AEMC

Consultation paper - System services rule changes

STAKEHOLDER SUBMISSION TEMPLATE

The template below has been developed to enable stakeholders to provide their feedback on specific questions that the AEMC has identified in the Consultation paper for the System services rule changes.

The rule changes discussed in the system services consultation paper are:

- AEMO – *Primary frequency response incentive arrangements* (ERC0263)
- Hydro Tasmania — *Synchronous services markets* (ERC0290)
- Infigen Energy — *Operating reserves market* (ERC0295)
- Infigen Energy — *Fast frequency response market ancillary service* (ERC0296)
- TransGrid — *Efficient management of system strength on the power system* (ERC0300)
- Delta Electricity — *Capacity commitment mechanism for system security and reliability services* (ERC0306)
- Delta Electricity — *Introduction of ramping services* (ERC0307)

This template is designed to assist stakeholders provide valuable input on the questions the AEMC has identified in the consultation paper. However, it is not meant to restrict any other issues that stakeholders would like to provide feedback on.

Given the breadth of issues discussed in the consultation paper, it is not expected that all stakeholders respond to all the questions in this template. Rather, stakeholders are encouraged to answer any and all relevant questions.

SUBMITTER DETAILS

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CHAPTER 1 – INTRODUCTION

Question 1: Section 1.2 & 1.3 – Current ESB & AEMO work relating to the rule change requests	
1) What are stakeholders' views on how the rule change processes should be integrated with ESB and AEMO work programs?	The rule change processes should be used as the primary mechanism for the evolution of the NER. ESB and AEMO program outputs should be considered as valuable inputs from key stakeholders, but should not outweigh the contributions made by other NEM stakeholders through rule change proposals and contributions to rule change processes, such as this one. The rule change proposals addressed in this consultation paper demonstrate that stakeholders are keenly interested in progressing the regulatory environment of the NEM, particularly in the key services that will be required to facilitate the transition. As such, rule change proposals such as these should be considered the catalyst for change, and AEMO and ESB work should be considered inputs to the consideration of issues and proposals as part of the AEMC rule change process.
2) Are there any additional processes that should be closely considered by the Commission when progressing these rule change requests?	
Question 2: Section 1.6 – Timetable for the consultation process	
1) Do stakeholders have any comments on the proposed timetable for the system services rule changes?	

CHAPTER 3 – APPROACH

Question 3: Section 3.2 & 3.3 – Three work streams: dispatch, commitment and investment	
1) Do stakeholders agree with the AEMC's approach to grouping the rule changes, at least for initial consideration?	Yes, the AEMC is right to begin to structure stakeholder rule change proposals into a coherent discussion of services and timeframes. The pace of change is accelerating and being able to consider the submissions of multiple stakeholders in parallel will reveal the key patterns, idioms and compromises that will underpin a future NEM.
2) Do stakeholders believe that Figure 3.1 captures the key issues to be considered for each rule change in each time frame?	Yes. Figure 3.1 is helpful in understanding the relationships between the various rule change proposals.
3) Do stakeholders have views on whether/which services should be procured in certain time frames and not others?	After consideration of the Consultation Paper and the rule change proposals within, our opinion is that there is some lack of precision in the thinking behind some of these rule change proposals. There seems to be a recurrent conflation of services and technology. Services, and the technology that delivers services are not the same thing - and services should not be defined in terms of the properties of a technology. The result is that some of the services considered in this consultation paper are not services at all, but a requirement for a particular technology. In much the same way that system strength has been defined in terms of physical properties by the AEMC, a similar treatment should be applied to the "services" described in these rule change proposals.

	Only then can a service be considered in each timeframe, and the priority for procurement analysed and assigned.

