2 November 2021

Ms Anna Collyer
Chair
Australian Energy Market Commission

Lodged via the AEMC website

Dear Ms Collyer,

PROJECTS ERC0290 and ERC0306: Capacity Commitment Mechanisms for System Security and Synchronous Services Markets

The Clean Energy Council (CEC) is the peak body for the clean energy industry in Australia. We represent and work with hundreds of leading businesses operating in renewable energy and energy storage along with more than 7,000 solar and battery installers. We are committed to accelerating the decarbonisation of Australia's energy system as rapidly as possible, while maintaining a secure and reliable supply of electricity for customers.

The CEC welcomes the opportunity to provide comment on the Australian Energy Market Commission's Directions paper for the Capacity Commitment Mechanisms for System Security and Synchronous Services Markets rule change requests.

The CEC agrees that the underlying issue being considered by the AEMC through these rule changes is of critical importance. However, we do not consider that the problem has been adequately described by the AEMC in its Directions paper. The main issue is not about 'missing services'. Rather, it relates to the operational complexity faced by AEMO as system operator. Re-characterising the immediate problem in this way indicates that the proposed NMAS' solution and introduction of associated aheadness, is not the optimal solution. Rather, we consider some form of incremental adaptation of the directions process is likely to be appropriate, if the focus is to be on procurement of synchronous combinations as a strictly transitional measure.

Such a mechanism must be purposefully transitional. Locking in the procurement of synchronous combinations through a mechanism such as the proposed NMAS model will simply delay the necessary and inevitable transition to operating a system based primarily around renewable technologies.

The AEMC should therefore undertake further work to identify the optimal market design for procurement of 'system security services' / synchronous services. This would be separate to a transitional mechanism to allow for synchronous combination procurement. The services to be procured must be clearly unbundled and effectively valued, so that participants can make appropriate operational and investment decisions. Such a mechanism must be open and transparent, with a focus on maintaining the existing decentralised dispatch process, and minimising the extent of AEMO intervention

Phone: +61 3 9929 4100
Fax: +61 3 9929 4101
info@cleanenergycouncil.org.au

Level 15, 222 Exhibition Street, Melbourne, VIC 3000, Australia

cleanenergycouncil.org.au

ABN: 84 127 102 443

Assessing this rule change in the context of NEM decarbonisation

The AEMC must assess these rule changes in light of whether they will contribute to the rapid transition of the NEM power system away from emissions intensive generation, while maintaining security and reliability.

Unfortunately, the indicative decision made by the AEMC is unlikely to be consistent with a safe, secure and reliable transition. The non-market ancillary serviced (NMAS) mechanism proposed by the AEMC will likely artificially extend AEMO's reliance on procuring combinations of synchronous thermal generators. This will result in an artificial extension of the life of these decreasingly reliable and emissions intensive generators. It will also artificially delay the process of transitioning the power system to maintaining system security based on renewable technologies.

This submission begins by addressing the key gap in the AEMC's analysis, by enunciating the nature of the problem to be addressed. This problem is AEMO's reliance on combinations of synchronous generation to maintain system operability.

It then explores what a short term mechanism might look like to address this problem. This short-term solution would be to amend the existing directions process to address the problem identified above.

Finally, it describes a long term solution. This long term solution should be as open and transparent as possible, and be built on the market ancillary service (MAS) model, such as that proposed by HydroTasmania in its original submission.

The underlying problem is one of system operability

The Directions paper identifies the underlying physical change that gives rise to issues of stability and system operability - the ongoing removal from service of synchronous thermal generating units. These units have traditionally supported the stability and operability of the power system through their innate physical characteristics and specific locations on the power system.

However, the Directions paper overemphasises the concept of 'missing services'. We do not consider that there are any such services missing, or if there are, they have not yet been defined. Instead, the real nature of the problem is the increasing complexity faced by AEMO's power system operators. Understanding this is critical to assessing the materiality of short and long term issues on the power system, and therefore to the design of appropriate regulatory solutions.

