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18 December 2025

Ms Anna Collyer
Chair, Australian Energy Market Commission
Level 15, 60 Castlereagh St
Sydney NSW 2000

Reference: ERC0359 & ERC0360

Dear Ms Collyer,

AEMO submission to consultation paper – Optimising contingency size in dispatch and Allocating FCAS contingency costs

AEMO appreciates the opportunity to submit to the Consultation Paper on Grids Energy's proposed changes to the National Electricity Rules (NER) to explicitly require optimisation of contingency size and to allocate FCAS contingency costs by runway settlement.

Regarding settlement, the current allocation of FCAS contingency costs on energy ("socialised allocation") is a weak interpretation of the "causer pays" philosophy, as costs are mostly recovered from assets who do not cause the cost. This allocation does, on occasion, distort energy market offers, resulting in inefficient dispatch and raised energy prices. Grids Energy's rule change provides an opportunity to investigate alternatives that could be more efficient and better aligned to the "causer pays" philosophy.

Runway settlement is a well-known alternative used elsewhere. While it may offer an improvement on the status quo, thorough theoretical and empirical analysis is necessary to determine its: (1) suitability to the transitioning National Electricity Market (NEM), (2) efficiency and market integrity implications, and (3) consistency with "causer pays". Where a case for change is demonstrated, the next stage will be to assess implementation options.

The paper is reluctant to allocate costs to networks where it would result in direct pass-through to network customers and has suggested excluding network contingencies out of scope of runway settlement. However, network contingencies are a very large causer of FCAS requirements. There appear to be more appropriate sources of funding these components aside from simple pass through to customers via regulated charges, but this also requires detailed analysis and consultation.

With respect to contingency size optimisation in dispatch, AEMO agrees this concept should be considered jointly with runway settlement. Optimisation can result in superior dispatch outcomes and, as the paper recognises, is already used where it is practical and beneficial. This is expected by the existing NER 3.8.1 (Central Dispatch) principal of maximising the value of trade, and, as such, AEMO considers the existing NER adequate.

AEMO's Network Constraint Formulation Guidelines (NER 3.8.10(c)) describes which contingencies are presently optimised. These guidelines are periodically consulted. AEMO encourages stakeholders who feel there are additional opportunities for optimisation to engage with those consultations.

It is not possible to optimise every contingency and even Grids Energy's rule proposal allows exceptions. AEMO considers there will continue to be many situations where optimisation is impractical or unlikely to be beneficial. In fact, the incentives created by the existing socialised allocation itself can undermine optimisation if AEMO were to use it more widely. Thus, addressing the settlement issues may lead to more use of optimisation.

With respect to the priority of these matters in the overall reform agenda, AEMO notes mixed drivers in the transitioning power system. AEMO agrees with the Paper's contention that large scale batteries are providing new low cost FCAS supply, but this is occurring in parallel with the closure of traditional suppliers. AEMO expects EnergyConnect will resolve most cases of local South Australian FCAS requirements, a major cause of historical FCAS costs. However new large contingencies may also emerge from data centres, Renewable Energy Zones (REZ) and from the batteries themselves.

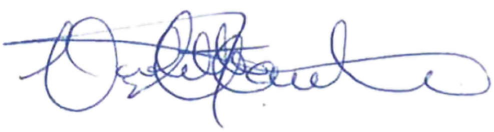
Grids Energy's rule proposal presents an opportunity to consider these matters in detail. Given the complexity of the existing issues in contingency FCAS allocation, the proposed solution and its design choices, it will be important to provide adequate time for analysis and consultation. This work may benefit from expert advice and a technical working group. A thorough process may require additional time than set out in the AEMC's current timetable.

Should a thorough process see merit in reform to FCAS recovery, AEMO will need sufficient lead time to implement the necessary procedures and system changes and for industry to understand its new commercial exposures.

Recovery of FCAS costs under NER 3.15.6A(f) contains prescriptive formulae. Should a reform be promoted, AEMO anticipates the NER maintaining this level of prescription.

The attached submission expands on these issues in further detail. Should you wish to discuss any aspect of our submission, please contact Hannah Heath, Group Manager, Strategic Market Reform (Hannah.Heath@aemo.com.au).