CHAPTER 4 – ASSESSMENT FRAMEWORK

Question 4: Section 4.2 – The system services objective	
1) Do stakeholders agree with the AEMC's proposed system services objective being used to assess these rule changes? If not, how should it be amended or revised?	Yes, the system services objective is helpful and should be used to assess the rule changes. It is suggested that the naming of particular technologies be removed (i.e. "generation facilities, load, storage, networks (i.e. the power system) and other system service capability") and replaced with simply "system service capability". Technology types are not a useful abstraction here, and will change rapidly. Services are the primary abstraction and should not be diluted. For example, five years ago it is unlikely "storage" would have made it to this definition.
Question 5: Section 4.3 – The planning, procuring, pricing and payment service design framework	
1) Do stakeholders agree with the '4Ps' service design framework being used to assess these rule changes?	Yes.
Question 6: Section 4.4 – Principles for assessment	
1) Do stakeholders agree with the principles proposed for assessing the rule change requests? If not, should any principles be amended, excluded or added?	Yes. Although most likely considered in the "Technology neutral" principle – it may be useful to make explicit that services will be defined in terms of physical properties (e.g. energy, power, time, rate of change, information, etc.) and NER abstractions (e.g. connection point, Market Customer, Loss Factor, etc.). Likewise, it might be useful to consider service provision to be location neutral (i.e. not centralised, decentralised, TNSP/DNSP connected, etc.), but instead to deliver a measurable amount of a physical property to the system.

CHAPTER 5 – THE RULE CHANGE REQUESTSCONS

Question 7: Section 5.1 – Infigen – Fast frequency response ancillary service market	
1) What are stakeholders' views on the issues raised by Infigen in its rule change request, Fast frequency response market ancillary service?	Infigen make a valid point that energy and power will increasingly come from inverter-based technologies, and that these technologies, as they stand today, will increase RoCoF. A two-second contingency FCAS service would help in managing RoCoF in the short-medium term.
2) Do stakeholders agree with Infigen's view that a change to the NER is required to encourage efficient provision of FFR services in the NEM following contingency	Yes. There is some incentive in the existing contingency FCAS arrangements for a very fast response, but it has unintended, negative consequences for system security.

events?	
3) What are stakeholders' views on if there are any other issues or concerns in relation to frequency control in the NEM as levels of synchronous inertia decline?	The current FCAS arrangements are not well suited to a low-inertia system. Balancing reserves of the type suitable to manage frequency must be faster acting than the ones that are currently procured if the system is to maintain security.
4) Do stakeholders consider there are alternative solutions that could be considered to improve the frequency control arrangements in the NEM for managing the risk of contingency events as the power system transforms?	Yes. There may be some merit in considering system strength, inertia, primary frequency reserve and fast frequency reserve as all being concerned with the maintenance of a stable voltage sine wave, in the very short term. This is very different to the current discrete-in-time treatment of system services, but inverter-based technology does allow for this kind of thinking. In the short-medium term however, a MASS-based, two-second FCAS market would be cost-effective to implement and be well-understood by stakeholders.
5) Do stakeholders consider that 5-minute markets for FFR ancillary services likely to be effective and efficient in the global interconnected NEM and on a regional basis?	Yes in the short-medium term.
6) Do stakeholders consider Infigen's proposal will provide adequate pricing signals to drive efficient investment in FFR capability in the NEM?	This depends on the quantity of FFR procured. A shallow market will be saturated with supply immediately and will not provide an adequate price signal. Deeper markets will provide a strong price signal, but will decline in marginal efficiency.
7) What are stakeholders' views on, if introduced, how the costs associated with any new FFR market ancillary services should be allocated?	They should be allocated in the same way that other contingency FCAS costs are allocated.
8) What do stakeholders consider to be the likely costs associated with establishing two new ancillary service markets for FFR in the NEM?	The provision of FFR from Reposit-controlled assets would be minimal. The control and measurement technology to participate in a two-second FFR market is already in place on all Reposit sites. AEMO would bear the majority of the implementation cost through augmentation of the contingency FCAS systems and processes.
9) What are stakeholders' views on how the proposed solution may result in any substantial adverse or unintended consequences in the NEM?	Assuming an implementation based upon the measurement and control facilities specified in the Market Ancillary Services Specification v5 for Fast contingency, there is little risk of adverse consequences of an FFR implementation. Any relaxation of measurement requirements in the MASS v5 however would create verification problems over a 6-second response requirement.
10) Are there specific issues with FFR that stakeholders think should be addressed in the NER as part of the establishment of markets for FFR services?	The extension of the MASS to include FFR would indicate that FCAS is a now first-class security service, and not simply a by-product of energy generation. As such, the NER should be modified to make the MASS the responsibility of the Reliability Panel. This is consistent with the Panel's focus on "determining standards required to deliver a secure, reliable and safe power system in the most efficient way in order to minimise costs for consumers".
Question 8: Section 5.2 – Infigen – Operating reserves market	

