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28 September 2023

Nomiky Panayiotakis
Project Leader
Australian Energy Market Commission
Sydney NSW 2000

Dear Ms Panayiotakis,

Improving security frameworks for the energy transition – Directions Paper

The power system is currently experiencing an unprecedented rate of transition. Regulatory reforms are essential to ensure the market frameworks can evolve to reflect and enable this transition.

AEMO is committed to progressing the NEM towards the goal of 100% instantaneous renewable energy operations. AEMO considers that the issues targeted by this rule change are fundamental to the functioning of the market and power system as the NEM moves towards this outcome. The NEM needs robust planning frameworks and complementary operational and market frameworks if it is to enable the energy transition in ways that are in the consumer interest. AEMO believes this is a vision shared by the AEMC, who it has worked closely with throughout the evolution of this reform. AEMO does not consider that a market relying on manual interventions as a means of ensuring sufficient security provision is well placed to deliver this objective. These frameworks were designed as emergency and last resort measures to be used infrequently.

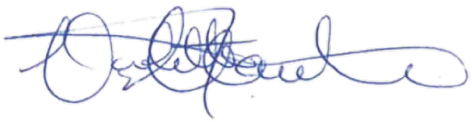
AEMO has reviewed the proposal within the directions paper and supports many aspects of it. This submission focusses on what AEMO now understands are the bounds of the reform, and what can be achieved within them. Key AEMO considerations, which are further discussed in the Attachments, are as follows:

- Planning frameworks: AEMO generally supports the AEMC's efforts to align the form and timing of various planning frameworks. AEMO considers that there are opportunities in the design of frameworks to cater to a broader set of power system needs at low cost. AEMO supports the introduction of additional procurement measures to address operational needs, such that AEMO does not need to rely on manual directions.
- Scheduling mechanisms: AEMO supports the way the scheduling proposals allow it to automate the enablement of contracts that address a variety of security needs. AEMO has concerns about the level of detail that is prescribed in the rules, and how this may impact its ability to implement a scheduling tool in the allowed time to meet the objectives and intent of the rule.
- Intervention frameworks: AEMO agrees with the AEMC's assessment that the current approach to directions compensation is not fit for purpose. AEMO is supportive of building greater flexibility into directions compensation in the short term and believes directions compensation should be holistically reviewed alongside other compensation frameworks in the longer term.

AEMO is committed to working with the AEMC and industry to both refine the proposal and to implement a robust solution as quickly as possible. AEMO is mindful there may need to be some refinements to the proposal, in partnership with the industry, prior to finalisation of the rule. AEMO is interested to explore how this may be done. AEMO also highlights that the decision to extend the regulatory process has created an additional delay to reform implementation of up to 9 months. As a matter of priority, AEMO requests that the AEMC take this delay into account in how it progresses this reform. The delay threatens the delivery of a solution before the commencement of the system strength framework in December 2025.

Should you wish to discuss any of the matters raised in this submission, please contact Kevin Ly, Group Manager - Reform Development and Insights at kevin.ly@aemo.com.au.

Yours sincerely,



Violette Mouchaileh
Executive General Manager, Reform Delivery

Attachments:

1) Comment on the rule change proposals
2) Comment on the rule drafting

Attachment 1 – Comment on the rule change proposals

Sections 1-4 of this attachment roughly mirror chapters 3-6 of the directions paper. Section 5 analyses the proposed obligations on AEMO across a variety of topics and the implications for implementation.

1. Existing planning frameworks

This section comments on the AEMC's proposed changes to the planning frameworks. Similar to the directions paper, AEMO's comments are focussed on the inertia framework. AEMO notes that the inertia proposals are now quite complex and it is difficult to track how nuances in the drafting reflect policies. AEMO is keen to work through this with the AEMC to improve the solution. Detailed commentary on the drafting is included in attachment 2.

AEMO recognises and supports the AEMC's intent to align the inertia framework with the system strength framework in terms of:

a) Procurement timeframes for Transmission Network Service Providers (TNSPs)

b) Procurement style, i.e. there are now primary obligations to provide full inertia requirements that do not need the 'trigger' of AEMO declaring a gap.

Notably, the directions paper describes an intent for the current inertia framework to remain largely intact, with changes (a) and (b) being applied to a new 'NEM-wide inertia floor'. It also provides guidance on how this floor would be determined and distributed. The example below illustrates that the extent to which the proposed drafting would impact inertia provision compared to current frameworks. Commentary on the value of targeting different levels of inertia provision is included later in this section.

Worked example – inertia procurement under the proposed framework

- AEMO is required to forecast (and TNSPs are required to procure a portion of) a system-wide[1] minimum level of inertia. Under 5.20.4(d1), this could in principle be determined by 'other matters' beyond the frequency operating standards (FOS).
- However, with the system-wide minimum defined in 5.20B.2(b) as the minimum level required to operate the interconnected power system satisfactorily[2], AEMO considers there is minimal scope to consider factors beyond the FOS as applied to credible events for an interconnected power system.
- The current framework ensures inertia provision up to its concept of an appropriate level, i.e. n-1 security for credible events that could occur within islanded sub-networks, presuming sufficient likelihood of the sub-network being islanded.
- In practice, the largest credible contingency in the NEM is in Queensland and the region was deemed sufficiently likely to island in AEMO's 2022 Inertia Report[3]. This means the system-wide inertia floor under the proposed framework would be expected to be similar in magnitude to the current Queensland requirement. The floor would only increase aggregate NEM inertia requirements in the sense that the floor is continuously required rather than only being needed once a region is islanded[4].
- In principle, it is possible that AEMO's discretion to distribute the system-wide floor could increase the magnitude of inertia requirements in some regions. However, the impact of this is unlikely to be material. Each region except NSW was deemed a sub-network at risk of islanding in the 2022 Inertia

[1] Note Tasmania is excluded in this context
[2] Note that, as described in attachment 2, AEMO considers that 5.20B.2(b)(1A) should say 'secure' rather than 'satisfactory'
[3] https://aemo.com.au/-/media/files/electricity/nem/planning_and_forecasting/operability/2022/2022-inertia-report.pdf?la=en
[4] Please note, however, that AEMO is supportive of this feature of the proposal.

Report. In these regions, a portion of the system-wide requirement would need to exceed the region's requirements to cover credible contingencies when islanded, in order for the new framework to increase the magnitude of inertia requirements above current arrangements.

As illustrated by the example above, the current islanding-based framework is likely to set the magnitude of the inertia requirements in the NEM, even if the new mainland floor were introduced. AEMO notes that, unlike the newly introduced floor, the current framework still involves a 'trigger' and 'gap' approach to procurement. AEMO recommends that this be changed to the same procurement style as exists for the system strength framework and is proposed for the mainland inertia floor. This would create benefits through consistency across frameworks. Further, having AEMO project inertia levels and declare gaps creates uncertainty about whether TNSPs need to source inertia and, if so, how much they need to source.

AEMO considers that there are currently opportunities to make no-regrets investments in inertia. This is because the system strength framework is likely to result in significant investment in synchronous condensers, which, as noted in the directions paper, can be fitted with flywheels to increase their inertia contribution at low incremental cost. AEMO considers that this is important context as the AEMC evaluates the risks of 'over-procurement' as flagged in the directions paper.

AEMO is unsure if it is the AEMC's intent to only slightly increase the magnitude of inertia procurement through the proposed framework. Regardless, AEMO recommends the AEMC consider how the proposals could evolve, or current frameworks could be leveraged (described later in this section), so there is the flexibility to cater for a broader range of system needs. AEMO notes that the current approach reflects a policy choice to address certain needs, i.e. (relatively) high probability credible events. However, in the context of AEMO's evolving understanding of the full benefits of inertia and opportunities to make low-cost inertia investments, it may be appropriate to choose to cater for a broader set of system needs.

An example of an alternative version of the AEMC's rule proposals is described below. Please note that the described framework is an indicative example and that AEMO would ideally have discretion to consult with stakeholders on a preferred approach that balances the costs and benefits of specific procurement methodologies. AEMO considers that the proposed drafting limits its ability to do this and strongly encourages the AEMC to provide appropriate discretion to AEMO for these matters to be worked through with stakeholders through the development of procurement methodologies.

Indicative example – benefits of an evolved version of the rule proposal

Suppose that the current requirements on regions at risk of islanding were applied as a continuous requirement to all regions regardless of the risk of islanding.