Yours sincerely,



Violette Mouchaileh
Executive General Manager, Policy & Corporate Affairs

ATTACHMENT – Detailed submission

Note in this submission AEMO has replaced the term "runway pricing" with "runway settlement".

Question 1: Is there a substantive problem or evidence of an emerging one?

> *Do you consider that the current allocation of contingency FCAS costs leads to a material loss of market efficiency?*

The current socialised allocation of contingency FCAS costs in the NEM is based on a proportional recovery method, where costs are distributed according to metered sent out energy or consumed energy at each connection point. The allocation of raise FCAS contingency costs to all exported energy and lower costs to all imported energy is only loosely linked to the "causer pays" philosophy, presumably emerging from historical participant classes of Generators and Market Customers. The contemporary NEM's bidirectional character has largely rendered this allocation obsolete.

By socialising the cost, rather than allocating costs privately to the participant that represents the largest contingency, decisions by that participant to maximise private profit may lead to an overall loss in market efficiency. Anecdotal examples of this are:

- Assets that form the largest contingency for which FCAS must be purchased do not internalise the marginal cost of this in their own operational decisions.
- When FCAS prices reach high levels, energy exporting assets are observed to raise energy offer price to include the proportional effect of the FCAS socialised allocation. This then inefficiently impacts energy dispatch and prices without resolving the cause of the high FCAS prices.

To assess the materiality of this problem, empirical analysis should be performed. Specifically:

- The relationship between FCAS prices and largest contingency profit margins can be used to estimate the net loss in market efficiency.
- Allocating FCAS costs privately to the largest dispatchable contingency allows the dispatch engine to optimise for generator profits and reduce FCAS costs. Any net loss calculated would provide an estimate of the loss in market efficiency.
- Identifying the relationship between high FCAS prices and resulting high energy prices due to the incentives created by socialised allocation and determining to what extent energy prices had been inefficiently raised.

This empirical approach will help quantify the efficiency loss under current arrangements and the potential gains from reform. It may also inform how to complete market modelling for a full cost benefit assessment.

> *Is there evidence of an emerging problem?*

AEMO notes mixed drivers as to why the issue may both increase and reduce over time.

The following drivers *increase* the significance over time of FCAS contingency costs:

- The largest historical supplier class of contingency services was coal-fired steam plant, which will decline with periodic de-commitment and closure.
- Data centres with contingency sizes greater than the largest existing load contingency are expected to connect in coming years.

- Storage charging contingency sizes greater than the largest historical load contingency are emerging[1].
- Radial Renewable Energy Zones (REZ) configurations are expected to introduce large supply contingencies greater than the largest existing supply contingency. Further discussion on REZ is included at Q6.
- Marinus Link may create a larger contingency than Basslink.

The following drivers *reduce* the value over time of FCAS contingency costs:

- One of the largest historical causes of high FCAS costs, risk of South Australia separation constraints, are expected to become rare with completion of EnergyConnect. This project results in four Alternating Current (AC) lines between South Australia and the other regions. Dual AC line configurations will continue to exist into and within Queensland.
- The rapid adoption of large-scale Battery Energy Storage Systems (BESS), and to a lesser extent, Virtual Power Plants (VPP), in widespread locations and with diverse ownership will provide large volumes of new and highly competitive supply of contingency FCAS.

Thus, there are mixed drivers as to the priority of addressing this issue. To assist the AEMC's consideration, it would be beneficial to engage some forward-looking modelling of these drivers regarding future FCAS market dynamics.

Question 2: Will contingency size optimisation address the issue raised by the proponent?

Do you consider that contingency size co-optimisation will address the issue identified by the proponent? Are there other factors or solutions that should be considered?

Contingency size optimisation can, in some circumstances, be beneficial. Where there is a linear relationship between a dispatchable unit or interconnector and an FCAS requirement, by allowing the dispatch engine to co-optimise the size of the largest credible contingency, units can offer their true marginal cost, and economic dispatch will ensure that a generator is only dispatched if its profit margin is sufficient to justify the associated FCAS expense. This means dispatch occurs on a fully economic basis, maximising the value of trade and supporting overall market efficiency.

AEMO already optimises contingency size where it is practical and clearly beneficial to do so, which mostly arises in local, rather than global, FCAS requirements. Co-optimisation is discussed in the consulted Constraint Formulation Guidelines (CFG)[2].

