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Ben Hiron
Australian Energy Market Commission
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Dear Ben

Submission: Draft Determination on Fast Frequency Response in the National Electricity Market

CS Energy welcomes the opportunity to provide a submission to the Australian Energy Market Commission's (**AEMC's**) *Draft Determination – Fast Frequency Response in the National Electricity Market (Draft Determination)*. CS Energy is strongly supportive of the creation of mechanisms that appropriately value services that are critical to the effective and efficient delivery of secure and reliable energy into the future.

About CS Energy

CS Energy is a Queensland energy company that generates and sells electricity in the National Electricity Market (**NEM**). CS Energy owns and operates the Kogan Creek and Callide B coal-fired power stations and has a 50% share in the Callide C station (which it also operates). CS Energy sells electricity into the NEM from these power stations, as well as electricity generated by other power stations that CS Energy holds the trading rights to.

CS Energy also operates a retail business, offering retail contracts to large commercial and industrial users in Queensland, and is part of the South-East Queensland retail market through our joint venture with Alinta Energy.

CS Energy is 100 percent owned by the Queensland government.

Key recommendations

The NEM is changing and will continue to do so as it transitions to a market with more variable renewable energy (**VRE**) and an overall lower carbon footprint. The ability to effectively and efficiently manage power system security and reliability against this evolving landscape is paramount, and CS Energy supports the need to develop flexible and adaptive market and regulatory frameworks for essential system services.

CS Energy maintains its concern that the processes underway by the AEMC and the Energy Security Board (**ESB**) on system services may lead to a series of incremental layers over current mechanisms, the complexity of which will risk efficient and effective outcomes for consumers.

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With respect to the Draft Determination, in CS Energy's view the lack of a holistic assessment of all frequency control services and associated frameworks risks the development of a mechanism that is less likely to be fit-for-purpose as the NEM evolves. CS Energy recommends the AEMC:

- Bring forward the review of the Frequency Operating Standard (**FOS**) to develop operational metrics that capture the changing system dynamics, thereby establishing the baseline need for Fast Frequency Response (**FFR**) as well as inertia and Primary Frequency Response (**PFR**);
- Lay the groundwork for efficient long-term solutions that will be flexible and adaptive to future needs; and
- Progress frameworks to value inertia and PFR in parallel to FFR. As acknowledged in the Draft Determination, there is no urgency for the implementation of FFR mechanisms. However, FFR, while distinct from inertia and PFR, is highly interrelated with these services. A holistic approach would facilitate the development of market frameworks that suitably unpacked and valued these interactions, potentially making their implementation more efficient. This will also reflect the AEMC's current work to shift from frameworks that are technology focused to ones that are services focused.

Only when these have been determined should the development of the appropriate technical specifications and requirements occur.

Responses to the specific questions

CS Energy's responses to the specific questions in the Draft Determination are set out in Attachment A.

If you would like to discuss this submission, please contact Henry Gorniak (Market and Power System Specialist) on 0418 380 432 or hgorniak@csenergy.com.au.

Yours sincerely



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ATTACHMENT A

Introduction

The characteristics of the power system are changing with increased VRE and the resultant dynamics can impact the suite of corresponding physical requirements for secure and reliable operation. The need to review and potentially redefine frequency control arrangements in the NEM as the power system evolves has been acknowledged both within this consultation and the AEMC's broader 2018 *Frequency Control Frameworks Review*. Notably, it is largely agreed, including by CS Energy, that there are missing markets for frequency control services that have either not been valued to date or are emerging as a new requirement. In the case of the former, the services have continued to be expected for secure operations and have not had a proper assessment of their actual value nor potential incentives for investment in the right mix of capability.

This Draft Determination focuses explicitly on the need to value faster forms of frequency response. Whilst CS Energy agrees with the differentiation between FFR and inertia, and the AEMC's reiteration that FFR and inertia are not interchangeable or substitutable, CS Energy also notes that these services are interrelated, and the value of inertia needs to be acknowledged on a stand-alone basis. Irrespective of this distinction, FFR can be delivered by existing synchronous plant that currently represent a portion of the existing 6-second Frequency Control Ancillary Services (**FCAS**) markets. For example, a steam turbine can deliver around 25% of its 6-second capability in the proposed FFR 2-second duration and in addition to PFR. It will be important for these capabilities to be properly captured in the development of any market arrangements. This existing capability can assist in the transition to new technologies such as simulated or synthetic inertia which requires further work to understand advances in processing times.

