

Rob Jackson
Australian Energy Market Operator
Level 22, 530 Collins Street Melbourne VIC 3000

Submitted via email: rob.jackson@aemo.com.au

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Response from EnerNOC to AEMO's Market Ancillary Services Specification Review – Draft Report and Determination, dated 26 April 2017.

Dear Mr Jackson,

EnerNOC appreciates the opportunity to provide further input on the amendment of the Market Ancillary Services Specification (MASS). We offer these comments in response to AEMO's Draft Report and Determination (Draft MASS) published 26 April 2017. Please consider these comments incremental to those we provided during the first stage of consultation in our submission dated 10 March 2017. In general, the Draft MASS improves upon the readability and accessibility of the current MASS – however we believe some aspects of FCAS measurement and verification will require further refinement over time, particularly as the FCAS markets see increased participation of aggregated quantities over time. Where we have suggested future clarifications and refinements in this submission, we suggest they be added to the agenda for the new Ancillary Services Technical Advisory Group.

Complexity of the MASS and impact on FCASVT:

The Draft MASS improves upon the previous version in terms of readability. The rewording into plainer English and phrasing into principles should make the MASS more accessible to would-be participants.

Most notable is the removal from the MASS of:

1. Description of defined variables FA, FB, FC, FD, SA, SB, SC, SD, DA, DB, DC
2. Formulas for determining reference trajectory
3. Formulas for determining inertial response

One side-effect of removing these technical aspects from the body MASS is that the FCASVT will become increasingly important for participants. The MASS and the FCASVT in tandem constitute the framework upon which participants must rely to create offers that are compliant with the NER. Without a defined mathematical M&V framework for calculating the three elements referenced above, it would be difficult for participants to create offers, and be certain that AEMO will judge the offers compliant following a *frequency disturbance*. We are glad that AEMO plans to continue to support the FCASVT and posit that it will become an increasingly important resource for participants.

Flexibility in allocation of *Frequency Settings*:

As detailed in our submission to consultation stage one, we are supportive in principle of AEMO's initiative to more flexibly allocate frequency settings, including potentially assigning an *Aggregated Ancillary Service Facility* multiple *Frequency Settings* in order to simulate the behaviour of a variable controller. However it appears to us that the application of this new principle in the Draft MASS may lack sufficient detail requisite for participants to formulate aggregated offers. The areas we believe may require further detail are:

1. How AEMO will assess the compliance of an *Aggregated Ancillary Service Facility* in the event that a *frequency disturbance* only reaches partway through the *Facility's* allocated range of *Frequency Settings*.

Even if a *frequency disturbance* carries through an *Aggregated Ancillary Service Facility's* entire range of allocated frequencies¹, having constituent parts configured with different *frequency settings* will make assessing aggregate compliance (against the enabled quantity) complex.

As detailed in our submission to stage one of this consultation, the methodology chosen to address this challenge is important, because any methodology that changes the aggregation hierarchy from "*Facility level*"² to "*Facility + Frequency Setting level*" would have material adverse impacts on an aggregator participant's business model. We are eager to discuss this consideration with AEMO in more detail.

2. How and when AEMO will assign *frequency settings*.

From the Draft MASS it is unclear to us whether AEMO will assign a unique *Frequency Setting* to each constituent part of an *Aggregated Ancillary Service Facility* at the time of registering each incremental constituent part, or whether AEMO will assign the *Aggregated Ancillary Service Facility* a range of *Settings*, with the expectation that the participant will manage the allocation of *Settings* across the constituent parts of the *Facility*, with the aim to achieve some sort of even balance across the range. As detailed in p16-17 of our submission to stage one of this consultation, AEMO can expect that some future FCAS participants will add dozens/hundreds/thousands of constituent parts to their *Aggregated Ancillary Service Facility* over time, and that the composition of the *Aggregated Ancillary Service Facility* will change dramatically from trading interval to trading interval, as individual constituent parts are added and removed from the aggregate offer throughout the day.