There are, however, many limitations to co-optimisation's practicalities and benefits which has led to it not being universally implemented. These include:

- In Very Fast (or "1 second") FCAS, the relationship between the largest unit on-line and the resultant quantity of purchased FCAS is not 1:1 linear. The requirement is set by the largest contingency multiplied by a non-linear ROCOF coefficient that is determined real-time from contemporary system inertia.

[1] For example Snowy 2.0's 366MW units

[2] See 5.9 of https://www.aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2022/cfg-and-scvpf/final/constraint-formulation-guidelines-v12---final_.pdf

- Co-optimisation is only possible with variables dispatched by the NEMDE, which are typically large generators and interconnectors. Existing load contingencies, for example smelter potlines, are non-scheduled and therefore unavailable. This is further discussed at Question 3.
- Aggregated stations cannot be readily co-optimised as dispatch is shared among physical units determined by the participant. For example, the largest South Australian and Tasmanian generator contingencies arise within aggregated stations. This is further discussed at Question 3.
- For the majority of time, the marginal cost of global FCAS contingency services is lower than the marginal energy profit of the largest dispatchable supply contingency, meaning that if it were co-optimised, the same dispatch would most often result.
- Where the marginal cost of FCAS does exceed the marginal energy profit of the largest dispatchable supply contingency, the benefit of its co-optimisation may be undermined by socialised allocation of FCAS costs. This is because the largest dispatchable contingency is not exposed to the marginal cost of FCAS, but more likely a smaller cost after sharing with other suppliers. The resulting behavioural incentive is for the spot trader to defeat co-optimisation by offering an energy price lower than its own true marginal energy cost. This would be addressed by runway settlement. This is further discussed at Question 4.

Question 3: Will runway contingency FCAS cost allocation address the issues identified by the proponent?

Do you consider that runway contingency FCAS cost allocation will address the issue identified by the proponent? Are there other factors or solutions that should be considered by the Commission when considering this?

Are you aware of any issues associated with the practicality of applying runway pricing to large loads? What load threshold should be applied?

Are you aware of any approaches or methods that could be used to extend contingency FCAS cost allocation frameworks to incorporate network events in a way that enhances cost reflectivity?

The proponent has identified that under current arrangements, contingency FCAS costs are socialised across all generators and loads, diluting the incentive for the largest contingency generator to factor FCAS costs into its bidding and operational decisions. This can lead to inefficiencies in dispatch and higher overall system costs.

Runway settlement addresses this issue by moving toward a private cost. Under runway settlement, the largest supply contingency is allocated a marginal FCAS cost that its output imposes on the system. This creates a stronger incentive for the supplier to bid at marginal cost, knowing that its profit margin must be sufficient to cover both energy and FCAS costs. As a result, economic dispatch will only occur when it is genuinely profitable to do so, supporting efficient market outcomes.

However, despite these theoretical attractions, there are practical and technical matters that would need to be considered, some of which are unique to the NEM. AEMO has listed some matters below for the AEMC's consideration.

Aggregated Stations: Some generators are represented by aggregated Dispatchable Unit IDs (DUIDs) in dispatch. For runway settlement these aggregated units would need to be disaggregated so that FCAS costs can be accurately allocated to the physical units according to their contingency sizes.

Loads: Storage charging is subject to bidirectional dispatch. Implementation is likely to be similar to that of a scheduled generator. As has already occurred in the WEM, which led to application of runway settlement to loads, instances of large storage charging is expected to set the largest load contingency in the short-medium term in the NEM.

Most other flows from the grid are however not scheduled and therefore do not have DUIDs nor submit bids. As such the dispatch engine cannot co-optimise them. However:

- It may still be appropriate to apply runway settlement to large unscheduled loads for equity and dynamic efficiency benefits (see question 4).
- Under the incentives of runway settlement some unscheduled loads may explore unilaterally reducing load in response.
- Under the incentives of runway settlement, some loads may consider registering as scheduled to facilitate efficient co-optimisation, such as data centres with controllable standby generation. There are other policy discussions underway on the broader benefits of greater visibility and market participation of large loads, and the incentives of runway settlement appear consistent.