This approach would target broader needs compared to the current or proposed frameworks. This approach would have costs associated with additional investments. Benefits of this evolved proposal would include:

- Security for a broader range of events (i.e. coverage of regional islanding events regardless of their likelihood)
- Positive externalities for managing aspects of security beyond frequency[5] and managing the possibility that the primary need for inertia shifts away from the current definition of contingencies
- Clearer investment signals by removing the risk of islanding as a variable in NSP investment decisions

[5] https://aemo.com.au/-/media/files/initiatives/engineering-framework/2023/inertia-in-the-nem-explained.pdf?la=en

- Savings for consumers at times when a region is considered unlikely to form an effective island after a non-credible contingency event, due to a lower requirement for interconnector headroom
- A more uniform distribution of inertia, providing some coverage of the possibility that inertia imbalances between regions could lead to system security concerns such as large power swings on interconnectors

It does not appear that AEMO could implement a framework like in the indicative example above under the proposed rules as the framework is not within the scope of the inertia requirements as contemplated by 5.20B.2(b).

AEMO is also aware that amending the inertia framework is not the only means of increasing the provision of inertia by monopoly networks, and AEMO recommends that the AEMC consider the risk that industry perceive this is the case. Managing this risk may require changes to the substance, messaging or timing of changes to the inertia framework. Specifically, AEMO considers that the process of updating the inertia framework should not act as a barrier or prerequisite to, for example, networks that are System Strength Service Providers (SSSPs) applying in their RIT-Ts for flywheels to be attached to any synchronous condensers. Updating the inertia framework should also not be seen as a barrier to flywheels being adjudged as prudent additions to investments made under the system strength framework. For reference, if it was assumed that system strength requirements for 100% renewable penetration conditions in 2030 were met by synchronous condensers, then a portion of these fitted with flywheels could meet all regional inertia requirements under current frameworks.

Synthetic inertia

The proposal includes several features designed to impact the treatment of synthetic inertia. AEMO's view of these proposals are:

- AEMO is tentatively supportive of the intent of the proposals, as they remove a potential restriction that only synchronous inertia could be used to address minimum inertia thresholds.
- AEMO considers it is appropriate that it specifies inertia services, with the potential to allow different service types. AEMO considers that consultation on a specification document could be consolidated with its inertia requirements methodology.
- AEMO notes that, within current frameworks, it can accommodate trade-offs between synchronous inertia, synthetic inertia and related services. AEMO considers this ability should be retained.
- AEMO is concerned that the drafting may not allow it sufficient discretion to control the proportions of synthetic inertia eligible to contribute to different inertia requirement thresholds. Even though there is no agreed technical definition of synthetic inertia at this stage, the drafting appears to assume that AEMO-approved service definitions of synthetic inertia are equivalent to synchronous inertia.

The feedback above is reflected in greater detail in attachment 2. AEMO looks forward to working with the AEMC on final drafting and verifying that the drafting can be operationalised.

2. New non-market ancillary service (NMAS) framework

Under current frameworks, where not all system needs can be represented in the NEM dispatch engine (NEMDE), AEMO is forced to direct plant online so that the system remains within a secure configuration[6]. AEMO recognises that directions, as a feature of the NER, were intended as a last-resort measure, whereas they are currently required routinely. The deficiencies of directions as an enduring and routine method to secure the system include:

- They are not designed to provide commercial incentives for directed units, which creates risks for the adequacy of security
- They are not integrated with AEMO's market systems, and therefore create manual work in real time and offline administrative burden for both AEMO and the directed resource operators
- They are required to be issued at the latest time to intervene, which causes the market to trade around an insecure forecast and undermines the prices produced by predispatch
- The compensation framework is administered on a per MWh basis, or effectively based on short-run marginal costs (SRMC). This implicitly assumes directions are rarely used, as the compensation does not automatically account for plant operation and maintenance[7]. The compensation may therefore be inadequate for the routine directions that occur now. A key consideration for the AEMC in reviewing the compensation arrangements, is what is the role of direction and therefore what are the incentives to be created through the compensation arrangements. We are mindful of the balance between appropriate compensation vs appropriate incentive to participate in the market. This is described further in section 4.

AEMO considers that addressing these issues is one of the primary motivations for this reform. The directions paper notes similar concerns to those listed, and AEMO supports the AEMC in introducing a new transitional services NMAS that provides commercial incentives, integrates with AEMO's market systems and provides more transparency for the market. AEMO understands that it would be able to use this framework to address power system needs in preference to addressing them via directions.

AEMO acknowledges and supports the flexibility in the proposals that give it the *option* of utilising the transitional services framework. This makes the proposal more dynamic and robust, and may taper the bargaining power of key units in contract negotiation. AEMO also supports the flexibility around whether transitional service contracts are fed into the solver described in section 3.

In the absence of bidding to participate in secure configurations (as proposed under the operational security mechanism (OSM)), a framework like the proposed NMAS is needed to reduce the extent of AEMO directions. AEMO considers that this is the primary reason to introduce the transitional services framework. AEMO notes that the directions paper contemplates a secondary reason; to allow AEMO to 'perform trials and conduct experimentation in the NEM to gain essential engineering knowledge about operating the power system with fewer synchronous generators'. AEMO has the following comments in relation to this reasoning:

- Any 'experimentation' that AEMO would ever conduct on the power system would be highly calculated, consulted on, contained in scope, rigorously simulated ex-ante and reviewed ex-post. AEMO believes that 'trialling' better captures this, and AEMO supports this language being chosen for the draft rule.
- AEMO does not consider that transitioning away from synchronous generators is the appropriate aim to be specified in the rules[8]. Firstly, other aspects of power system operation may also benefit from trials. Secondly, an aim of transitioning away from synchronous generators is not always equivalent to an aim to decarbonise. Though South Australia has a reliance on configurations of gas generators that is currently a

[6] https://www.aemo.com.au/-/media/files/electricity/nem/security_and_reliability/congestion-information/transfer-limit-advice-system-strength.pdf
[7] However, such costs can be recovered manually through additional compensation claims
[8] Refer to AEMO's comments on draft clause 3.11.12(a)(2)(ii) in attachment 2

limiting factor on the progression to higher variable renewable penetrations, other synchronous units such as hydro and solar thermal have zero emissions. AEMO would prefer a more flexible drafting that is not anchored to the specific problems encountered in the current NEM, and that recognises that a fully decarbonised grid can still be based on synchronous generation.

AEMO considers this secondary application of transitional services will provide appropriate flexibility to explore solutions to emerging power system needs and is keen to work with the AEMC as it develops its own understanding of how this framework could be best utilised. In turn, this could inform rule drafting. Ideally the framework in the rules would be broad enough to accommodate diverse application in the future, whilst also limited in scope to taper the expectation that it is utilised to manage every power system issue, and to ensure appropriate consumer protection.

As a possible input into the AEMC's consideration of transitional services, the box below describes how AEMO may utilise the new NMAS, and how this is distinct from NSCAS.

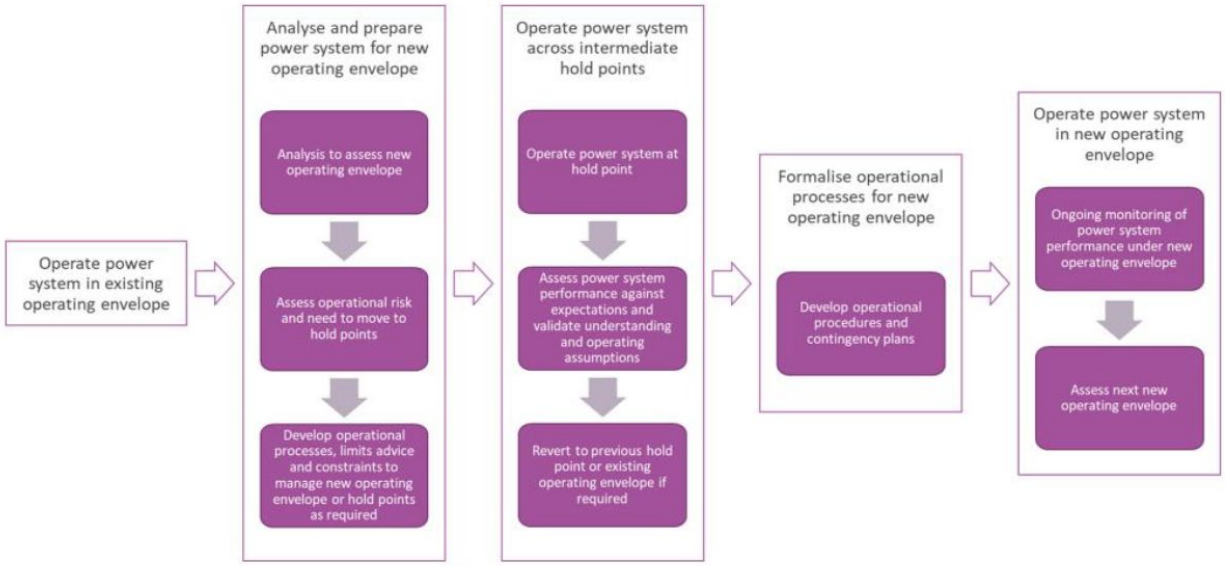
How AEMO may utilise the transitional services NMAS

Currently, AEMO progresses the technical limits of the power system (e.g. inverter-based-resource (IBR) hosting capacity, synchronous generator dependence) incrementally in conjunction with TNSPs while keeping industry informed of such progression. For example, AEMO has reported on how the installation of 4 large synchronous condensers, which commenced operation in November 2021, changed the allowable configurations of synchronous generators in South Australia[9]. It has then continued to update industry as its understanding of various technical limitations evolves, and describe how addressing these limitations should allow for progressively fewer synchronous units online. AEMO understands that this sort of investigation is in a similar technical realm to what the AEMC intends to be covered by the proposed reporting obligations for transitional services and directions[10].