It would be preferable if the range of frequency settings provided to an *Aggregated Ancillary Service Facility* is able to be flexibly distributed amongst its constituent parts by the participant, rather than AEMO assigning frequency settings to each new constituent

¹ (and thus all constituent parts of the *Aggregated Ancillary Service Facility* are expected to respond, and thus compliance can be judged against the *Facility's* enabled quantity)

² i.e. the "dispatchable unit" level

part at the time of registration or specifying fixed quantities that must be available at each *setting*.

3. How AEMO will combine high-speed data from multiple constituent parts within an aggregated *facility* with different *frequency settings* in order to arrive at a single delivered quantity:

It seems to us that the FCASVT as it exists currently may not provide a sufficiently robust methodology for effectively assessing the compliance of *Aggregated Ancillary Service Facilities* with multiple *Frequency Settings* (in order to simulate the response of a Variable Controller). It seems there may be several approaches AEMO could employ in order to assess the compliance of these ‘staggered’ aggregated portfolios, each with a slightly different result:

1. Run multiple iterations/batches of the FCASVT for each block of load/generation assigned a given *Frequency Setting* and proportionally combine the individual files (against expected response within each batch) to provide an overall assessment of compliance; or
2. Aggregate all the constituent parts that responded to the *frequency deviation* into a net aggregate portfolio response (regardless of *frequency setting*) and enter the net response into the FCASVT alongside a single value for the *Frequency Setting* (simulating as if all constituent parts had the same *setting*).
3. As per the new Section 2.4 of the Draft MASS, participants “*may propose an alternate method of demonstrating the response of the constituent units which AEMO, at its discretion, may accept*”.

Each of these three methods will produce a different result, and each has pros and cons that we propose to discuss with AEMO in greater detail.

Accommodating fast-responding FCAS technologies

Our experience with the Draft MASS and the existing FCASVT indicates that the MASS is designed primarily to model the response of resources that respond to *frequency disturbances* by changing output/load in some linear fashion, and which ramp to a target over a defined timeframe of multiple seconds to multiple minutes. We suggest that in the future, new participants will offer FCAS resources that will respond in milliseconds, will respond in a near-binary (non-linear) fashion, and can provide all three contingency services (3X Raise and/or 3X Lower) simultaneously - and that the Draft MASS and today’s FCASVT do not well accommodate the modelling of such responses. An illustration of this concept can be found in [Appendix A](#). The MASS seems designed for plant that responds like the blue plot – but in the future, we expect the MASS will be required to assess responses shaped more like the green and red plots.

Our modelling indicates that for a fast-responding *Aggregated Ancillary Service Facility* offering all three Contingency Raise services simultaneously, the MASS’ assessment of the response provided by the *facility* for each of the three services will vary considerably depending on what combination of services clear the market and are enabled. Said otherwise - the same physical response (*basic response*) and the same offered quantities will result in differing quantities of response delivered

(as assessed by the MASS) depending on which permutations of the three services clear the market and are enabled. The un-avoidable result is that the participant will sometimes over or under deliver on their enabled quantity for a service, based purely on the mathematics of the MASS/FCASVT, and with no way to prevent doing so. This has two ramifications:

- 1) A participant may be judged non-compliant for delivering too much or too little of a service;
- 2) AEMO may procure greater quantities of a service than was required.

We are eager to discuss and confirm our modelling with AEMO, and to discuss how AEMO intends fast-responding participants to calculate offers in order to avoid the two issues noted above. We note that the Draft MASS contains new Section 2.4 whereby participants “*may propose an alternate method of demonstrating the response of the constituent units which AEMO, at its discretion, may accept*”. This new provision for flexibility may provide an avenue to address this issue.