That being said, implementing runway settlement for customers would likely involve a significant task in terms of identifying the correct metering data to apply, which would need to be considered when assessing the net benefits case for change.

Minimum Thresholds: For both supply and load, there is likely to be a minimum threshold beneath which there is little benefit in calculating specific runway settlement. This would need to be lower than the smallest contingency that would likely ever set an FCAS requirement, and lower than a level that would result in a material discontinuity at the threshold boundary.

Below that level the existing socialised allocation could be used, noting there is also a theoretical argument for complete exemption where the size is smaller than that AEMO assumes for load relief.

These matters deserve detailed theoretical and empirical study.

Networks: The consultation paper indicates a reluctance to allocate runway settlement to networks where it would result in a direct pass through to customer network charges. The paper does not explain how these network contingency costs would be recovered were they excluded from runway settlement. If the costs were to continue to be recovered in the current socialised manner, it may undermine the theoretical attractions of equalising marginal private and social cost for those subject to runway settlement.

For network contingencies where co-optimisation is applied, economic dispatch will ensure that the energy revenues achieved by the network flow (which must be matched by FCAS) are greater than the cost of FCAS required to support that flow. This means there should be sufficient settlement revenue to pay for the FCAS costs associated with network events, provided the co-optimisation is correctly implemented. It can be demonstrated that, in practice, inter-regional energy settlement surpluses are generally adequate to cover FCAS costs when network flows are optimised alongside FCAS requirements. These surpluses would otherwise be allocated to settlement distribution units, or mis-priced (in energy) dispatchable units if one is also co-optimised alongside an interconnector term. Thus, there may be other more appropriate revenue sources to fund the inclusion of networks in runway settlement without reverting to network pass through.

Marginal dispatch incentives for second, third-largest contingencies: Runway settlement and co-optimisation aligns the dispatch and profitability of the largest contingency. However, this principle does not apply for lesser contingencies in the runway, who are not co-optimised.

In some cases, runway settlement may inefficiently encourage units smaller than the largest sized contingency to bid higher than marginal cost to reduce private exposure to runway settlement. This would raise total energy dispatch cost without reducing total FCAS cost.[3]

This over-signalling by runway settlement is evident upon contingencies with a size close to, yet below, the largest contingency. It quickly declines along the runway to the smaller contingencies.

Meanwhile it should be recognised that the status quo of socialised settlement also leads to inefficient bidding incentives upon all participant when FCAS prices are high. These two forms of incorrect signalling of lesser contingencies require empirical comparison.

Further discussion of existing arrangements and the need for both runway settlement and co-optimisation will be addressed in response to Question 4.

Question 4: Do stakeholders consider the two rule changes to be complementary?

> *Do you consider contingency size co-optimisation and runway FCAS cost allocation to be complementary mechanisms that work together or substitute mechanisms which aim to achieve the same outcomes via different methods??*
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> *What is your understanding of the interactions between these two mechanisms, should they be implemented together?*
>
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>
> *Do you have any views on how to manage the potential risks to market integrity?*
>
> *How should the limits on contingency size optimisation issues be expressed to avoid market integrity risks?*

The two concepts—runway settlement and contingency size co-optimisation are best considered together, and where practical the concepts implemented simultaneously. However, only the settlement aspect requires a rule change – see Question 7.

Runway settlement without co-optimisation

To obtain dispatch efficiencies without co-optimisation requires participants to modify behaviour in response to changing FCAS prices and runway cost allocations in an imperfect and unpredictable manner. By analogy, this is observed when generators presently rebid energy prices higher according to their shares of socialised FCAS costs.

Western Australia was initially unable to co-optimise its spinning reserve FCAS due to its legacy ancillary service arrangements. Nevertheless, runway settlement was implemented during this time due to its equity and dynamic efficiency benefits. In this vein, runway settlement may still have merit for non-co-optimised assets where co-optimisation is not possible.

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[3] AEMO can provide a worked example of this upon request.

Co-optimisation without runway settlement

As also discussed at question 2, co-optimisation alone will not work efficiently if the largest supplier or load is not privately exposed to the marginal cost of FCAS. In such cases, the supplier can distort an offer price below its true marginal cost, causing the dispatch engine to incur inefficient socialised FCAS costs to maximise its own private profits.