The Draft Determination proposes to value FFR by establishing it as a separate Market Ancillary Service (**MAS**). This is one example of meeting power system requirements and challenges as the NEM evolves and is likely to set a precedence in addressing missing markets for frequency control. As this service is expected to be one of several, it will serve as an enabler and provide confidence that the power system can transition to a new operational paradigm via appropriate market frameworks. To this end, quantification and specification of the proposed services should provide forward investment signals. It is crucial then that the Draft Determination reflects the most effective and efficient approach to valuing frequency control services.

Market ancillary service arrangements for FFR

CS Energy agrees that spot market procurement for frequency control services is preferable but reiterates its concerns about the lack of a holistic approach in developing these market frameworks. To CS Energy's knowledge, there has been no strategic exploration of system services by the ESB since the FTI report in mid-2020, which itself was high-level. Instead, the roadmap proposed by the ESB is limited to the rule change requests submitted by industry.

It is incumbent on the AEMC to ensure that a strategic review is not overlooked, as it could avoid the incremental layering of mechanisms which will add complexity and inefficiency. CS Energy is not convinced that the Draft Determination reflects the most effective outcome.

Process of determining mechanism

CS Energy has the following concerns about the process by which the Draft Determination has proposed the addition of raise and lower FFR markets to overlay the existing FCAS markets:

- **Options development** - The AEMC requested technical advice from the Australian Energy Market Operator (**AEMO**) based on three predetermined options. That is, the “solutions” had been proposed and therefore AEMO’s advice was necessarily limited on to which of the three options suited best from an operational perspective.

Efficient market and regulatory frameworks are best developed via a holistic approach that diligently examines both the underlying operational needs as well as economic considerations.

In this context then, AEMO would have ideally quantified the need for the service based on a clear operational metric to then feed into the development of potential mechanisms;

- **Examination of existing markets** - There has been no assessment on whether the current six raise and lower contingency markets are appropriately defined both within the context of FFR and separate services. In its advice, AEMO even explicitly states its analysis is “*assuming that an FFR product is specified in keeping with this design*”.¹ This is discussed further below;
- **Holistic approach** – While CS Energy agrees with the distinction between inertia and FFR, any assessment of frequency control mechanisms needs to explicitly consider the contributions of all forms of frequency control. For example, as per Energy Australia’s submission to the Directions Paper,² any potential mechanism to value inertia will impact on the need for FFR, and therefore is a key input into any cost-benefit assessment.

In CS Energy’s view, in order to develop new market frameworks further planning and understanding needs to occur as follows, prior to the development of procurement, pricing and payment mechanisms:

1. Operational metrics

As a first step, the AEMC and Reliability Panel must understand and quantify the need via an explicit operational metric; CS Energy has previously stated its concerns on the absence of a power system standard based on the rate of change of frequency (**RoCoF**) as a transparent guide to the procurement of FFR and inertia that is already quantified by AEMO. Furthermore, given it appears that AEMO will be implicitly basing FFR procurement volumes on RoCoF,³ making it explicit should be relatively uncontroversial. Such a standard would also allow the need for FFR to dynamically vary based on system conditions and the level of inertia, thereby abating concerns of over-procurement at times of higher system inertia.

Clarifying expectations in the FOS needs to occur to provide transparency to the market of this operational metric and provide the ability to assess the system’s performance against it. For example, the lack of a metric for how frequency should be managed within the Normal Frequency Operating Band (**NOFB**) has been a source of contention for PFR.