The transitional services NMAS would provide AEMO a formal procurement power that aligns with aspects of the investigations described above, and has the potential to streamline and structure AEMO's planning and procurement activities. AEMO sees this could occur as described below:

- AEMO defines the secure technical envelope for the system (for example a configuration of units), beyond which secure power system operation has not been proven, but AEMO is actively working to progress beyond through studies, seeking information from international peers, and trials.
- To the extent that the secure technical envelope can only be ensured by services that are undefined or without a clearly accountable party (for example grid reference), AEMO procures transitional services, potentially referencing the reporting described in the previous dot-point.
- AEMO uses the defined technical envelope, which would assume any transitional service requirements are met, as a basis for its NSCAS studies. Any residual departures from a secure envelope must be due to known system needs (e.g. voltage control, thermal loading, reactive margin etc.) that are the responsibility of TNSPs, and can therefore be addressed through NSCAS.
- As AEMO progresses exploratory studies and trials and leverages international experience, it can redefine the technical envelope and change the basis for NSCAS studies. AEMO would seek to utilise transitional services to manage its progression through hold points and complement a process like the below[11].

[9] https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/system-operations/congestion-information-resource/related-resources/operation-of-davenport-and-robertstown-synchronous-condensers
[10] Note AEMO's detailed feedback on the reporting obligations described in section 5
[11] Engineering Roadmap to 100% Renewables, page 17, available at https://aemo.com.au/-/media/files/initiatives/engineering-framework/2022/engineering-roadmap-to-100-per-cent-renewables.pdf



Please note that, although NSCAS studies were the final step in the sequence above, the transitional services NMAS is still the framework that is addressing issues not addressed by the current rules. The value of sequencing work as described is to provide assumptions for the NSCAS process such that it can operate as it does now, but does not risk double-counting issues that ought to be addressed through transitional services.

Finally, though it is a somewhat administrative feature of the proposal, AEMO questions the value of a 10-year sunset clause for the transitional services NMAS. AEMO views transitional services as a security tool that ensures manual directions remain a last resort. AEMO considers that this is an appropriate enduring feature of the rules, with AEMO having a last resort procurer power for system security, similar to the Reliability and Emergency Reserve Trader (RERT) role for reliability. In accordance with its integrated system plan (ISP)[12], AEMO projects that traditional forms of generation will be a feature of the NEM for decades to come. Though technology change *may* reduce the reliance on such generation, AEMO thinks it is premature at this stage to default to the view that the need for transitional services will no longer exist in 10 years.

3. Scheduling

Extent of obligations on AEMO

The proposed rules place a complex set of obligations on AEMO to schedule contracts for system strength, inertia, NSCAS and transitional services. In principle, through a single process which automates the scheduling of these contracts, the manual work required of the AEMO control room (or AEMO real time operations (RTO)) in issuing directions should reduce. However, the task of monitoring whether there is a need to direct will remain and the increased scale and scope of contracts demands broader situational awareness from RTO. Analogies to illustrate this include:

- The energy spot market runs on an automated dispatch process, however RTO needs to be constantly corresponding with generator operators to understand security risks.
- AEMO's Reliability and Emergency Reserve Trader (RERT) function has a much narrower scope than this reform but requires multiple support staff to exercise.

[12] https://aemo.com.au/-/media/files/major-publications/isp/2022/2022-documents/2022-integrated-system-plan-isp.pdf?la=en

Further, specifically in relation to system strength, the proposed framework introduces the objective of contract management to enable a forecast level of IBR, which is not aligned with AEMO's core remit to manage security, nor the capacity of the power system engineers in the control room. Therefore, particularly in the near-term while the impact on directions is still being revealed, AEMO expects the new scheduling processes will materially increase its RTO resourcing requirements, even with a set of fully automated tools.

As per earlier sections of this attachment, AEMO is highly supportive of aiming to integrate the provision of security into market processes and reduce reliance on manual directions. However, the points above highlight the implications of the proposed policy on resourcing. AEMO does not agree with the framing of extensive scheduling obligations in the directions paper as '*empowering* AEMO to schedule', rather than '*obliging* AEMO to schedule', and is concerned with how this sets industry expectations.

Implementing the proposal

AEMO supports the discretion in the proposals to consider through consultation how the scheduling horizon is divided into blocks, and how the scheduling process is iterated. AEMO notes, however, that some directions occur with approximately 12-hour lead times. Therefore, AEMO is concerned that a 12-hour time horizon for contract enablement may be too short to be practicable, depending on what is feasible for AEMO to implement in terms of blocks and iteration.

AEMO also appreciates the discretion to choose whether the scheduling of NSCAS and transitional services NMAS contracts is integrated with the scheduling of system strength and inertia contracts. This may allow it to be more dynamic in how it treats new contracts, or cover specific cases where a contract provides a fully unbundled service that is simpler to exercise unilaterally.

However, AEMO expects that treatment of NSCAS and NMAS (and inertia to a lesser extent) will be secondary to the core scheduling task, which will likely relate to system strength contracts, at least in the early years of this implemented reform. There is potential for a large number of contracts, far beyond what could manually be managed by a single party. Though the draft rule is not explicit that AEMO develop a scheduling algorithm or solver, AEMO considers this is the only practical pathway to compliance with the proposal. Further, a solver would maximise the benefits extracted through AEMO, rather than TNSPs, being the scheduling party. This point is justified later in this section.

As a side-note, the directions paper argues that TNSP enablement would be inferior to AEMO enablement in terms of inter-regional coordination of security needs and contract enablement. This argument is premised partly on an assumption that TNSPs do not care about the amount of money spent in scheduling contracts to meet their prescribed service. As the real buyer for the services, system strength, NSCAS and inertia, TNSPs should have a direct interest in it being money well spent and be reticent to hand over the responsibility (to spend their money) to a third party like AEMO[13]. Further, TNSPs should learn from the costs incurred so as to adapt their buying of services, prices they are willing to pay and risks they are willing to take in the interests of electricity consumers.

Irrespective, with sufficiently long enablement lead-times, processes to operationalise joint planning and appropriate data feeds to give visibility of security needs, there is no inherent reason why TNSPs could not coordinate across regions. In AEMO's view, the directions paper is somewhat contradictory in that TNSPs are assumed to have the capability of effective inter-regional coordination when forming contracts, but are unable to operate contracts in a co-ordinated way. AEMO considers this unlikely in reality. AEMO considers it more likely that, if TNSPs are unable to effectively coordinate across regions, this would be true across all

[13] For example, there are risks for TNSPs associated with inter-regional allocation of contract costs that they cannot manage if AEMO is the sole scheduler. Consider that a contract formed by the network in region A could support region B, and AEMO could schedule it for this purpose, resulting in charges to network A.

timeframes. In this case, contracts are unlikely to be able to help neighbouring regions, and it is too late to wait until enablement to value central control.

In AEMO's view, the main benefit of AEMO scheduling is that it can more readily integrate a scheduling algorithm into existing systems to monitor security and communicate with market participants, and this would allow it to deliver the same outcomes TNSPs could deliver in a more dynamic fashion. However, without a solver, this argument is diminished, and AEMO scheduling contracts across the whole NEM could even be less dynamic than TNSPs predominately focussing on a single region. Further, as networks are not exposed to operational risks under the proposals, there is a risk that without automation (and to some extent with automation), an inoperable set of contracts (e.g. an excessive number of contracts) is presented to AEMO.

For the reasons outlined in the paragraphs above, it is necessary that if AEMO is assigned responsibility for scheduling it is given the time to properly develop a solver. The directions paper includes the AEMC's view that some simplifications to operational mechanisms and additional flexibility built into the rule proposal should allow AEMO to meet a deadline of 2 December 2025; the commencement date for the new system strength framework. AEMO understands this objective, however, in light of delays to the regulatory process and a significant increase in other obligations on AEMO (discussed in section 5) it does not consider that it can meet the proposed rule in the allowed timeframe. AEMO proposes some measures in this section which could reduce the implementation time of a scheduling algorithm, however, these measures alone are unlikely to create the necessary time savings. The box below compares solver implementation activities between the OSM and the new proposal, with some commentary about how this links to the broader reform implementation task.