From Question 1:

> *Do you have any views on how to manage the potential risks to market integrity?*
>
> *How should the limits on contingency size optimisation issues be expressed to avoid market integrity risks?*

The following considers these questions in the context of the combined concepts. It appears the term "market integrity" refers to the possibility that changes to market rules could undermine the proper functioning, fairness, or stability of the electricity market. However, it is important to distinguish between genuine risks to market integrity and wealth transfers that are well understood and telegraphed. It is also worth comparing these concerns against the status quo, where in some cases large FCAS costs can create similar concerns.

Alignment of price signals and incentives: the proposed reforms—runway settlement and co-optimisation—appear to better align price signals and incentives with the true costs imposed by participants. Socialised allocation seems more likely to distort incentives, resulting in inefficient dispatch and investment. By exposing the largest contingency supply or load to the actual cost of FCAS, the proposals should encourage efficient bidding and operational decisions.

Financial volatility and exposure: while runway settlement and co-optimisation do provide sharper financial signals to some parties, this does not necessarily create unmanageable risk. Large contingency assets have ability to manage their exposure, either by having their output adjusted by NEMDE, rebidding, or procuring FCAS from other sources (such as batteries or other DUIDs within their portfolio). Moreover, the implementation timeline would provide opportunity for participants to adapt their strategies, mitigating the risk of sudden, deleterious effects.

Allocation of co-optimised network events: Under runway settlement, it may be possible for the cost of network events to be allocated to interconnectors rather than suppliers or loads in the affected regions, as opposed to the current approach which can on occasion allocate surprisingly high costs upon parties who are not responsible for causing them.

Electricity contract market liquidity: concerns about reduced contract market liquidity are not necessarily indicative of a market integrity risk. If an outcome of the two concepts is that a large contingency asset sells fewer energy contracts, this is not necessarily inefficient, analogous to how generators already consider congestion and forced outage risks when determining hedging volumes and trading strategies. The hedging market would then prefer, at the margin, suppliers who impose less FCAS costs on the spot market. Furthermore, a generator that is the largest contingency may choose to buy an FCAS instrument from another provider or instead use another DUID in its portfolio to supply the required FCAS.

Note also that in socialised allocation during extreme FCAS prices it is typical for participants to be directly exposed without hedges. In turn, generators are observed to reduce output to reduce exposure to FCAS costs in a way that would undermine their hedged energy positions.

Hedging FCAS: The common-clearing price FCAS design is intended to support the ability of participants to hedge. Whilst for the most part FCAS exposures do not justify developing hedging instruments, there is public evidence that it can be done[4].

Whilst such arrangements are theoretically feasible, it is not essential for participants to hedge FCAS where the volatility can be managed in other ways, such as through contingency size co-optimisation or sourcing FCAS revenue within a varied portfolio.

Confidence in market outcomes: Transparent settlement linked to the marginal causer of FCAS requirement does not seem likely to undermine confidence in market outcomes. In general, one would expect the reverse to hold.

In theory at least, when combined, the concepts appear to improve market efficiency without undermining integrity. Risks appear to be manageable by participants and replace risks in the current arrangements.

Importantly, the reforms should be implemented with sufficient lead time to allow market participants to adapt, ensuring that any transfers of wealth do not become deleterious.

While the concepts have theoretical attractions, they require careful design and a resolution for runway settlement of co-optimised network events. There will also need to be retention of ways to recover costs of FCAS where runway funding cannot be readily determined, for example for non-co-optimised network contingencies, or where energy settlements are reduced due to RRP capping or scaling, and yet the FCAS prices are not.

Question 6: What are your views on the costs, benefits, and risks of the proposed solution

> *Do you agree with the costs and benefits of the package of proposed rule changes as put forward by the proponent?*

The proponent identified several benefits of the proposed rule changes, including improved market efficiency, more cost-reflective allocation of FCAS costs, better investment signals, and enhanced system resilience. By ensuring that FCAS costs are allocated to those participants whose actions drive those costs, the reforms are expected to incentivise efficient bidding and operational decisions, potentially reducing overall FCAS volumes and prices.