1) Do stakeholders agree with Infigen that tight capacity conditions and increasing uncertainty in market outcomes are problems that an operating reserve would address?	Yes. The existence and increasing use of RERT suggests that additional operating reserves are required.
2) Are there alternative solutions that could be considered to address tight capacity conditions and increasing uncertainty in market outcomes?	RERT could be formalised in the NER to address future tight capacity outcomes in the way described in the Consultation Paper.
3) Do stakeholders consider Infigen's proposal would provide adequate pricing signals to drive efficient use of and investment in operating reserve services now and in the future?	Perhaps. The RERT experience is instructive here.
4) How do stakeholders think separate operating reserves arrangements would affect available capacity in the spot, contracts and FCAS markets now and in the future?	This is a complex question, however it is likely that the capacity made available for this service would be part of the capacity that is currently employed in RERT, and have a strong overlap with the capacity that would be made available to the market via the Wholesale Demand Response (WDR) mechanism. It is not clear that there would be strong additionally over WDR apart from that capacity that is unable to operate in a 5-Minute settlement environment.
5) How do stakeholders think separate operating reserves arrangements would affect prices in the spot, contracts and FCAS markets now and in the future?	As above, it is likely that this Operating Reserve would replace RERT, and be more attractive to interruptible load than WDR. Perversely, this might work to negate any price decreases associated with WDR.
6) How could the design of an operating reserve market (e.g. criteria for eligible capacity) best support competitive outcomes both in the operating reserves market but also energy and FCAS markets?	
7) What are the factors that should be considered when seeking to set and procure efficient levels of operating reserve?	
8) Would Infigen's proposed operating reserve market result in any substantial adverse or unintended consequences in the NEM?	It may render WDR redundant.
9) What are the costs associated with establishing an operating reserve market in the NEM? If introduced, how should these costs be allocated?	
10) What kind of incentive/penalty arrangements would be necessary to be confident the operating reserves procured are available when needed?	
Question 9: Section 5.3 – Delta Electricity – Introduction of ramping services	
1) Do stakeholders agree with Delta that price volatility that occurs when dispatchable generators ramp through their energy bid stacks in response to predictable, daily, high rates of change from solar ramping up and down is a problem that needs addressing?	No. This is the nature of a system that has variable and cyclical demand. It is difficult to understand why the daily cycle of solar generation should be treated as different to the cyclical demand variation caused by human activity throughout a day. Even at 2600MW/hour or 5200MW in total, this seems like a rate and magnitude of change that was accommodated efficiently before significant solar generation was introduced to the system.

2) Do stakeholders think that a new raise and lower 30-minute FCAS would address the price volatility at these times? Are there alternatives that could be considered to address this problem?	
3) Do stakeholders consider Delta's proposal would provide adequate pricing signals to drive more efficient use of and investment in ramping services thanks existing price signals and information provided through the PASA and pre-dispatch processes?	
4) How do stakeholders think a separate 30 minute ramping product would affect available capacity in the spot, contracts and FCAS markets now and in the future?	
5) How do stakeholders think a separate 30 minute ramping product would affect prices in the spot, contracts and FCAS markets, now and in the future?	
6) How could the design of a ramping FCAS product (e.g. criteria for eligible capacity) support competitive outcomes in both energy and FCAS markets?	
7) What are the factors that should be considered when seeking to set and procure efficient levels of ramping services?	
8) Would Delta's proposed new 30-minute raise and lower FCAS products result in any substantial adverse or unintended consequences in the NEM?	
9) What are the costs associated with establishing new 30-minute raise and lower FCAS products in the NEM? If introduced, how should these costs be allocated?	
10) What kind of incentive/penalty arrangements would be necessary to be confident the new 30-minute raise and lower FCAS products procured are available when needed?	
Question 10: Section 5.4 – Delta Electricity – Capacity commitment mechanism for system security and reliability	
1) Do stakeholders agree with Delta that there is an increasing risk that capacity capable of providing reserves or services may not be available at times when the power system may need them to respond to unexpected events because of increasing incentives to de-commit?	Yes. As the duty cycle of fuel-burning generation is lightened, there is an increasing risk that this generation will be unavailable. This is particularly true of generation with a combination of long start times, and fuel costs.
2) Do stakeholders think that a mechanism to commit capacity one day ahead of time would deliver the reserves or services needed? Are there alternatives that could be considered to address this problem?	Yes it would be effective. It would also be inefficient and have various known and unknown side effects. A more efficient approach would be to: 1. Decrease the negative price cap to less than -$1000 AND 2. Provide a strong price signal for balancing reserves at times of MSOL This would allow scheduled generation to outbid non-dispatchable generation (by paying significantly