¹ AEMO, Advice to the AEMC on *Fast Frequency Response Implementation Options*, April 2021, p.23

² AEMC, Fast frequency response market ancillary service, Draft rule determination, 22 April 2021, p.29

³ AEMO, *Op cit*, p.14

In terms of frequency control following contingency events, the key requirements arise from the FOS where *containment*, *stabilisation* and *recovery* services are delivered in response to a contingency event (credible or non-credible). If the proposed 2-second FFR is deemed as a very fast response and provides the containment component, ambiguity on the role of the 2-6-second fast response arises. Should it still be containment also or part of the stabilisation response? This is confused further by the discussion on the name of the proposed FFR service where the Draft Determination's Table 4.1 lists it as separate to the arresting 6-second service.

2. Review existing FCAS arrangements alongside FFR

This review should consider whether the current six raise and lower contingency markets are appropriately defined and whether the markets for secondary and tertiary frequency control should be examined and specifications updated if required. This will be underpinned by the development of the standards above to first identify minimum quantities and the relevant suite of services required to meet the current, evolving and future power system requirements.

As discussed in CS Energy's submission to the ESB P2025 September consultation, the containment, stabilisation and recovery envelopes present a baseline to reconcile the requirements to meet the FOS with the current and expected technology capability mix. There may need to be fluidity in these envelopes to meet the operational and economic needs.

In its advice, AEMO also indicated the potential for consolidating the 6-second and 60-second services.⁴

3. Challenge existing concepts

The rationale for the proposed FFR arrangements appears to be based on the perceived ease of implementation relative to other options. Given the transformational change underway, the market cannot shy away from solutions that may have greater short-term complexity if they represent more effective longer-term solutions.

The power system is becoming more dynamic and complex necessitating changes in the way both market participants and AEMO are expected to perform as part of their roles. In this respect, some of the arguments posited in the Draft Determination, in CS Energy's view, need to be challenged particularly those around registration and constraint determination.⁵

In CS Energy's view, some of AEMO's cost concerns overlook that the tasks represent what AEMO is chartered to do, with the associated commentary on costs in the Draft Determination effectively representing "the cost of doing business". For example, Market Ancillary Service Specification (**MASS**), Generator Performance Standards and constraints are core functions of AEMO.

⁴ AEMO, *Op cit*, p.53

⁵ AEMO, *Op cit*, p.23

Technology versus service neutral

While CS Energy agrees that inertia and FFR are different services and thereby shouldn't be contained in the same MAS, all frequency control services should be valued and have equal treatment in the development of relevant mechanisms. The development of FFR markets is non-urgent as stated in the Draft Determination and supported by the fact that AEMO first identified its utility in 2017 but is not the proponent of the rule change request. The development of market arrangements for FFR should be progressed in parallel with those for inertia and PFR.

CS Energy acknowledges that the AEMC is progressing the PFR incentivisation rule change in the coming months and has referred to the ESB's work on inertia markets. In the case of the latter, this has not had any attention and has effectively been earmarked as a longer term rather than immediate priority.⁶ These services, while not subject to the same market arrangement, are so interrelated that they cannot be progressed in disparate processes. Reiterating CS Energy's comments that were cited in the Draft Determination:⁷

- PFR is delivered upstream of the contingency FCAS as part of the sequential delivery or withdrawal of energy provided by PFR, FFR and other contingency services. These cannot be ignored from a holistic perspective based on the service that is being delivered.

It is anticipated that the current Mandatory PFR (**MPFR**) survey will unveil a preference for technology capability as the determinant of the PFR deadband settings rather than the universal ± 0.015 Hz deadband setting for generators subject to any variations or exemptions. AEMO's advice to this consultation indicated confidence that individual plant can manage the interaction between the provision of FFR and PFR, particularly through the application of variable droop settings. At present however, there is a conflict in the provision mechanisms for FCAS and that of MPFR where headroom (raise) and footroom (lower) is not mandated, affecting the ability to effectively coordinate services;

- Inertia, while physically different to FFR, also acts to slow RoCoF following a contingency event and AEMO's advice acknowledged the value of synchronous inertia.⁸ Any procurement of FFR whether by a RoCoF standard or co-optimisation with inertia cannot be efficiently performed without explicitly valuing inertia.