On the cost side, the proponent acknowledged that implementation would require changes to AEMO's dispatch systems and market processes, introducing additional complexity and some financial risk—particularly for participants exposed to large contingency events. However, the proponent's overall assessment was that these costs would be outweighed by the long-term benefits, especially if the reforms are introduced with sufficient lead time for participants to adapt.

While noting the proponent's general assessment, AEMO would add:

- A robust settlement solution should be investigated for co-optimised network constraints as these drive substantive FCAS costs at times. It would be beneficial if these costs were allocated under runway settlement to the interconnector being co-optimised, rather than to supply or load in the region. For this reason, it would be beneficial to keep network contingencies in scope.

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[4] See for example these arrangements [2010 Frequency Control Ancillary Services (FCAS) Investigation | Office of the Tasmanian Economic Regulator]

- AEMO will need to complete a high-level implementation assessment before the full costs and delivery timetable can be identified. This assessment would likely be undertaken around the Draft Determination stage should the AEMC determine there are sufficient theoretical benefits to recommend progression.

Further investigation of benefits is required to determine value improvements in market efficiency. This could include back-casting of settlement and dispatch results and modelling of the arrangements with the future technology mix.

AEMO recommends allowing sufficient time to undertake this analysis given the complexity of the matters under consideration, the scope of possible implementation work and its non-urgent nature. A longer timeframe than the currently proposed Draft Determination in March 2026 would provide the opportunity for AEMC to engage expert theoretical and modelling advice on these difficult matters, potentially supported by an industry working group such as it has successfully convened with other technically complex matters.

In summary, while the proponent's assessment of costs and benefits is reasonable, further empirical analysis and implementation planning are needed to fully understand if the reforms would deliver these.

How do you see the change in the contingency risk profile of the NEM affecting costs and benefits over the course of the transition?

At question 1, AEMO noted mixed drivers towards both increasing and reducing risk profiles as the power system transitions. A likely increase in the contingency risk profile relates to large, radial REZs or Designated Network Assets (DNAs).

It expected that such a REZ will connect via a large double circuit connection to the shared grid. A large contingency size is relevant when:

- The REZ has been classified as a single contingency, for example due to a line outage or lightning.
- With both circuits in service, the system must maintain "resecure reserves" such that upon loss of one, the system can replace a reduction in REZ output to its single line limit within 30 minutes. This will require a form of dispatch or service that is yet to be developed. However, an efficient allocation of its costs would parallel those of the efficient allocation of FCAS contingency costs.

This has the following implications for this project:

- Dispatch efficiency using co-optimisation. As contingencies become network dominated, co-optimised dispatch could compare energy value on the REZ/interconnector path against costs. When FCAS scarcity drives up prices, co-optimisation could curtail flows (i.e. by constraining suppliers on the REZ).
- Risk allocation using runway pricing. If co-optimised network constraints are well integrated into the solution, runway pricing can allocate contingency FCAS costs to the interconnector/REZ flow that sets the requirement. Such costs would not be passed onto broader customers through regulated charges. For example, they could be:
    - Passed onto the REZ who would presumably recover from contracted REZ users; or
    - Allocated to REZ users directly by AEMO, in proportion to their share of supply into the REZ at the time.

- Dynamic effects for planning & system operations. Quantifying and monitoring these costs enables planners and operations to better choose connection designs and operational strategies. This could support more accurate REZ sizing and makes the benefits of additional circuits visible.
- Dynamic effects for risk management. As contingency risk migrates toward network flows, the primary financial exposure also shifts. Under cost reflective allocation, the entities driving the flow (REZ) face FCAS/reserve costs with options to manage them: reduce flow, rebidding, or procuring FCAS competitively (e.g., from batteries or portfolio DUIDs).

Question 7: Assessment framework

Do you agree with the proposed assessment criteria? Are there additional criteria that the Commission should consider or criteria included here that are not relevant?

The proposed assessment criteria are broadly appropriate for evaluating the rule change proposals.

As noted earlier, it would be worthwhile the AEMC engaging expert theoretical and modelling advice on the options and benefits of runway settlement and FCAS co-optimisation.

While the proponent's proposal and the AEMC consultation paper suggest clarifying or extending the co-optimisation obligation in the Rules, the current framework already allows AEMO to co-optimise contingency size and FCAS requirements under appropriate conditions. The AEMC could review whether the proposed rule change has any substantive legal effect.