Defined terms and minor clarifications

In this section we offer commentary on terms and concepts that we suggest may benefit from better definition and/or clarification, as encountered in the Draft MASS chronologically:

1. Definition of *Ancillary Service Facility*³. Throughout the Draft MASS, the terms *Ancillary Service Facility* and *Aggregated Ancillary Service Facility* are variously employed, but only the former term is defined in the Definition of Terms. There may be benefit in also defining the latter term, or clarifying in the existing definition to note that a *Facility* may comprise an aggregation.
2. Definition of *Frequency Deviation Setting*⁴ – indicates that the *setting* is applied to the *Ancillary Service Facility* and implies that the setting is singular. Further sections imply that a *facility* might be assigned multiple *settings*. This definition might be improved to cater for that possibility. In addition – it is unclear to us how this defined term is different to *Frequency Setting* on p8. It may be that the two defined terms can be effectively combined into one.
3. Draft MASS section 2.1 includes the new principle indicating “the MASS is designed to... treat *ancillary service facilities* with the same performance equally⁵”. It seems possible to us that the Draft MASS itself violates this principle, via employment of a *standard frequency ramp* and the “clock start” point of when the frequency leaves the normal operating band. Using these methodologies, two *facilities* with identical physical responses (*basic response*), but differing *frequency settings* will be assessed different performance quantities⁶. Our submission to stage one of this consultation detailed this issue in a table on p10. We agree with the sentiment in AEMO’s *Draft Report and Determination* that altering the “clock start” methodology need not undergo wholesale

³ Draft MASS, p6

⁴ Draft MASS, p7

⁵ Draft MASS, p11

⁶ Section 3.7.1 (a)(vi) of the Draft MASS describes this concept thusly: “*For a Switching Controller, the basic response is compensated to take into account the timing difference for the Local Frequency to reach the Frequency Setting, compared to the Standard Frequency Ramp.*” It seems possible to us that requiring a basic response to be “compensated” on the basis of the administratively assigned *frequency setting* results in *ancillary service facilities* with the same performance being treated *unequally*.

revision in this amendment of the MASS, but suggest the issue receive a closer look in the new Ancillary Services Technical Working Group.

4. The terms “constituent unit” and “constituent plant” are employed variously throughout the Draft MASS⁷. We suggest that AEMO will receive offers from an increased number of aggregated *facilities* in the future, and thus references to the constituent components of a *facility* will become more commonplace (particularly if constituent components of a *facility* are assigned unique *frequency settings*). As such, it may be worthwhile for AEMO to decide on preferred nomenclature for a “constituent” piece of a *facility* and to memorialise it in the Definition of Terms.
5. We are glad to see from Section 2.5 that the FCASVT will remain available to participants, but are concerned that “AEMO may update the algorithms and its form from time to time”⁸. In our view, it is important that participants are consulted on and made aware of any changes to the FCASVT, as many will leverage the tool to both create offers and verify the performance of their *facilities*.
6. Draft MASS section 3.6 (a) (ix) effectively requires a Fast Raise measurement facility to record and store high-speed recordings every time the frequency reaches 49.8 Hz. Many *facilities* will have a *frequency setting* below 49.8 Hz, and so are required to capture high speed recordings in situations event where their *setting* is never reached and no service delivery is required/desired. In our view this is a requirement that adds both complexity and cost for participants, whilst adding limited value for AEMO. We suggest that the need to continue employing this requirement be discussed at the Ancillary Services Technical Working Group.
7. To us it seems that Draft MASS section 3.7.1 (a)(i) might be improved by appending “or, in the event that Frequency Recovery does not occur within 60 seconds of the Frequency Disturbance Time, 60 seconds”.
8. The term “basic response” is an essential term that is employed frequently throughout the Draft MASS, but that its definition is arrived at indirectly⁹. As such we consider there may be value in defining the term in the Definition of Terms.
9. Draft MASS Section 3.7.1.(a)(viii) has a strikethrough, and it is unclear to us whether AEMO intends for this paragraph to remain in the MASS, or not. If it is to remain we suggest that the paragraph be clarified as suggested in our added parenthesis below.

If slow raise service or slow lower service is also enabled for the Ancillary Service Facility, then its (does “its” = “the Facility’s”?) response should exceed (in quantity, or in duration of time?) the required response (for which service?), such that the slow raise service or slow lower service can be provided.