The key issue is therefore not a lack of services, but instead the 'operability' of the power system. Historically, power system operability has been based around specific assets that have formed the synchronous backbone of the power system. Specific synchronous generation assets, located in particular parts of the power system, have played a central role in how the system has been designed and operated. As these asserts retire, two things must be considered: firstly, whether their innate capabilities are still required (such as high levels of fault current), and secondly, how these capabilities can be provided from the new mix of equipment that makes up the power system.

Power system operation involves a lot more than simply procuring a mix of services and energy. The power system is a complex machine that requires multiple operators to make complex judgement calls, with the objective of maximising economic efficiency while managing for system security. Operability of a power system therefore describes the ability of operators to predict how the power system will function under specific internal and external conditions, and their ability to then make use of all available tools to maintain the system within the technical envelope.

The combination of endogenous changes in the generation fleet, coupled with increasingly severe exogenous shocks from climate change, are highly relevant to operability. Assets that were formerly critical to system operability are being removed from service, at precisely the same time as external weather driven events are becoming more severe. Operators thus face increased difficulties managing the system to supply energy at the lowest cost to customers, while also maintaining the system within technical limits.

This is the nature of the underlying problem. While the Directions paper acknowledges some elements of this problem, a focus on simply procuring ‘system services’ fails to acknowledge the complex control theory that sits behind effective power system operation, and the real challenges faced by power system operators during this period of transition.

This is not to downplay the importance of system service unbundling. Clearly identifying the specific system services needed to support power system operability, security and resilience is crucial to delivering efficient outcomes. Clear price signals will support efficient investment in new assets and efficient operation of existing ones and are crucial to minimising the cost of the transition for customers.

For this reason, the AEMC should not push for the NMAS solution at this stage, but rather take the time needed to work up a properly transparent and efficient market mechanism for the long term procurement of unbundled system services.

However, in the short term, the focus should be on the immediate and most material problem – how to maintain operability of the power system, as the mix of assets that make up the power system rapidly change. This suggests that in the short term, continuation of some form of ‘synchronous combination’ procurement may be appropriate.

In order to ensure ongoing efficiency of the power system, it’s crucial that use of this mechanism is strictly limited, and used only as a transitional tool.

Synchronous combinations as a transitional tool only

The Directions paper repeatedly refers to ‘missing services’ and suggests that mechanisms do not exist to procure them. For example, in paragraph 15 of page ii, the Directions paper states that “while some efforts have been made to explicitly value some of these services (e.g. system strength), this is not the case for all services.”

It’s unclear what these missing system services are. If we assume that system services include frequency control, static and dynamic voltage control, inertia, system strength and system restart/restoration support services, there are already multiple procurement mechanisms in place. The minimum inertia and system strength requirements, the new system strength mechanism, FCAS, NSCAS and SRAS all provide mechanisms to source all of these services. Other ‘services’ are also provided by networks through the specific equipment they install and operate, while still others are provided through the various requirements placed on generators through the generator access standards.

Some of these services are described in the table below.

Table 2 Technical attributes, and services required to deliver them

Technical attribute and section of report where addressed	Requirement	Service(s) needed to meet requirement
Resource adequacy and capability • **There is a sufficient overall portfolio of energy resources to continuously achieve the real-time balancing of supply and demand. (See Section 3.1)**	Provision of sufficient supply to match demand from consumers	Bulk energy
		Strategic Reserves
	Capability to respond to large continuing changes in energy requirements	Operating reserves
	Network transport capability	Transmission and distribution services
Frequency management • **Ability to set and maintain system frequency within acceptable limits. (See Section 3.2)**	Frequency within limits	Inertial response Primary frequency response Secondary frequency control Tertiary frequency control
Voltage management • **Ability to maintain voltages on the network within acceptable limits. (See Section 3.3)**	Voltage within limits	Slow response voltage control Fast response voltage control
		System strength
System restoration • **Ability to restart and restore the system in the unlikely event of a major supply disruption. (See Section 3.4)**	Ability to restore the system	Black start services Restoration support services

Source: AEMO, *Power System Requirements*, July 2020, page 11

It follows there is no missing service, or if there is, this service has not yet been defined by AEMO or the AEMC.[1] This focus on system services misses the point. The key issue isn't so much that any particular service is missing, but rather that the dynamics of the power system are changing rapidly.