CS Energy is concerned that the Draft Determination considers the benefits of FFR with the underlying premise of low inertia, stating an efficiency gain through reduced procurement of R6/L6 services. This is a static assessment with no consideration of how this efficiency gain may change under different system conditions and as noted above, how this may be impacted by the explicit valuing of inertia.

CS Energy agrees that FFR will add value to the NEM as its characteristics change but it should be valued alongside PFR and inertia, and as such, these pieces of work should be brought forward. The current Rules frameworks do not appropriately value inertia, instead they provide a snapshot of the minimum requirement for security purposes. There is no transparent, contestable mechanism that values inertia for its role in normal operations and contingency events, and the referenced ESB process is lacking in this regard.

⁶ See for example ESB, *NEM Post 2025 Options Paper*, April 2021, Figure 3.6

⁷ AEMC, *Op cit*, p.71

⁸ AEMO, *Op cit*, p.25

Through its work on two-sided markets and the Integrating Energy Storage Rule Change, the AEMC has been emphasising the need to shift from a technology specific approach to a services-based perspective to recognise the value of different services that individual technologies can provide. While the Draft Determination is technology neutral, it is not service neutral, exalting the role of FFR in frequency control while the valuation of inertia and PFR is outstanding.

CS Energy recommends that the AEMC develop the FFR mechanism in parallel to mechanisms to value inertia and PFR (which should be brought forward), so that frequency control is assessed in the required holistic manner. A more robust FFR determination will be made if the interrelatedness between FFR and other services is understood, recognised and incorporated into the final design.

Comments specific to proposed market arrangements

Options

Notwithstanding the comments above, of the options proposed, CS Energy is most supportive of Option 2 where FFR is integrated into the existing FCAS markets. The exclusion of speed factor parameterisation reflects the AEMC's acknowledgement of stakeholder feedback. In CS Energy's view, following the development of the pricing mechanism, participants will be able to determine for themselves the volume and speed of delivery of any service offerings.

CS Energy also supports the AEMC's decision to not introduce a sloping demand-side.

Naming of the service

CS Energy prefers the services to be named as per their function as set out by the FOS:

- Raise (lower) frequency *containment* service;
- Raise (lower) frequency *stabilisation* service; and
- Raise (lower) frequency *recovery* service.

This nomenclature is both transparent and flexible in its application, directly linking the service market to the operational outcome. This also has the advantage of removing the relativity of different speed classifications as this will likely change as the power system evolves.

Registration

CS Energy supports the registration process being the same for all markets and is unclear about AEMO's concerns. The MASS provides AEMO with the opportunity to clearly articulate the technical parameters required for FFR and registered participants are responsible for ensuring delivery to these technical standards.

Measurement and verification of FFR capability

CS Energy agrees that the measurement and verification of FFR capability needs to be determined through a consultative MASS process. Amendment of the Frequency Standard Ramp should be tied into the FOS explicitly so that it is reflective of future needs.

CS Energy also assumes the fast data requirements for existing fast FCAS may need to be amended from the current MASS specification of 50ms.

Scheduling and dispatch

If FFR and R6/L6 are to both be procured for frequency containment, then they must be co-optimised in dispatch.

Pricing and settlement, allocation of costs

CS Energy is supportive of the positions stated in the Draft Determination.

Drafting of the rules

CS Energy has no concerns with the proposed drafting.

Implementation and transitional arrangements

As discussed previously, CS Energy is of the view that mechanisms for FFR should be developed and implemented in parallel with mechanisms that value inertia and PFR.

CS Energy acknowledges the need for appropriate MASS timelines to allow for consultation on aspects such as the measurement and verification process, and any complexities that may arise in this process. The level of changes to AEMO and participant IT systems will be contingent on the outcomes of incorporating FFR into the MASS.

CS Energy does not support out of market transitional arrangements unless there is a demonstrable power system requirement for FFR. Arguably, FFR is not an entirely new service; it has a clear specification that mirrors existing services but customised to meet emerging power system requirements. Transitional arrangements won't negate the need for registration and MASS development, and have an overall cost impost. Given this, CS Energy considers it preferable for AEMO to conduct the desired testing utilising the NEM Simulator and NEMDE Pre-production platforms.