.2 Power to make the rule

The Commission is satisfied that the more preferable draft rule falls within the subject matter about which the Commission may make rules. The more preferable draft rule falls within s. 34(1)(a)(ii) and (iii) of the NEL as it relates to the:

- operation of the national electricity system for the purposes of the safety, reliability and security of that system
- activities of persons (including registered participants) participating in the national electricity market or involved in the operation of the national electricity system.

In addition, the more preferable draft rule falls within a number of the matters set out in Schedule 1 to the NEL, being items 11 to 13 (relating to the operation of transmission systems), 15 to 20 and 24 (relating to transmission revenue and pricing), 26K (relating to electricity network services), 30F (relating to AEMO) and 34(c) (relating to the payment of money).

E.3 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 draft rule. The Commission's reasons for making a more preferable rule are summarised in chapter 2.

E.4 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 Ministerial Council on Energy (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 primarily relates to parts of the NEL 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.¹⁹¹

E.5 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 during first and second round consultation
- 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 MCE statement of policy principles for this rule change request.

E.6 Civil penalties

The Commission cannot create new civil penalty provisions. However, it may recommend to the Energy Ministers' Meeting (formerly the Council of Australian Governments Energy Council) that new or existing provisions of the NEL be classified as civil penalty provisions.

The NEL sets out a three-tier penalty structure for the NEL and NER. A Decision Matrix and Concepts Table, approved by Energy Ministers, provides a decision-making framework that the AEMC applies, in consultation with the AER, when undertaking the assessment of whether provisions of the Rules should be classified as civil penalties, and if so, under which tier.

¹⁹¹ From 1 July 2016, the NEL, as amended from time to time, apply in the Northern Territory, subject to derogations set out in regulations made under the Northern Territory legislation adopting the NEL. Under those regulations, only certain parts of the NER have been adopted in the Northern Territory. (See the AEMC website for the NER that applies in the Northern Territory.) National Electricity (Northern Territory) (National Uniform Legislation) Act 2015.

The AEMC makes the following recommendations in Table E.1 below:

Table E.1: Recommended civil penalties

CLAUSE	SUBJECT OF CLAUSE	PROPOSED CLASSIFICATION	REASON
3.7G.7(b)	Submitting OSM offers in accordance with accreditation for the security service	Tier 2	Align with existing provisions for bidding obligations.
3.7G.9(g)	Obligation for a participant to ensure spot market bids are consistent with the OSM	Tier 2	Align with existing provisions for bidding obligations.
3.7G.10(b)	Obligation for a participant to ensure that it can dispatch its OSM facility once enabled through the OSM	Tier 1	Align with existing obligations to meet dispatch instructions.
3.7G.10(c)	Obligation for an OSM participant to comply with dispatch instructions from AEMO	Tier 1	Align with existing obligations to comply with dispatch instructions.
4.9.8(g)	General responsibilities of Registered Participants	Tier 1	Align existing general responsibilities of Registered Participants to extend to OSM Participants

In addition, the below table shows the Commission's proposed amendments to clauses currently subject to civil penalty provisions that the Commission recommends are expanded to incorporate the OSM framework.

Table E.2: Recommended amendments to existing clauses subject to civil penalty provisions

CLAUSE	SUBJECT OF CLAUSE (AS AMENDED)	PROPOSED CHANGE	CURRENT CLASSIFICATION
3.8.8(b)	Validation of bidding data in dispatch and the OSM	Incorporate OSM bids alongside other dispatch and market ancillary service bids	Tier 2

CLAUSE	SUBJECT OF CLAUSE (AS AMENDED)	PROPOSED CHANGE	CURRENT CLASSIFICA- TION
3.8.22(c)(1)	Method of making rebids	Incorporation of OSM bids	Tier 2
3.8.22(c)(2)	Providing a reason for making a rebid	Incorporation of OSM bids	Tier 2
3.8.22(c)(3)	Requirements to provide additional information to substantiate a reason for making a rebid	Incorporation of OSM bids	Tier 2
3.8.22(ca)	Record keeping of information if making a rebid during a late rebidding period	Incorporation of OSM bids	Tier 2
3.8.22A	Requirements that bids and rebids must not be false or misleading	Incorporation of the OSM into bidding and rebidding obligations	Tier 1
5.20C.4(b)	System strength services information and approvals	Incorporation of the OSM for services under a system strength services agreement	Tier 2

E.7 Conduct provisions

The Commission cannot create new conduct provisions. However, it may recommend to the Energy Ministers' Meeting 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 Energy Ministers' Meeting that any of the proposed amendments made by the draft rule be classified as conduct provisions.