This changing power system environment creates challenges for AEMO's system operators – the operability of the power system has become more difficult. One way that AEMO currently manages this complexity is through the lens of 'system strength requirements'. These requirements are set out in the Transfer Limits Advice[2], which describe the combinations of synchronous generators that must be online at any time so that the system can survive a credible contingency. These limits are based on modelling of the power system, under various conditions. To date, they have largely included combinations of synchronous thermal generators.

Recent changes in South Australia highlight how these arrangements are changing. In October 2021, AEMO revised its transfer limits advice, to account for some of the new synchronous condensers that have been installed by the SA TNSP, Electranet. The installation of this new equipment has reduced AEMO's reliance on procurement of synchronous generator combinations in South Australia. As more synchronous condensers are brought online, fewer synchronous thermal generator combinations will

[1] Its acknowledged that 'operating reserves' might form a missing service, although the rationale or likely uses of this service has not yet been defined. Further, AEMO has previously discussed 'grid forming' services, and in the recent Grid Forming Inverter Whitepaper have also referred to other types of 'Islanding' services. However, at this stage these services remain undefined.

[2] AEMO, *Transfer Limit Advice – System Strength in SA and Victoria*, October 2021.

be required, as AEMO learns how to maintain basic system stability and operability with these new assets.

Recent changes made by the AEMC to the system strength frameworks are likely to further reduce AEMO's need to rely on synchronous thermal combinations. The new system strength rules require TNSPs to procure greater levels of system strength than before. They may do this through whatever solution they deem fit. This could include building synchronous condensers, contracting with batteries or existing generators, or other options such as 'retuning' of existing IBR.

If we look at what has recently happened in South Australia, it appears likely that these new rules will see a further reduction in the requirement for AEMO to procure additional synchronous thermal generator combinations. TNSP contracting, or asset build, will reduce the need for AEMO to undertake further interventions in the market. In any case, the continued removal from service of thermal units, for either physical or economic reasons, will force AEMO to utilise methods other than relying on synchronous thermal combinations for system operability.

The CEC notes suggestions that some form of NMAS/centralised optimisation will be required to 'operationalise' any generator contracts entered into by TNSPs in order to meet their new system strength planning standard. We do not consider this warrants the introduction of the NMAS model:

- Firstly, its unlikely TNSPs will be entering into many contracts with synchronous thermal generators, given the decreasing physical reliability and economic viability of these units. Furthermore the nexus of aggregate mingen limitations acrosd the system, and minimum system demand means that AEMO will increasingly need to separate system stability from the provision of energy. Given these issues, we expect solutions such as grid forming battery storage systems, syncons and collective retuning of inverter response will be the dominant system strength solution. If relatively few of these contracts are entered into, a new mechanism may not be warranted to schedule them.
- Secondly, even where TNSPs do enter into contracts with synchronous generators, there is no reason why these contracts need to be 'optimised' by AEMO through an ahead mechanism. Rather, these contracts could very well take a purely bilateral form between NSP and generator, with the generator simply bidding itself available into pre-dispatch in accordance with its contract. No centralised approach is required here to manage inter-temporal optimisation, as the generator will simply manage that risk itself in accordance with its contracting and operational strategy.
- Finally, the position of the AEMC throughout the development of the new system strength frameworks has been that the system strength planning standard is just that – a planning standard. As per responses to TNSP calls to account for planned outages, the underlying rationale has always been that what is planned for does not need to be trued up in the operational timeframe. It follows there is no reason why the NMAS would be needed to fill any shortfall of system strength than occurs in the operational timeframe. If the AEMC does elect to progress this line of justification for the NMAS model, it follows that some form of system strength operational standard will be required to complement the planning standard that has already been developed, to ensure that AEMO is procuring services to an efficient level.