	more to generate energy than the value of an LGC) and then recovering the cost of generating energy through the provision of balancing reserves sufficient to keep the generator operating at a safe minimum. Additionally, these generators should be compensated for the provision of PFR, Inertia and System Strength under a technology neutral service definition. The additional revenue from these services during high VRE conditions would also help to offset to the substantial cost of generating energy under a negative price scenario.
3) Do stakeholders consider Delta's proposal would provide adequate pricing signals to drive more efficient use of and investment in reserves and system services?	The proposal gets very close to implementing a capacity market in the NEM for energy. It would provide adequate pricing signals to keep these generators spinning, but it would also be inefficient. Additionally, it is not technology neutral as the only reserves that would benefit from this proposal are those that take a long time to start.
4) How do stakeholders think Delta's capacity commitment payment would affect available capacity in the spot, contracts and FCAS markets now and in the future?	This proposal is likely to increase the available capacity in all three markets.
5) How do stakeholders think Delta's capacity commitment mechanism would affect prices in the spot, contracts and FCAS markets now and in the future?	This proposal is likely to dull the price signal in the spot and FCAS markets. This is because generators that are long on fuel will be paid to generate energy in trading periods where they would otherwise not be required. This energy/FCAS will need to be accommodated in the NEMDE as it will contribute to supply. This means it will have to be included at the bottom of the bid stack and will lower the price for energy and FCAS.
6) How would a capacity commitment mechanism and payment affect entry, exit and competition in the NEM over the short and long term?	This mechanism would lower competition and dull investment signals. It is likely to create an incentive for the inefficient provision of reserves in the form of older style generation, and create a disincentive for more efficient forms of reserve in the form of fast-starting, fast-ramping, fast-stopping generation much better suited to managing VRE.
7) What are the factors that should be considered when deciding how much capacity to commit ahead of time?	
8) Would Delta's proposed capacity commitment mechanism result in any substantial adverse or unintended consequences in the NEM?	Yes. Please see above.
9) What are the costs associated with establishing a capacity commitment mechanism in the NEM? If introduced, how should these costs be allocated?	
10) What kind of incentive/penalty arrangements would be necessary to be confident that the committed capacity would be available throughout the commitment period and/or when called upon?	
Question 11: Section 5.5 – Hydro Tasmania – Synchronous services markets	