Comparison of solver implementation effort for AEMO – OSM vs new proposal

This box is not based on a comprehensive bottom-up assessment of implementation impact. It is based on a qualitative comparison to AEMO's most recent high-level implementation project plan for the OSM, developed in March 2023. This plan projected a 3.5-year lead time from final determination to go-live. AEMO will endeavour to keep the AEMC updated and involved as the rules are refined and our estimates are refined in turn. AEMO rejects the reasoning provided in the directions paper that the opportunity to draw on elements of the OSM design could expedite implementation. If the OSM were to have been progressed to a final determination, then implementation tasks would utilise *all* of the design work done to that point. A change in policy can only decrease the extent to which prior work is utilised.

At a high-level, the revised direction of reform modifies or removes some operational elements of the implementation task, while more emphasis falls on elements that apply over longer timeframes. The scope of the reform has also evolved, meaning that elements are added that were not affected by the OSM proposal. Though these elements may not be on the critical path for implementation of the scheduling aspects of the reform they will, to various extents, impact the pool of expertise AEMO is able to draw from to complete the reform, so ought to be considered. The table below attempts to capture this, by identifying key functional changes in the reform including dependencies across elements. This is followed by a preliminary assessment, with scope limited to scheduling and related systems, of how this would impact the deliverables of the reform.

Functional element of reform	Comparison to OSM	Comment on dependencies
Planning frameworks	- Various modifications in procedural aspects of reform (e.g. timing). - Approach to defining a NEM-wide minimum inertia floor added.	- Revised approach must work together with the new NMAS. - Ability to integrate NSCAS scheduling into the solver must exist by the time planning timeframe contracts must be scheduled, so AEMO can manage the risk that not enough contracts are sourced.
New NMAS	- The OSM had annual reporting obligations that consolidated the NMAS and scheduling annual reporting under the revised approach. - The OSM had procedures that consolidated the NMAS and scheduling guidelines under the revised approach. - Accreditation under the OSM is somewhat equivalent to sourcing transitional services, however under the latter approach AEMO has the additional requirement to do procurement work.	- There are resource overlaps across the statement of security needs, NMAS annual report and NMAS guideline. - It is undesirable to have the implementation of an NMAS scheduling process lagging a process for network contract scheduling, as this would require manual and automated scheduling to occur concurrently.
Scheduling	- Enablement guideline and annual reporting obligations are fragmented compared to the OSM (as per new NMAS row). - Settlement processes under the OSM are no longer required. - Dynamic bidding as proposed under the OSM is no longer required. The equivalent under the revised approach is the ability to intake fixed contract terms over a longer period.	- There are resource overlaps with the new directions and compensation obligations.
Directions and compensation	- Modifications in process and content of directions reporting - Need to automate a new process for directions compensation - Additional information in market notices under the new approach - Additional need to report on frequent directions	- Implementation task can occur largely in parallel to solver development, however this does have resource overlaps particularly with the scheduling row above.

The table above suggests that the impact of the policy change may be an increase in work from a reporting and 'soft' process perspective. The systems impact is explored below.

As described in the table, the systems deliverables or outcomes proposed under the OSM that are not required under the revised approach are:

- A market settlement system
- An approach to dynamically intake bids (though a static equivalent to intake contract terms is required)

The systems deliverables or outcomes that are common to both the OSM and the revised approach include:

- A mixed integer solver
- Integration of the solver with other market and forecasting systems (note that the revised approach may require a parallel 'twin' of predispatch)
- Automation of constraint invocation
- Communication procedures for cleared parties
- Communication and data for general consumption
- Data housing
- Control room displays

This suggests that the revised approach constitutes a smaller systems implementation task than under the OSM.

On balance it is not clear whether the new proposals will take more or less time and effort to implement than the OSM. Such an assessment is further complicated by different risks that apply to each proposal. For example, the box above highlights that the greater breadth of the revised approach increases risks associated with resource overlaps, whereas the revised approach gives AEMO more flexibility in how it implements several elements of the rules, which may better allow it to manage timing risks. Regardless, it is clear that given a final determination date scheduled for December 2023, a reform of similar magnitude to the OSM (estimated to have a 3.5-year lead time from the final determination) cannot be implemented in the allowed timeframes. This underscores the need for substantial revisions to the proposal and AEMO-AEMC to manage risks for the industry. Furthermore, we also wish to engage with industry on an appropriate commencement date – as per the processes we have discussed and defined through the Reform Delivery Committee, to ensure AEMO and industry implications are factored into the considerations. The commencement for the rule will require further discussion between AEMO and AEMC.

Reasons for scheduling certain resources

As part of the policy shift for this reform, the objective of scheduling has shifted from maximising the total value of trade in energy, FCAS and security services to minimising only the cost of security services. The former objective had the following characteristics as it determined a preferred set of security providers:

- It inherently accounts for the energy provided through security commitments, and trades off the direct costs of security commitments against the indirect benefits of savings in existing markets
- It inherently values the benefits of commitments which increase the IBR hosting capacity of the system and trades them off against their costs

Perhaps partly with the intent of realising these characteristics, the directions paper and proposed drafting includes obligations on AEMO which seek to avoid cases where a costly contract is activated for a marginal gain in IBR dispatch. However, with a least-cost scheduling objective, there is no way to value the gain in IBR or the reduction in consumer costs due to the energy received as a by-product of a commitment for security. The best that can be done is approximate these factors, and therefore the proposal requires that AEMO compare contracted and IBR MW as a proxy for cost comparison.

The new scheduling proposals also introduce additional (or modified) constraints compared to the OSM proposals, namely:

- AEMO must aim to use contracts specifically for their intended purpose
- AEMO has two objectives in enabling system strength contracts; system security and maximum possible IBR dispatch

AEMO recognises and supports that the enablement principles outlined in 4.4A.4 are 'reasonable endeavours' clauses. AEMO understands that the AEMC intends for this to provide AEMO some discretiony in giving effect to the principles in all practical circumstances. However, for reasons described in the 'implementing the proposal' sub-section above, AEMO must build a scheduling algorithm to implement this proposal. Therefore, AEMO must build features into this algorithm to reflect the enablement principles. Each additional feature increases the complexity of the implementation task. The box below describes one way AEMO could bring together all of the proposed requirements in a solver.

Algorithm decision logic to give effect to the scheduling proposal

The scheduling algorithm would need to work through tiers of questions to reflect the policy described in the directions paper[14]. As well as the questions themselves, examples of systems that could be leveraged to find answers are identified below. Depending on the answer, different subsequent questions and systems apply.

- Is predispatch (PD) secure?
  - Yes
    - Question: Can more system strength contracts be dispatched to improve the IBR hosting?
    - System: The new solver must constrain on any units forecast to be online in PD. Only units forecast to be offline can be scheduled by the solver. The solver would aim to maximise the amount of IBR via constraints.
      - Yes
        - Question: Assuming perfect forecasts, would scheduling additional units actually increase IBR dispatch to a greater extent (in MW terms) than the enabled contract MW?
        - System: An offline version of PD (or similar) could simulate dispatch with additional commitments.
          - Yes

[14] As a side-note, AEMO considers that the simplified example included in the directions paper does not robustly capture the policy of primarily using contracts for their intended purpose. The approach in the example arbitrarily addresses inertia before it addresses other needs. A different arbitrary choice would lead to a different scheduling outcome. If an arbitrary outcome can satisfy this policy, AEMO questions the value of the policy.

- Schedule these contracts
- No
- Do nothing (or take reasonable endeavours to consider alternative enablements)

➢ No

- Do nothing

- No
- Question: what services or needs are deficient?
- System: this may be evident from PD

➢ Units that pertain to contracts for deficient services that are also projected to be offline in PD can be scheduled by the solver.

➢ Question: can more system strength contracts be scheduled to improve IBR hosting?

- [logic as per secure-PD case earlier in this section]

The box above is an example of how the policy could be implemented, though its feasibility has not been comprehensively tested. The example is also deliberately simplified, particularly regarding questions of whether the use of particular data or systems is compliant with the proposed drafting. It also does not consider how the algorithm ought to be iterated.

Even considering this simplified view, it is clear that implementing the scheduling requirements as proposed demands a sophisticated solver. AEMO supports the intent of several of the enablement principles in the directions paper. However, in the interests of implementing a solution as soon as possible, AEMO considers that these should not be prescribed in the rules as they can be added, if appropriate, through consultation on AEMO's enablement guideline at a later stage. AEMO believes that a simpler scheduling objective is appropriate and the level of prescription needed in the rules to deliver a minimum viable product is a least-cost scheduling objective that unlocks the IBR forecast to the extent possible. AEMO notes the following factors which may mitigate perceived risks of this simplified approach:

- Even under an assumption of perfectly cost-reflective bidding, it is unclear whether comparing security contracted MW with unlocked IBR MW is a good proxy for comparing costs, and therefore unclear whether the approach results in better outcomes for consumers.
- In general, contracts will get used for their intended purpose if they are the best value way of delivering the intended need.