To be clear, the CEC acknowledges there is most likely a need for AEMO operators to procure synchronous thermal unit combinations for some time during the transition. However, any such mechanism must be strictly limited, in terms of its lifespan and its applicability. It is a crude and blunt instrument for maintaining the ongoing security and operability of the power system. This is particularly the case if the AEMC's proposed NMAS model is implemented, as this could effectively hardwire the combinations approach into AEMO's operational processes. This can only delay the transition to a power system that is no longer reliant on carbon intensive forms of generation to maintain system operability and security.

Given these issues, we consider that some form of amendment to the existing directions process should be implemented, to allow AEMO to procure synchronous unit combinations as a strictly transitional measure. While the directions mechanism has its flaws (as discussed below), instituting a major reform such as the NMAS model creates a risk that AEMO will simply continue to procure these synchronous thermal combinations, and delay the transition to renewable sources of system stability and operability.

Enhancements to the directions mechanism

One of the justifications for an NMAS model relates to the flaws associated with the existing directions mechanisms. These flaws include the manual nature of the directions process, the cost of issuing directions, as well as the fact that reliance on 90^{th} percentile pricing may not send effective signals for efficient operation of assets.[3]

We do not consider that these issues warrant the introduction of the NMAS model. Instead, we consider that relatively minor tweaks to the directions framework should be considered.

Firstly, it is argued that the directions framework requires AEMO to undertake more manual interventions in the power system and market. It's not clear what this refers to. The Transfer Limit advice described above sets out clearly predefined combinations of units that must be online for the purposes of system operability. While the process of direction may itself require a manual phone call or issuance of an instruction through the AGC, its also not clear that the degree of manual administrative burden is all that significant.

Secondly, issues related to cost are frequently raised with the Directions process. To date, there have certainly been many directions issued in South Australia, the cost of which have been material (although the nature of these costs is the subject of some detailed debate).

The main point, however, is that as synchronous condensers and other system strength solutions are brought online, the number and cost of these directions is likely to decline materially.

Relatedly, the argument is often made that the Directions process does not send effective price signals. This argument it correct. Directed parties are generally paid compensation based on the 90^{th} percentile wholesale price (acknowledging that these frameworks have been subject to extensive change). Depending on wholesale price levels, this could very well lead to directed parties receiving payments that do not cover their reasonable costs, or which do not send investment signals.

While these are legitimate issues, we consider they can all be addressed relatively easily, by changing the basis of directions compensation. For example, this could be achieved by increasing the level of compensation to a higher percentile or developing a schedule of regulated prices – such as a 'cost plus' approach, whereby directed parties are paid an estimate of their costs, plus a reasonable percentage margin to account for any error.

An argument made against this approach is that it would not provide any 'investment signal'. While this may or may not be the case, it is somewhat irrelevant, as the directions process should only be applied as a transitional mechanism for existing assets, and therefore needs only to allow for

---

[3] The Directions paper also suggests that the directions mechanism does not provide sufficient investment signals. We don't consider this is an issue, on the basis that a mechanism to support synchronous combination procurement should be a purely transitional and short lived tool – and which therefore does not need to provide investment signals.

operating costs. As described later on in this submission, we consider that if a more targeted, truly ‘unbundled’ solution is needed, then this would be the way in which investment signals would be sent.

To complement the use of such a mechanism, AEMO must also face strong transparency and planning obligations. As discussed, it is imperative that AEMO find new ways to maintain system operability and security, as the assets that have traditionally provided these services are withdrawn for both physical and economic reasons.