1) Do stakeholders consider this rule change proposal presents a viable model for the provision synchronous services? a) Could this proposed model be used to provide the essential levels of system strength (and / or inertia and voltage control) needed to maintain security and the stable operation of non-synchronous generation? b) Could this proposed model be used to provide levels of system strength (and / or inertia and voltage control) above the essential level required for security?	No. It conflates technology with services by creating an explicit market for a particular technology instead of for a service. This is not consistent with the service-orientation of the NEO. All of the services that are provided by synchronous generation are also able to be provided by non-synchronous generation. At present there exists no investment signal in the NEM for the manufacturers of non-synchronous generation to deploy technology that delivers system strength as defined by the AEMC (i.e. grid-forming inverters). This technology would also contribute to "inertia" (which requires a definition in the style of the AEMC's definition of system strength) and voltage control. There is nothing physically unique in a voltage sine wave created by an alternator. It is simply one way of delivering a service. Switching power electronics is another way. The key is to define the service such that any technology that can deliver the service as defined is able to participate in the market. Doing anything else ignores new technology and leads to inefficiency. If explicit, well-designed, service-oriented markets for system strength, inertia and voltage control existed, non-synchronous generation would meaningfully participate in the provision of these services.
2) Do stakeholders consider that the creation of a synchronous services market could have any adverse impacts on other markets in the NEM? If so, what are these impacts?	Yes, it ruins the technology neutrality of the NEM and seriously degrades its efficiency.
3) Would the proposed model set out in the rule change request efficiently price and allocate costs for synchronous services in the NEM?	
4) Do stakeholders consider the model set out in the rule change request to be capable of sending price signals sufficient to encourage new investment in synchronous capacity?	Yes, but this is the wrong question. It is not synchronous capacity that is required, but system strength as defined by the AEMC, "inertia" (however it is to be defined), and voltage control services. These services should be procured directly, not via procuring a technology that delivers these services.
5) Do stakeholders consider the rule change provides an appropriate incentive mechanism for existing synchronous generators to make operational decisions to provide synchronous services?	
6) Do stakeholders consider the rule change provides the appropriate locational signals for the provision of synchronous generators to provide synchronous services?	
7) What do stakeholders see as the primary opportunities / limitations of the mechanism as proposed by Hydro Tasmania?	
8) Would the model proposed in the rule change request enable effective competition in the market for the provision of synchronous services?	
9) What suggestions do stakeholders have in relation to the first order changes that would be required in NEMDE to facilitate this proposal and any second order	

changes that may be required as a result of this rule change proposals' implementation?	
Question 12: Section 5.6 – TransGrid – Efficient management of system strength on the power system	
1) Do stakeholders consider that TransGrid's approach addresses all issues related to system strength currently experienced in the NEM?	No. It only considers the transmission system. System strength issues are rife at the distribution level, and they are materially affecting generator connection efficiency there.
2) Do stakeholders consider that a system strength planning standard met by TNSPs would effectively and pro-actively deliver adequate system strength?	Yes, but only at the transmission level. Given that most new generation is now being connected to distribution networks, a system strength effort should include the DNSPs. To ignore system strength on distribution networks is to not recognise that generator connection inefficiencies exist on a much larger scale at distribution voltages. It is at these voltages where the majority of new generation will be connected.
3) Do stakeholders consider TransGrid's proposal will provide useful and timely locational and financial signals to new entrants?	
4) Do stakeholders agree that the 'do no harm' obligations should be removed? a) If so, do stakeholders consider an alternative mechanism is required to regulate or incentivise the minimisation of a new connecting generator's impact on the local network and proximate plant?	
5) What are stakeholder's views regarding generators' being required to make a financial contribution for provision of system strength services?	
6) Would stakeholders be supportive of the ownership of existing private system strength assets being transferred to TNSPs, as suggested in TransGrid's rule change request?	
7) Would the proposed, TNSP-led solution to system strength result in any adverse or unintended consequences for market participants in the NEM?	

CHAPTER 6 – SYSTEM STRENGTH

Question 13: Section 6.1 – Evolving the regulatory definition of system strength	
1) Do stakeholders consider that the AEMC's working description of the effects of system strength, and related problem description of system strength and its components accurately represents all elements of system strength, as experienced in the NEM?	Yes. It is a good definition.
2) If not, are there other components of system strength that the AEMC should	