If, as we suspect, the intent of this section is to say “if also enabled for Slow Raise, a *Facility* should keep responding past the end of the Fast Raise assessment window”, then it may be that this paragraph need not be retained in the MASS.

⁷ See Draft MASS, p13

⁸ Draft MASS, p14

⁹ See Draft MASS, p17

10. In Draft MASS Section 4.3 (a) we suggest that this paragraph might be improved/clarified by replacing the word “provided” with “enabled”, to better reflect the composition of value “FD” in the current MASS.

11. In Draft MASS Section 7.2.(d)(i) we suspect the reference to “(a)” is meant to read “(b)”

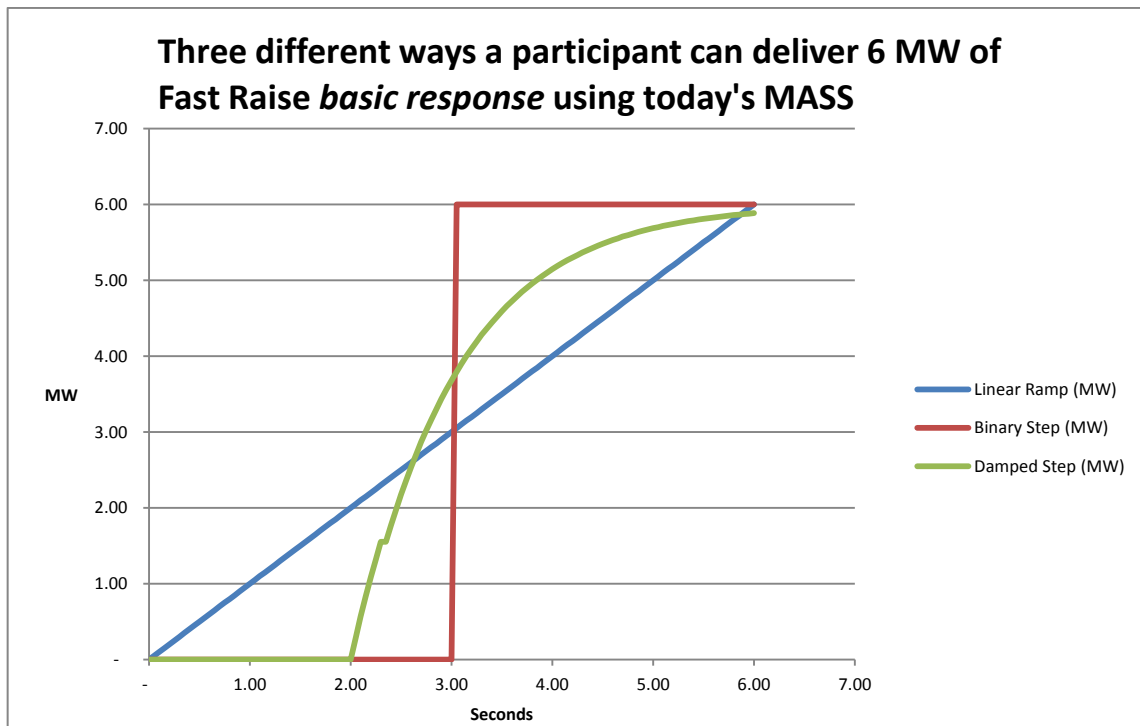
Thank you for the opportunity to contribute to the second stage of consultation on the Amendment of the Market Ancillary Service Specification (MASS). Please do not hesitate to contact me if you have any queries.

Regards,

A handwritten signature in blue ink, appearing to read 'Matt Grover', with a stylized flourish at the end.

Matt Grover
Manager, Market Development
mgrover@enernoc.com | 03 8643 5907

Appendix A



Assumptions in this example:

1. No reference trajectory to compensate for.
2. No inertia to compensate for.
3. No compensation for "the timing difference for the Local Frequency to reach the Frequency Setting, compared to the Standard Frequency Ramp", (which no matter the frequency setting employed, would result in slightly less than 6 MW being assessed as delivered).
4. Plots could equally represent either generation increase, or inverted load decrease data.