AEMO must therefore be required to report annually on the specific combinations it is procuring, the cost of doing so, and what it is doing through the joint planning processes to address these issues. This latter process is crucial. Many of the system stability and operability issues that AEMO manages through synchronous unit combinations can likely be significantly ameliorated through the use of various network solutions, particularly those that will be procured through the new system strength frameworks.

The AEMC should also consider whether some form of standardisation could be implemented, to provide transparency as to the nature of the uncertainties and operational complexities faced by AEMO. As described above, this is particularly important if AEMO is procuring synchronous combinations to deliver ‘market benefits’, as has been suggested might occur where using the NMAS to operationalise the system strength planning standard. The Reliability Panel could play a key role in developing such a standard.

Finally, such a mechanism could also be subject to a sunset clause.

For the reasons set out above, we consider that the AEMC should abandon its preference for the NMAS model described in the directions paper. This mechanism will reduce any discipline on AEMO to effectively plan for operating a power system with fewer, or no, synchronous thermal units online. The NMAS model could very well result in contracts being locked in with existing thermal synchronous assets, delaying the inevitable transition and worsening Australia’s already lacklustre efforts at decarbonisation. Instead, if the AEMC considers that AEMO operators require a mechanism to procure synchronous combinations, this should be achieved through amendments to the existing directions process.

Development of a transparent and flexible approach

We agree with the AEMC’s general argument that system services should be ‘unbundled’ and explicitly valued. Unbundling and potentially developing new services will support efficient investment and operation in the NEM.

However, we strongly disagree with the AEMC’s assertion that the NMAS approach represents the best way forward. In addition to the risks of locking in synchronous thermal combinations as described above, this mechanism appears to favour a specific technology, weakens existing system strength mechanisms and also represents a material departure from the concept of decentralisation that is fundamental to the NEM.

The NMAS approach proposed by the AEMC appears to be slanted very heavily toward existing thermal coal assets. Mechanisms that entail ahead optimisation have been promoted on the basis that they internalise the significant start up and cycling costs of thermal coal units. Under current market design, the risks associated with these costs are appropriately borne by the owners and operators of thermal coal generators. The ‘inter-temporal’, or unit commitment problem, is therefore really a problem primarily for slow units that have long lead times and incur extensive costs associated with cycling behaviours. Its not clear why an entirely new mechanism is required to manage these costs.

Another weakness of the NMAS design is that it risks weakening the signals sent through the recently finalised system strength frameworks. Under those frameworks, TNSPs meet the new system strength standard through whatever technology solution is lowest cost. This could potentially include contracting with existing synchronous thermal units (noting comments above about the extent to which is likely to occur). In any case, the significant countervailing power of TNSPs acts to manage any market power held by such synchronous generators. However, the possibility of entering into alternative long term contracts with AEMO through the NMAS mechanism automatically weakens this NSP countervailing power. This cannot but worsen outcomes for consumers.

The 'ahead' elements of the NMAS approach described in the Directions paper are also likely to significantly increase cost to consumers, due to the effect of forecast uncertainty. Depending on the (as yet undisclosed) design of variables such as gate closure, synchronous thermal generators may be locked in significantly ahead of when they are expected to be required, and will likely begin to incur start up costs well before this time. In the context of the likely worsening of NEM forecast uncertainty, it becomes increasingly likely that these units may not be required in real time. However, these costs will still be borne by customers, for no benefit. Instead of such a 'ahead' design, market mechanisms should incentivise those technologies that can rapidly adapt and provide services as and when they are needed.

More generally, the NMAS approach represents a significant departure from the fundamental principle of decentralised decision making in the NEM. This principle is core to efficient investment in and operation of the power system – any move towards centralisation, with AEMO determining what is an 'optimal' dispatch mix, would materially weaken the effectiveness of the existing market mechanisms.