include?	
3) What measures might be used to define system strength? Is fault level the only measure that can be used practically, or are other measures available?	The use of Fault Level (MVA) assumes that those MVA are being provided by a synchronous machine. It is a short hand for "MVA provided by an electromechanical (spinning) machine". This is not technology neutral. As an aside Fault Level also implicitly assumes electromechanical protection, with the fault current being used to create enough magnetic flux in a piece of electromechanical protection equipment to create a state change. It is suggested that this means of electrical protection may be not be the only available mechanism anymore. As such Fault Level isn't technology neutral. The AEMC definition of system strength is centred on "the voltage waveform". It is suggested that some measure of the waveform and its management should be considered as the metric for "system strength". There is a wealth of tools in signals analysis, amplification and processing that could be drawn upon to create a service-oriented definition of system strength. It would be surprising if Australian electrical power academia were not interested in this meeting this challenge.
Question 14: Section 6.2 – Mechanisms to provide system strength above the essential levels that are necessary for security	
1) Do stakeholders consider the centrally coordinated model, as proposed by TransGrid, is the preferable option for providing system strength above the essential levels required for secure operation?	No.
2) Do stakeholders consider the decentralised, market-based model proposed by HydroTasmania to be the preferable option for providing system strength above the essential levels required for secure operation?	Yes.
3) Could a hybrid of these models be used to deliver system strength above the essential level?	Perhaps, but it would be difficult to keep the two mechanisms from interfering with one another.
4) What do stakeholders perceive to be each model's strengths and weaknesses?	
5) Do stakeholders consider there are other, alternative models for delivering system strength above the minimum levels required for secure operation?	
6) What do stakeholders perceive to be the biggest benefits and risks to introducing a mechanism to deliver system strength above the minimum levels required for secure operation?	• It would compensate synchronous generators for their provision of system strength and allow them to withstand negative energy pricing. Negative energy pricing is going to be increasingly required to create the right investment signals for new generating capacity. At present, negative energy pricing unintentionally degrades system strength by causing existing system strength providers to disconnect. • It would allow for the efficient connection of new generation. • If a system strength service is defined with an implicit synchronous machine bias, then it has

	the potential to damage investment and operational efficiency in the NEM.

CHAPTER 7 – OPERATING RESERVE SERVICE

Question 15: Section 7.1 – Requirement for a dedicated in-market reserve service, mechanism or market	
1) What do stakeholders see as the key drivers or changes in the NEM that could be addressed by introducing an explicit in-market reserve arrangement?	The key driver is the increasing uncertainty of the future operating state of the NEM across all time scales. This uncertainty is driving people to seek capacity to accommodate mispredictions so that the power system continues to operate securely (as opposed to reliably). Reliability becomes higher as generating assets become cheaper to purchase, with no fuel cost, and with distributed connection (requiring less, or no network). But at the same time, and for the same reasons, security is degraded.
2) Do stakeholders' think there is a need for an explicit in-market reserve arrangement in the NEM. If yes, do stakeholders consider the need to be permanent or transitional?	Yes, but it should be transitional. Better prediction of future system state across all time scales is required and should be invested in as a substitute for an in-market reserve mechanism.
3) How would an explicit in-market reserve mechanism or market impact stakeholders? What would be the key benefits and costs? Would it effect stakeholders' operational or investment decisions?	It would degrade efficiency in exchange for certainty. It is a step backwards to pre-NEM times.
4) Do stakeholders see there to be an explicit need for a capacity commitment mechanism as proposed by Delta? Do stakeholders see this as a separate need to an in-market reserve service?	No, the Delta proposal has too many negative side-effects. The Delta proposal should be considered separately from an in-market reserve mechanism. It is much too narrow to consider as a candidate for an in-market reserve mechanism.
Question 16: Section 7.2 – Achieving security and reliability using dedicated in-market reserves	
1) Do stakeholders have views on whether an in-market reserve market or mechanism should solve primarily for reliability outcomes and security outcomes second? Or can this be more effectively co-optimised?	Security outcomes. Please see the answer to question 1 above.
2) How do stakeholders see an explicit in-market reserve market or mechanism interacting with the existing NEM reliability framework? What are the policy design priorities for a new operating reserves arrangement that would deliver the reliability needs of the power system?	
3) How do stakeholders see an explicit in-market reserve market or mechanism interacting with the existing NEM security framework? What are the policy design priorities for a new in-market reserve market or mechanism that would deliver the security needs of the power system?	