In addition to discretion on the scheduling objective, AEMO also seeks discretion on which systems and data can be utilised to define the inputs and outputs of the solve. These include those related to the projection of IBR. This is described further in attachment 2.

4. Directions and compensation

This section is divided into two parts. The first part discusses the primary issue of the timing and scope of possible changes to directions compensation processes. The second part provides feedback on the specific proposals related to directions and compensation, or specific ways this impacts AEMO.

High-level feedback on changing the approach to directions compensation

AEMO agrees with the AEMC that the 90th percentile pricing approach to directions compensation is imperfect. Given the ongoing nature of directions, AEMO considers there may be merit in including greater flexibility in the framework immediately so as to address these issues in the near term in combination with a longer term more holistic review. AEMO therefore proposes the following:

- Near term flexibility should be introduced to allow the compensation framework to better reflect the costs incurred in practice. The current limitations mean that additional compensation claims are often made. This would be particularly relevant and helpful where directions are known to be an ongoing and systemic occurrence with high frequency for a known period. While AEMO acknowledges this is not the intent of the directions arrangements (i.e. directions should be a last resort and used infrequently) the current limitations in the compensation framework are not aligned with the reality of current power system requirements. AEMO is mindful of how the compensation arrangements incentivise the provision of security and incentivise participation in other markets. AEMO is keen to work with the AEMC on how framework flexibility could help to balance these matters, and how the resource impact could be managed to support the implementation of this reform as a whole. AEMO further acknowledges such flexibility should be time bound, given the potential for resolution through a more holistic review of compensation arrangements.
- A holistic review should be undertaken over the longer term for the following reasons:
  - The changes to the planning frameworks introduced under this reform are likely to substantially change the frequency and nature of directions. The holistic review should provide time for these changes to be understood and implemented so they can be taken into account.
  - The directions, administered pricing and market suspension compensation frameworks were all tested during the operational challenges in the NEM in winter 2022[15]. It is clear that some of the compensation arrangements are inadequate due to the limitations in the framework. Part of the AEMC rationale described in the directions paper for applying the market suspension compensation framework to directions is the consistency this would create across frameworks. However, if AEMO were to implement the proposals in this reform and the AEMC were to propose changes to suspension compensation in response to the winter crisis, then this would either mean the frameworks become misaligned again, or further changes to directions compensation are required. The review should allow the AEMC to holistically review the performance of these frameworks and propose changes that are coordinated.
  - AEMO has recently updated and automated its approach to directions reporting[16]. It now reports on a monthly cadence in a concise format that aligns with NEM settlement timetables. All of the stakeholder feedback on this topic canvassed through this reform is based on AEMO's prior approach to reporting. The holistic review would allow stakeholders the opportunity to benefit from the update and refine their feedback before considering further.

Specific feedback and impacts relating to the proposed approach to directions compensation

[15] https://aemo.com.au/-/media/files/electricity/nem/market_notices_and_events/market_event_reports/2022/nem-market-suspension-and-operational-challenges-in-june-2022.pdf?la=en
[16] https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/nem-events-and-reports/market-event-reports

Feedback in this sub-section is largely second-order to feedback in the first sub-section that proposes a different approach to changing directions compensation. However, AEMO hopes that the feedback in this section provides useful insight into future measures the AEMC may explore.

a) Changing the basis for compensation

The box below describes how 90th percentile pricing compares to the proposed approach of ISP-based benchmarks.

South Australian directions case study – current vs proposed compensation approaches

- As of 2 August 2023, the 90th percentile energy price was $230/MWh in SA
- Between 4 July 2023 and 2 August 2023, the prices requested by directed participants in additional compensation claims ranged from:
  - $293/MWh to $337/MWh for combined cycle gas turbines (CCGT)
  - $319/MWh to $464/MWh for open cycle gas turbines (OCGT)
- The corresponding ISP SRMC benchmark prices are:
  - $134/MWh for CCGT
  - $234/MWh for OCGT

The data above shows that even a 15% premium on ISP SRMC benchmark prices is still significantly less than compensation claim prices. As a result, directed participants are likely to be systematically undercompensated and submit additional compensation claims under the proposed framework. Notably, the current 90th percentile price is well in excess of the CCGT price under the proposed framework. If this price endured, the immediate impact of the new framework could be to increase claims for additional compensation from this generator type. In any case, it appears that the proposed framework will not deliver on two of its objectives; to reduce the administrative burden of additional compensation claims and, since independent expert claims take time to process, to improve the timeliness of information provision. As a general comment, AEMO also notes that, even with the possibility of claiming additional compensation, the level of compensation automatically applied to directions influences participant incentives to have plant available for direction. Caution should therefore be exercised in measures that potentially limit the level of compensation.

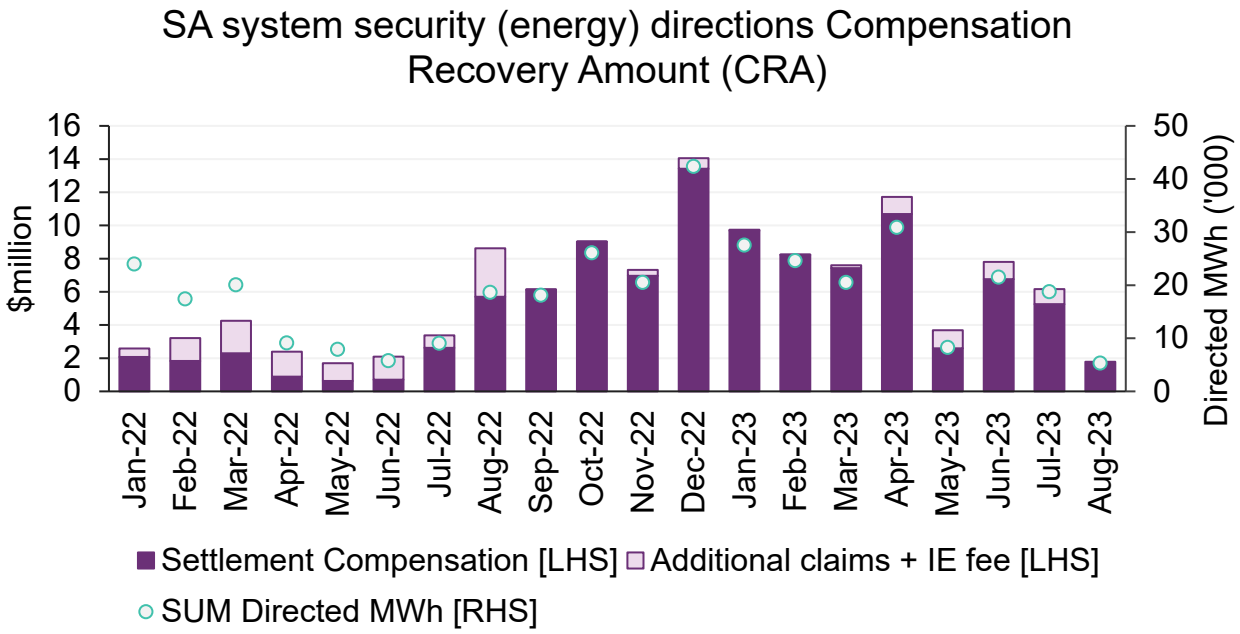
The fact that the suspension compensation regime may not be fit for purpose for directions compensation is likely to reflect the different objectives and context of each framework. For example, ISP benchmark prices assume full output of gas generators, as is appropriate where generators are needed for the energy they provide. In contrast, generators directed for security typically operate at their minimum stable generation level, where their heat rate is lower and their fuel cost per unit of electrical output is higher. The directions paper identified a further issue with ISP-based compensation, in that there is no established process to compensate storage. AEMO notes this is also the case for VRE and dual-fuel units.

The scope of possible solutions to address the concerns above is broad, ranging from changing the premium on benchmark prices, moving away from a SRMC-based approach for repeated or systematic directions, adopting a novel approach to compensation, reconsidering the role of the independent expert, or changing the additional compensation claims approach. This is a complex area that warrants a more flexibility than is currently provided for as an immediate improvement. This could then feed into a more holistic review and thorough consideration of options over the longer term, as proposed in the high-level feedback sub-section above.

b) Reporting timeframes

The directions paper proposes that AEMO be obliged to report on directions, including compensation amounts[17], within 1 month[18] of the end of each calendar quarter. Given that final settlement data is only available 30 weeks ex-post, this means that directions reporting would rely on provisional settlement data. Two implications of this are:

1) Participants are presented with an incomplete dataset. Additional compensation claims can be material, as shown in the chart below.



2) AEMO would need to update published quantities to reflect final settlement data. Given that the settlement cycle is not aligned with the proposed quarterly reporting cycle, publishing updates would not fall on quarterly boundaries, and previous quarters would contain a mix of provisional and final data.