Our strong preference is therefore that the AEMC should spend more time exploring the MAS approach. The AEMC must work with AEMO to more properly define and understand the nature of the services that are needed in an increasingly non-synchronous power system. While it is acknowledged that this is a complex area, it is crucial that future power system needs are identified, and valued, as soon as possible. This will enable the market to respond and invest in the new assets needed to transition the power system.

As described in more detail in many other submissions, the MAS approach

1. Provides market participants with opportunity to manage their own assets efficiently and effectively
2. Allows AEMO to clearly define and procure the services required through the existing NEMDE constraint formulations
3. Complements the various other system services mechanisms that have been developed, particularly the new system strength framework
4. Assists in efficient price discovery as well as identification of key system needs
5. Creates an even playing field and avoids artificially extending the life of synchronous thermal coal and gas assets

We consider that such a mechanism should be developed by the AEMC, with a view to rapidly replacing any amended directions framework that is used to procure synchronous combinations. As opposed to using NMAS to procure synchronous combinations, the MAS approach will actually allow for the unbundling of essential system services, primarily through its inherent transparency and iterative nature.

We also acknowledge the various issues with an MAS solution identified by the AEMC in the Directions paper. Various CEC members have provided more detailed feedback to the AEMC to address these concerns, particularly HydroTasmania, who have provided an updated version of their original proposal that we understand addresses most of these concerns.

Conclusion

For the reasons described above, we strongly urge the AEMC to reconsider its positions described in the Directions paper.

Firstly, the AEMC must recharacterize and more effectively assess the nature of the underlying problem. This is not simply a matter of ‘missing markets’ – describing the problem in this light may be sufficient from the perspective of regulatory economic theory, but it fails to capture the real nature of the problem. It also steers toward a suboptimal solution.

The real problem is the significant operational uncertainty associated with a rapidly transitioning system. Starting from here, we can see that what is needed is a transitional mechanism that can be used by system operators to maintain operability and provide the time to ‘learn’ how to operate a new system. We consider that the existing direction framework could form the appropriate basis of any such mechanism, subject to some changes.

However, such a mechanism can and must only be transitional. Firstly, the ageing synchronous thermal units on which it is based are being removed from the system, for both physical and economic reasons. Secondly, other mechanisms such as the system strength framework will drive network investment in assets that will reduce the reliance on synchronous thermal generators for the provision of system operability and stability.

It follows that AEMO must rapidly reduce its reliance on the use of synchronous thermal unit combinations, as it has done in South Australia with the introduction of the synchronous condensers. Clear planning and reporting obligations must be imposed on AEMO in terms of how this mechanism is used. This mechanism could also be subject to a sunset clause.

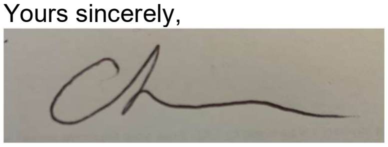
Finally, we urge the AEMC to spend more time exploring what a long term solution will look like. The AEMC must work with AEMO to actually put some shape around what services are needed to transition the power system – it is not acceptable to argue against doing so based on the difficulty of the task. This must happen as quickly as possible, so that the market can invest in necessary assets.

If the AEMC looks to progress a long term mechanism for system services, we consider that some form of MAS solution is preferable, as this solution maintains the fundamental NEM design principle of decentralisation. It also avoids transferring risk to consumers, ultimately leading to lower costs of energy.

The CEC appreciates the extensive and genuine engagement undertaken by the AEMC on these complex rule changes. We also appreciate the diligence and hard work of AEMC staff, who are working incredibly hard to analyse bleeding edge problems and come up with the best possible solution. The CEC and industry generally is ready to assist in what ever way we can, to develop an effective and proportional solution to these complex problems.

If you would like to discuss any of the issues raised in this submission, please contact me at czuur@cleanenergycouncil.org.au.

Yours sincerely,



Christiaan Zuur

Director Energy Transformation