CHAPTER 8 – FREQUENCY CONTROL

Question 17: Section 8.1 – Reforms related to the provision of synchronous inertia	
1) Do stakeholders consider that the issues relating to declining levels of synchronous inertia have been adequately and accurately described?	Yes
2) Are there any other issues related to the provision of synchronous inertia that have not been adequately described?	There needs to be a definition of "inertia" formulated in the same style as the AEMC's definition of system strength. Inertia in the power system implies the "moment of inertia" physical quantity. This requires both mass and rotation to make sense. These are both properties of a synchronous machine, which is one type of technology that can provide the (as yet undefined service) called "inertia". Without an AEMC definition of "inertia", it is unclear what it is from a power system perspective. This Consultation Paper implies some relationship between the services of Inertia and FFR, and this does make sense. Both services seem to be about the injection or withdrawal of energy from the power system to maintain the periodicity of the voltage and current sine waves within the FOS. It is suggested that Inertia should operate on the millisecond timescale, while FFR is proposed to operate in the 1-6 second timescale.
3) What are stakeholders' views on the approach to considering the interaction between FFR and inertia in the NEM?	It is agreed that FFR and Inertia are probably the same service, but on different timescales – with FFR being the slower of the two. It would make sense to consider together two new services that are essentially faster Fast contingency FCAS services. This does assume that the definition of Inertia is essentially "very fast contingency FCAS" however.
Question 18: Section 8.2 – Reforms related to frequency control during normal operation	
1) Do stakeholders consider that the issues relating to frequency control during normal operation have been adequately and accurately described?	Yes
2) Are there any other issues related to frequency control during normal operation that have not been adequately described?	It is suggested that an Inertia service could be considered to overlap with a PFR service. There is delineation between FFR and PFR in that FFR is likely to be a contingency service and PFR is not a contingency service. But the nature of physical inertia is that it contributes to any change in sine wave periodicity at all times, but only over short timescales. PFR also does this, but over the next longest time scale, with some overlap. From this perspective it isn't clear how a PFR service and an Inertia service would be neatly separated from one another.
3) What are stakeholders' views on the proposed approach to reforming the process for the allocation of the costs of regulation services (Causer pays)?	All improvements to this calculation are welcomed.
4) Is the level of specification of regulation services in the NER fit for purpose as the power system transforms?	It is suggested that Inertia may be a regulation service, and not a (very fast) contingency service. Adding an explicit Inertia service may be part of the PFR incentive solution.

Question 19: Section 8.3 – Reforms related to frequency control following contingency events	
1) Do stakeholders consider that the issues relating to frequency control following contingency events have been adequately and accurately described?	
2) Are there any other issues related to frequency control following contingency events that have not been adequately described?	
3) What are stakeholders' views on the best way to address the challenges to managing system frequency following contingency events, including reforms to value and reward FFR?	
4) Is the level of specification for contingency services in the NER fit for purpose as the power system transforms?	

CHAPTER 9 – INTERACTIONS BETWEEN SYSTEM SERVICES

Question 20: Section 9.1 Technological and temporal issues for system service provision	
1) What are stakeholders' views on how the arrangements for system services can be developed, to best utilise the capability of both established, as well as new and emerging technologies?	System service definitions should be carefully formulated to avoid any implicit technology prescriptions. The AEMC's definition of system strength is well formulated in this regard. Where this is done, it • Provides some scope for existing deployments to be refit to deliver a new service – particularly where a software-only refit to an inverter-based generator is possible • Allows researchers and engineers to identify technology that is able to deliver the service without being unnecessarily constrained by implicit assumptions on the technology that may be delivering the service.
2) Do stakeholders have any initial thoughts on how the arrangements for system services can be best coordinated over dispatch, commitment and investment time frames?	The AEMC's structuring of this co-ordination in Figure 3.1 is a solid beginning. New rule changes and services should be considered under this structuring as a way to identify overlapping proposals, and service formulations. This is a challenge however. It seems that there will be a significant number of new services required. Encapsulating each service precisely, so as to avoid broad interactions between the services will be important in limiting side effects from overlapping services.
Question 21: Section 9.2 – Aheadness and commitment	
1) Do stakeholders agree with the characterisation of arrangements for aheadness and commitment, including the potential benefits?	
2) What are stakeholders' views on the potential downsides of	

introducing arrangements for commitment of capability ahead of dispatch?	
3) Are there alternative arrangements that can reduce the increasing uncertainty associated with power system operation in the NEM?	
Question 22: Section 9.3 – Cost recovery arrangements	
1) What are stakeholders' views on the appropriate approach to cost recovery for each of the system services discussed in this paper?	
2) In each case, how can the cost recovery arrangements be developed to lower the overall costs of the NEM?	
Question 23: Section 9.4 – Implementation considerations	
1) What are the challenges or implications associated with implementing proposed arrangements discussed in this paper?	
2) What are stakeholders' views on the prioritisation or staging of the reforms to address the issues discussed in this paper?	