Point (2) above may undermine the clarity and, therefore, the benefit of the more onerous reporting obligations proposed in the directions paper. In contrast, AEMO's recently upgraded directions compensation reporting process only uses final settlement data, removing any issues of misaligned cycles. The upgraded approach generally has longer lead times than the proposal, however as it follows a monthly cadence, the lead times are not as long as if a quarterly approach were adopted using final settlement data.

For the reasons described above, AEMO considers the proposal in the directions paper would considerably increase administrative effort for AEMO for potentially little benefit for report users. Additionally, users have had minimal experience with AEMO's recent reporting updates. Thus, AEMO requests that the proposed changes to 3.13.6A be removed.

c) Compensation automation

Directions compensation would need to be administered through an automated process for the proposals to be workable. AEMO's project pipeline, particularly given the roll-out of IESS bi-directional units at around the same time, means the proposed implementation date in the directions paper of 1 July 2024 is not viable. This

[17] AEMO notes that it already publishes provisional compensation recovery amounts through settlement statements. This information, combined with market notices, provide very similar information to proposed clause 3.13.6A (a1)(2). Therefore, AEMO suggests this clause can be removed from the drafting.
[18] Given the AEMC intent to align reporting timelines with RERT, AEMO suspects that the timeframe for directions reporting was intended to be 30 business days, rather than 1 month, and this is a drafting error the AEMC can correct.

would introduce unacceptable resource conflicts and project risks for AEMO. AEMO considers it would need a minimum of approximately 12 months from the final determination date to automate the proposals.

d) How the framework impacts competition for service provision

Proposed clause 3.13.6A(c)(3)[19] requires AEMO to indicate whether it intends to procure transitional services in relation to frequently used directions. AEMO considers this clause may undermine its negotiating power and flexibility during procurement, which could reduce its ability to source the best outcome for consumers. For example, publishing its intention to procure transitional services may encourage providers to exercise their market power during contract negotiation.

e) Reporting obligations

The proposed amendments to clause 3.13.6A, specifically (a1) (1) and (c) (1-3) require AEMO to report on a quarterly basis observation and trends on when and why directions are required and, should AEMO have directed a particular registered participant a certain number of times explain itself for doing so, and why it is not NSCAS or a Transitional Service.

AEMO respectfully suggests these reporting obligations, if at all necessary, sit within the relevant clauses that place the obligation on AEMO, (e.g. the clauses that specify AEMO must plan for NSCAS, manage power system security, and procure Transitional Services), and not within the directions reporting. AEMO provides further comment on these obligations in section 5.

[19] AEMO has further comment on this clause in section 5.

5. System security reporting obligations

Throughout this submission, AEMO has identified obligations in the proposals that it considers ought to be modified, rationalised or deleted. In addition to the benefits AEMO considers its suggestions would bring for the efficacy of the reform, the aggregate impact of these suggestions would be to lower the resourcing requirements for AEMO to implement the reform. AEMO does not believe that the implementation deadlines in this proposal can be feasibly met. It is unsure whether its suggestions are sufficient to make the proposals feasible, however it considers that substantial reductions are essential if there is to be any chance of meeting the required deadlines.

This section transcends several of the topics in sections 1-4 of this attachment, by providing further commentary on the many new reporting obligations on AEMO related to security. At a high-level, AEMO considers that (a) there is a lot of duplication in the proposals and (b) several of the proposals fall outside the scope of where AEMO can possibly provide meaningful comment. The table below describes AEMO's view on specific reporting obligations.

#	Clause	Quote	Where applied	Comment
1	3.13.6A(a1)(2)	*AEMO's observations of any trends in when and why directions are required, including the power system security conditions necessitating directions*	Quarterly directions reports	AEMO considers that clause 3.13.6A(a1)(2) adds no value in requiring AEMO to describe trends in *why* directions are required. Clause 3.13.6A(a)(1) already requires AEMO to describe the (technical) circumstances giving rise to the need for directions. This, combined with trends in when (or how) directions are required, is the scope of what AEMO can comment on objectively. To explain why directions are occurring beyond this would require AEMO to explain the function and design of other security and market frameworks. As AEMO does not own or operate assets, make investments or write rules, it is not in a position to explain this, and such commentary is best left to other parties. 3.13.6A(c)(2) also does not capture that AEMO issues directions to address system needs remaining beyond those met by other frameworks, and appears to imply that the reason for ongoing directions relates to AEMO discretion. Similarly, this clause and 3.13.6A(c)(3) both require AEMO to report on ways it aims to reduce the use of directions. This is despite an aim of reducing directions not otherwise being a feature of the rules. The only lever that AEMO has to avoid directions is transitional services, presuming this proposal is implemented. Transparency on the use of this power is achieved through the proposed statement of security needs. Comment on the effort involved in reporting on trends and the issues with declaring intentions
	3.13.6A(c)(2)	*details of any investigation… into what actions can be taken to reduce the use of directions*		
	3.13.6A(c)(3)	*whether AEMO intends to declare a NSCAS gap, procure a transitional service or take any other action to reduce the use of directions*		

#	Clause	Quote	Where applied	Comment
				to use transitional services was included in section 4(b).
2	4.8.9(k)	*AEMO must…publish a notice setting out:* • *the Directed Participant subject to the direction;* • *the required actions to be taken by the Directed Participant, including the quantity of energy (in MW) to be dispatched, and details about the Directed Participant's future dispatch targets, if applicable;* • *for a direction pursuant to clause 3.15.7(a2)(4), the service that was provided;* • *details of the circumstances that necessitated the direction…*	Market notices	In general, AEMO is open and supportive of providing more information through market notices, however it considers that the type of information must be carefully considered. To give a sense of what can be feasibly provided and easily implemented, please refer to the participant market notice template for a reliability direction[20] below this table. AEMO would be able to make this information available in public notices. Feedback on specific elements of these clauses includes: - Though AEMO will leave others to comment on any confidentiality-related concerns, AEMO is comfortable from an administration perspective with identifying the participant subject to direction. - AEMO directions are not for an energy quantity in MW, but rather for a participant to synchronise and follow dispatch targets. - AEMO is comfortable with indicating the technical category of a particular direction (for example, 'voltage control' or 'grid reference') through market notices. However, any further details of circumstances are best left to other publications. Market notices are a tool for AEMO to interact with participants and manage security, and any information benefits of public consumption are secondary. Including extra details in

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AEMO ELECTRICITY PARTICIPANT NOTICE.

Direction - {{UNIT.ParticipantName}} - {{UNIT.DUIDName}}

AEMO is issuing a direction to {{UNIT.ParticipantName}} to take the following action.

{{UNIT.DUIDName}} at {{Hrs[1]}} hrs {{Date[1]}} to make xx MW of additional capacity available for dispatch and follow dispatch targets.

The direction is issued at {{Hrs[2]}} hrs {{Date[2]}} and is expected to stay in place until {{Hrs[3]}} hrs {{Date[3]:}}

For the purposes of the National Electricity Rules this is a direction under clause 4.8.9.

Manager NEM Real Time Operation

#	Clause	Quote	Where applied	Comment
				market notices would create manual work for RTO and impact AEMO's ability to manage system security. Therefore, this is not a viable proposal. - 4.8.9(k)(3) refers to 3.15.7(a2)(4). Together, these clauses indicate that AEMO must identify the service provided for directions with incidental energy provision. Though, as above, AEMO can technically characterise its directions, it is not always able to identify a 'service' that corresponds to its directions. - Given the two points above, AEMO proposes that 4.8.9(k)(3) and 4.8.9(k)(4) be consolidated and generalised, such that AEMO is able to comply with them.
3	3.11.13(a)(1)	*AEMO must publish a statement describing the power system security need necessitating the transitional services and expected duration of the need*	Statement of security needs (new report)	AEMO is comfortable describing the power system need necessitating the transitional services and supports that this is made transparent. AEMO currently publishes a range of information related to how it is defining and progressing the technical limits of the power system[21]. Practically, AEMO may aim to leverage or reference some of this work in the statement of security needs. However, AEMO rejects that it should comment on the expected duration of the need (beyond recording objective matters like 3.11.13(b)(1) and 3.11.13(b)(2)), why the transitional service can't be provided by another framework[22] or the steps it is taking to move away from transitional services. As per AEMO's comments in row #1 of this table, all of these matters are outcomes of the system needs remaining beyond those met by other frameworks. AEMO has no control over these matters. The key issue at the point that AEMO requires transitional services is that a gap exists, and someone should be empowered to address this.
	3.11.13(a)(3)	*AEMO must publish a statement describing why AEMO considers the transitional services cannot be provided by any of the services specified in clause 3.11.12(a)(4)*		
	3.11.13(b)	*…AEMO must prepare and publish a report setting out:* *(1) the total annual cost…* *(2) a description of the transitional services…* *(6) the steps AEMO is taking to transition away from the procurement of transitional services.*	Annual transitional services NMAS report	
4	3.13.6A(c)(1)	*If AEMO has issued 30 directions or more to a particular Registered Participant in any period of 12 months or less, AEMO must*	Quarterly directions reports	The circumstances for a repeated direction are the same as for a single direction, so AEMO would already have provided this information through other reporting obligations. Therefore, AEMO considers that this clause can be

[21] For example, the Engineering Roadmap, SA minimum synchronous generator publications and limits advice
[22] AEMO suspects the AEMC has made a drafting error referring to non-existing clause 3.11.12(a)(4). AEMO's feedback presumes the intent was to refer to clause 3.11.12(a)(1).

#	Clause	Quote	Where applied	Comment
		include in its next quarterly directions report: *(1) the circumstances that have led to the repeated directions for that Registered Participant;*		deleted. If the intent is that AEMO explain why a direction is particularly enduring, AEMO refers to its comments in row #1 and #3 of this table; that AEMO is not able to comment on the design and function of other frameworks. AEMO considers that the parent text in this clause should refer to stations rather than participants, as the latter does not necessarily correspond to a single technical need.

Attachment 2 – Comment on the rule drafting

Table 1 List of proposed amendments – Inertia framework

Clause	Applies to	Description of clause and proposed amendment
5.20B.2(b)(1A)	AEMO	Specifies that AEMO must forecast the system-wide minimum level of inertia, which is defined as the minimum level of inertia required to operate the power system in a *satisfactory* operating state.
		Change: This should be redefined as the minimum level of inertia required to operate the power system in a *secure* operating state.
		Reason: Unless the requirement is for secure, the system may not remain satisfactory if a credible contingency occurs. AEMO assumes the choice of satisfactory reflects an assumption that the power system will have some additional inertia provided by one or more binding minimum threshold levels of inertia in a sub-network. This assumption may not be robust if there are no sub-networks at risk of islanding.
5.20B.2(b)(1B)	AEMO	Specifies that AEMO must forecast each inertia sub-network's allocation of a portion of the system-wide minimum level of inertia (inertia minimum level allocation), which must be determined based on: (i) A balanced allocation of the system-wide minimum level of inertia (ii) Any identified minimum requirements for inertia in a particular inertia sub-network
		Need to clarify/change: The definition of the inertia minimum level allocation is unclear. Is the inertia minimum level allocation the maximum of either (i) or (ii), or is it a combination of them? How can a portion of the system-wide also include an identified minimum, and still add up to the total across the mainland? It is unclear whether (ii) is the minimum threshold level of inertia as defined in 5.20B.2(b)(1), or if it is something different.
5.20B.3, **5.20B.4(b)**	AEMO	Clause 5.20B.3 requires an inertia shortfall to be forecast and the likelihood of islanding as two condition precedents for a binding inertia shortfall period to exist, which then requires inertia network services to be available to meet the minimum threshold level and secure operating level of inertia – the conditions for when 5.20B.4(b) applies.
		Change: AEMO recommends that clause 5.20B.4(b) be changed to match the system strength framework and how it is proposed for the binding inertia minimum level allocation in clause

Clause	Applies to	Description of clause and proposed amendment
		5.20B.4(a2)(3). Inertia Service Providers[23] should need to always provide inertia to meet the binding minimum threshold and secure operating levels of inertia to ensure sub-networks that are at risk of islanding have sufficient inertia to maintain security following a separation event. To confirm, AEMO is confused by the application of the shortfall as a condition. AEMO recommends (a)(1-3) and (b)(1) be removed, placing sole focus on (b)(2), i.e. islanding, as the condition precedent to require a TNSP to provide for the secure and minimum levels of inertia. Further, AEMO also does not understand clause (2a), which seems to be the portion of the system wide requirement – this seems to be irrelevant as this must be always met under 5.20B.4(a1).
		Reason: With the shortfall clause, AEMO is required to forecast both the secure operating level of inertia as well as the level of inertia that will be supplied into the future in that inertia sub-network. AEMO would prefer to simply set the minimum and secure operating levels of inertia which the Inertia Service Providers will be obliged to be meet. If there are existing or forecast resources that will meet the requirement, then the Inertia Service Providers can enter into an agreement to ensure the inertia is provided.
5.20B.4(d)	AEMO	Specifies that the inertia network services that qualify to provide inertia up to the binding minimum threshold level of inertia are: i. A synchronous generating unit or a synchronous condenser; or ii. Other equipment approved by AEMO in accordance with clause 5.20B.4A(f).
		Need to clarify/change: Is it feasible that once approval is given to 'synthetic' inertia equipment in clause 5.20B.4A, an Inertia Service Provider can meet the binding minimum and secure operating levels of inertia with no synchronous generating units or synchronous condensers? In other words, is there no proportion or limit of the binding minimum threshold level of inertia that AEMO can specify that needs to be met by synchronous generating unit or synchronous condensers? AEMO would prefer to be able to determine the types of inertia services and any relationships or limits associated with each. Further, the text is somewhat confusing as to whether the approval given in clause 5.20B.4A(f) is for a generic type or class of plant, that conforms with the specification, or whether the approval is for individual plant – AEMO assumes the former, given it is a

[23] AEMO requests that the AEMC consider whether a different name could be used for 'Inertia Service Provider', given the potential for confusion with 'Integrated System Plan'.

Clause	Applies to	Description of clause and proposed amendment
		specification that providers can then meet and then TNSPs can use.
5.20B.4A	AEMO	Specifies that AEMO must make and publish an inertia network service specification.
		Change: AEMO would prefer to consolidate the inertia network service specification within the inertia requirements methodology in clause 5.20.4.
5.20B.6(b1), 3.11.1(f)	AEMO	Clause 5.20B.6 (b1) and 5.20C.4(b1) are duplicative to 3.11.1(f).
		Change: AEMO suggests the removal of 5.20B.6 (b1) and 5.20C.4(b1).

Table 2 List of proposed amendments – NMAS framework

Clause	Applies to	Description of clause and proposed amendment
3.11.1(c)(2)	AEMO	Specifies that NSCAS can be procured by TNSPs or AEMO as non-market ancillary services. An additional NMAS is Transitional Services. • Clause 3.11.1(c)(2)(ii) specifies AEMO procured NSCAS as a type of NMAS. • The TNSP provisions are those under clause 3.11.1(c)(2)(i).
		Change: Whilst 3.11.1 may not need to change, there may be some problems in the drafting with duplication of NSCAS dispatch 3.11.6 clauses arrangements: this is because NSCAS is a system security service under 4.4A.2 and comes under the enablement arrangements of 4.4A.
		Reason: There may be some duplication in the NSCAS dispatch, preparation of guidelines, and possibly the procurement arrangements with Transitional Services. It is worth reviewing the necessity of some of the existing NSCAS clauses. The new rules make explicit use of the NSCAS framework as a co-ordination, planning, last resort procurement and scheduling arrangement for the system strength and inertia frameworks. If the system strength service providers or inertia service providers (both TNSP) fail to procure services, this means the NSCAS procurement by AEMO would need to be used. It is worth considering whether the NSCAS clauses are up to the task, and whether there are any problems in doing so. For example, there are clauses in 3.11.6 which limit AEMO to “only call for offers to acquire NSCAS to maintain power system security and reliability of supply of the transmission network in accordance with the power system

Clause	Applies to	Description of clause and proposed amendment
		security standards and the reliability standard". This would mean NSCAS would not be able to be procured to the objective in scheduling 4.4A.1 (b) for inverter-based resource dispatch and there would be no contracts to dispatch to meet this requirement.
3.11.11(e)	AEMO	This clause discusses Transitional Services, and references tenders and seems to rely on a similar NSCAS tender process set out in 3.11.5 for when AEMO procures NSCAS. There is no equivalent to 3.11.5 for Transitional Services and AEMO would suggest there need not be. In some respects, the drafting of 3.11.11 "borrows" from the NSCAS and SRAS procurement arrangements, and yet is neither.
		Change: In clause 3.11.11 (e) should remove the provision, which starts "AEMO must first…" and ends "not deemed to be competitive". This leaves an abridged 3.11.11 (e) that should always apply. References and definitions of tenders and tenderers should be removed and replaced with offers. Delete - 3.11.12 (c) (4) & (5) and 3.11.13 (5) refer to processes for bilateral approaches in the absence of a formal tender. These can be removed because there is no formal tender clause – the Guideline should just explain how AEMO intends to procure transitional services. Delete 3.11.13 (a) (4) requires AEMO to explain why it is not using a direct tender to procure Transitional Services, which by implication is then assumed not to be a competitive processes. It is not the procurement process that establishes whether competition exists, but the competitive threat of other suppliers. This seems more of a probity clause on AEMO having to account for its actions – a formal tender process does this. If the AEMC is concerned AEMO may approach one supplier and exclude another, then this may require a formal tender clause. AEMO does not consider it necessary. In any case, this clause seems to suggest tendering is expected, yet there is no tendering clause like NSCAS which is applied to Transitional Services.
		Reason: The applicability of tenders for Transitional Services is not evident. Transitional Services are likely to be more short term, targeted and may not draw many responses in a formal tender process, which would probably take too long anyway, leaving AEMO to rely on direction. In any case there is no tender provision for Transitional Services, like which exists for NSCAS under 3.11.5.

Clause	Applies to	Description of clause and proposed amendment
3.11.11(g-h)	AEMO	Specifies that AEMO may request Transitional Services Providers to demonstrate its capability to provide transitional services to the satisfaction of AEMO.
		Change: Clauses (g) and (h) should be in the Transitional Services Guideline in 3.11.12, which can require AEMO to set these matters out in the Guideline.
		Reason: Reduce rule drafting, better governance of the testing and power system model requirements for Transitional Services.
3.11.11(i)	AEMO	Specifies that when AEMO is entering into an ancillary services agreement with a Transitional Services Provider, AEMO and the Transitional Services Provider must negotiate in good faith as to the terms and conditions of the ancillary services agreement.
		Change: Remove the ability to negotiate over the structure of the T&Cs. Instead AEMO sets out the structure in standard pro-forma, consistent with the System Security Services Procedures. Standardization allows for ease of agreeing price and should better allow AEMO to align procurement with the enablement arrangements set out in the System Security Services Procedures.
		Reason: AEMO would prefer to have the ability to operate with standard pro-forma contract, where only the relevant commercial parameters are negotiated, rather than negotiate full contractual agreement.
3.11.12(a)(2)(ii)	AEMO	Specifies the aim for testing new ways of maintaining power system security is for AEMO to transition away from reliance on the number of synchronous generating units required to maintain power system security.
		Change: AEMO doesn't consider the transitioning away from synchronous generators to be the appropriate aim for this and suggests a more flexible drafting that is simply forces on testing and trialing power system security with the aim of expanding the secure technical operating envelope.
		Reason: There are synchronous units that have zero emissions. Proposed drafting is invalid.
3.11.13(a)(3)	AEMO	Specifies a reference to clause 3.11.12(a)(4) which does not exist. This should be changed to 3.11.12(a)(1).
3.11.13(b)(6)	AEMO	Specifies that in the transitional services annual report, AEMO must mention the steps that it is taking to transition away from the procurement of transitional services.

Clause	Applies to	Description of clause and proposed amendment
		Change: AEMO suggests the removal of this clause.
		Reason: AEMO does not necessarily have the powers to take steps to avoid (6) so it is unreasonable to make AEMO report on it.

Table 3 List of proposed amendments – Scheduling services

Clause	Applies to	Description of clause and proposed amendment
4.4A.1 and 4.4A.4 (4)	AEMO	Requires system security services (including system strength services) to be enabled for clause (a) - the minimum security requirements. System strength services enabled only for clause (b) - the inverter-based resource forecast to be dispatched in the pre-dispatch schedule. Subject to 4.4A.4 (a) (lowest cost), the proposals say AEMO should enable system security services for the need for which it was contracted in preference to another.
		These clauses may be problematic – there seems to be an implied hierarchy between system strength services and system security services in meeting clauses 4.4A.1 (a) and (b) and yet meeting the IBR dispatch forecast under (b) may result in the minimum requirements under (a) being met.
		AEMO recommends procedures referred to in clause 4.4A.6 allow AEMO to develop a methodology for determining the IBR forecast, under clause 4.4A.1 (b). At present the procedure only requires AEMO to set out the methodology 4.4A.6 (a)(1) for enablement and does not allow AEMO to set out a methodology for calculating 4.4A.1 (b), instead this being directly prescribed in the clause. Further, AEMO respectfully suggests the intent of 4.4A.4 (4), which requires system security services be used for the need it was contracted, be considered during the development of, and consultation on, this procedure. For example, there may be further complicating factors – for example, AEMO has the power under 3.11.6 (a) (2) to maximise the economic dispatch of NSCAS. Also, meeting the IBR forecast with 4.4A.1 (b), using only systems strength services, may result in the minimum requirements being met. The implication that only system strength services be used to meet 4.4A.1 (b) may be problematic.

Clause	Applies to	Description of clause and proposed amendment
		If this clause has been inserted for cost recovery purposes, AEMO would respectfully suggest cost recovery be deprioritised when compared to procurement and dispatch.
4.4A.2(a)(4)	AEMO	Specifies NSCAS as a system security service.
		Possibly delete 3.11.6
		Reason: 3.11.6 already requires AEMO to dispatch NSCAS and have procedures for it. The AEMC should resolve this duplication.
5.20B.1 (d) (2) & (3) **5.20B.3 (b) (2)** **4.4A.3(b)(2)**	AEMO	5.20B.1 (d) (2) & (3) – specifies the boundaries of sub-networks be related to likelihood of islanding [this is deleted in proposed rule] and criticality and practicality of maintaining the sub-network in a satisfactory state if it is islanded and returning to secure whiles islanded. 5.20B.3 (b) (2) – specifies the likelihood of the inertia sub-network becoming islanded as something AEMO must take into account when assessing whether there is a shortfall – which then triggers the obligation to provide the minimum and secure levels of inertia 4.4A.3(b)(2) - specifies that the minimum threshold of inertia should be provided to the inertia sub-network when the islanding of that inertia sub-network is classified as a credible contingency event or protected event.
		Change: Removal of reference to credible contingency or protected event in 4.4A.3(b)(2).
		Reason: For scheduling, AEMO believes the minimum always applied, and not only when defined as a credible contingency event. This is because the minimum is targeted at non-credible contingencies and the ability of the sub-network to form an electrical island.
4.4A.3 (4) and (5)	AEMO	Clauses (4) and (5) both specify three phase fault levels at system strength nodes, to meet the minimum level when it may otherwise drop below, and the three phase fault level to maintain the power system in a secure operating state.
		Under the 5.20C.1 (c) (1) AEMO sets the system strength requirements for the purposes of clauses 4.2.6(g), 4.4.5(a) and 4.6.1(b), at each system strength node for the following year. This is expressed as the minimum three phase fault level for the system strength node applicable for the forthcoming year (commencing 2 December).

Clause	Applies to	Description of clause and proposed amendment
		For the purposes of scheduling under new clause 4.4A.3 AEMO is unsure of the relationship between clauses (4) and (5) and clause 5.20C.1 (c) (1). The purpose and distinction of each clause should be clear, and they should refer to each other where necessary.
4.4A.3 (6) and 4.4A.4	AEMO	Clause (6) sets out a NSCAS need for the secure operating state as being the minimum security requirement. Clause 4.4A.4 (3) outlines the enablement principle of meeting the minimum requirements. 3.11.6 specifies NSCAS dispatch and would include NSCAS that is dispatched for market benefits having previously been procured by a TNSP.
		Is this why 3.11.6 is retained for NSCAS dispatch?
4.4A.4(a)	AEMO	Specifies that AEMO must follow the following principles when electing system security services to be enabled: 1. Lowest cost combination to achieve requirements. 2. Service should be enabled as close as practicable to the relevant trading internal (and in any case, no more than 12 hours ahead). 3. Should only be enabled when the minimum system security requirements would not be met but for such enablement. 4. AEMO should enable a system security service for the need in which it was contracted in preference to another service. 5. When enabling services to in addition to the amount required to meet the minimum security requirements, AEMO must only enable a quantity in which the energy dispatched by that enablement is less than the total increase in IBR that will be dispatched as a result of that same enablement.
		Change: Keep (1) and (3). Remove (2), (4) and (5).
		Reason: (2), (4) and (5) are quasi-economic factors that complicate matters and may not be a complete list of matters that should constrain the expenditure of services to support the inverter forecast. They can also conflict with (1), to choose lowest cost combination. AEMO should develop a series of factors that it considers necessary to ensure the lowest cost is achieved in its enablement guideline and scheduling process, without incurring unreasonable expenditure. This flexibility is also necessary given

Clause	Applies to	Description of clause and proposed amendment
		the ambitious timeframe the AEMC has imposed to meet this obligation.
4.4A.6(a)	AEMO	Specifies that the System Security Services Procedures must include any minimum or recommended requirements to be included in agreements entered by TNSPs.
		Change: It is important that the minimum requirements should be binding on TNSPs, so AEMO can specify contractual terms (blocks, timing, etc), as necessary. This measure would be complementary to those AEMO has proposed in relation to 3.11.11(i).
		Reason: To schedule services there will need to be some standardization – the procedure should allow AEMO to impose requirements on services provided by TNSPs.
4.4A.7(a) and (b)	AEMO	Specifies in (a) that AEMO must publish data each day and (b) requires that AEMO must prepare and publish an annual report (System Security Services Report).
		Change: This clause should be deleted.
		Reason: AEMO provides data through market systems and can publish any report that will be useful for stakeholders – AEMO is unsure of the merit of this proposal. This seems like an extra, superfluous report that is not needed because it is already covered under 3.2.2 which includes requirements for AEMO to publish information for the spot market to function.