Our ref: RN

8 March 2021

Matthew Holmes
Principal – Systems and Performance and Commercial
Australian Energy Market Operator

Lodged by email: mass.consultation@aemo.com.au

Dear Mr Holmes

**Submission on Market Ancillary Service Specification Issues Paper**

CleanCo welcomes the opportunity to comment on the Australian Energy Market Operator's (AEMO)Market Ancillary Service Specification (MASS) Issues Paper (the consultation paper). This submission focuses on general MASS issues rather than the DER-related changes.

CleanCo is Queensland's newest electricity generator. Our purpose is to support the reliable, affordable integration of renewable energy into the Queensland grid, and to provide firmed low-emissions energy at a competitive price for customers. We will contribute to the achievement of Queensland's 50 per cent renewable energy target by 2030 by supporting 1,400MW of new renewable generation by 2025 and will support new investment and jobs in regional Queensland. CleanCo supports rule and policy changes that facilitate an affordable, reliable supply of clean energy to customers into the future.

**Attachment 1** provides responses to AEMO's consultation questions and offers several potential alternatives for limiting FCAS from switching providers and improving regulation FCAS provision. Our key points include:

- **Redrafting of the MASS** – CleanCo is broadly supportive of the proposed redrafting of the MASS and agrees that the new format simplifies and clarifies a range of issues.
- **Contingency FCAS** – CleanCo notes the considerable benefit switching controllers provide in terms of stabilising and returning frequency to within the normal operating frequency band (NOFB)[1]. As such, any proposals to limit or control switching controllers should be undertaken in a way that still encourages them to take part in the market.
- **Regulation FCAS** – CleanCo supports provision of real-time data to AEMO to facilitate closer monitoring of regulation FCAS provision. Our view is that closer monitoring is preferable to periodic testing in that it identifies issues in real-time and allows AEMO to focus its efforts on the plant with worst performance while minimising the burden on well-performing plants. CleanCo suggests a control response delay of 150 seconds may be too generous and that a three-minute ramp requirement may be too short.

[1] AEMO, *Renewable Integration Study Stage 1, Appendix B: Frequency Control*, March 2020 - See Figure 17

We thank AEMO for the opportunity to make a submission on this process. If you have any questions about our submission, please contact me at rimu.nelson@cleancoqld.com.au or on 0455 080 871.

Yours sincerely

Rimu Nelson
Principal Advisor – Regulatory

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**Attachment 1 – Response to Consultation Questions**

**Attachment 1 – responses to consultation questions on general MASS issues**

| Question | Response |
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| • Does the proposed reformat of the MASS make for improved readability and understanding? What other improvements in the form and drafting of the MASS could be beneficial? If you consider the reformatted MASS may have materially changed the substantive meaning of the MASS v6.0, please also bring this to our attention. | The updated drafting in the mass appears clear and simple, and removes unnecessary duplication. These changes improve the readability of the document while retaining the intent of alien versions. |
| • Clarification of FOS references – please provide any feedback on the proposal to clarify that FOS terms relate to Table A.1 of the FOS, and any other terms that have ambiguous values. | This clarification is useful and appropriate. |
| • Frequency responsiveness of FCAS:<br>a. What would be involved in ensuring that non-frequency responsive facilities:<br>i. Respond only when enabled in the relevant FCAS market(s)? | Before considering options for limiting or controlling FCAS provision by switching controllers, it is important to recognise the important role switching control plays in the contingency FCAS markets.<br><br>Switching controllers are excellent at returning the frequency back to within the normal operating frequency band (NOFB) in the shortest timeframes. In the vast majority of situations, over-provision of response by switching providers has improved outcomes for consumers – frequency recovers faster following shocks and in a manner that is essentially free for consumers. The Renewable Integration Study |

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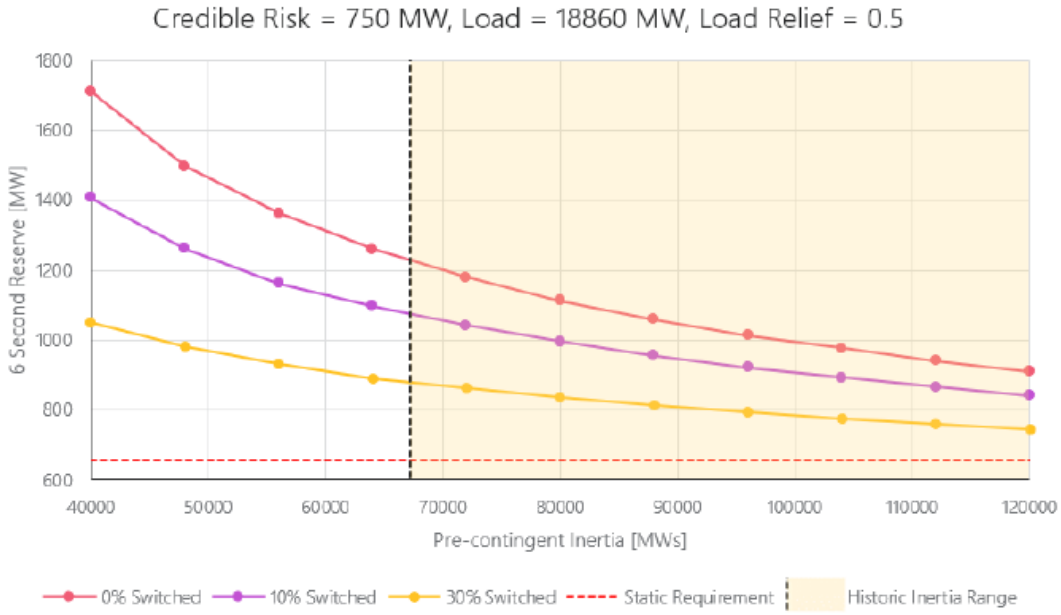
| ii. Do not deliver significantly more than market enablement (for example, >50%)? | (RIS) highlighted the important role that switching providers play in terms of reducing the reserve requirement, particularly as system inertia reduces[2].<br><br>**Figure 1 – Reserve requirements for loss of Kogan with increasing proportions of switched reserves**<br><br>  <br><br><br>*Figure 17 from RIS Appendix B*<br><br>Noting the above benefits of switching providers, it is important to ensure any changes do not preclude or disincentivise switching providers from participating in FCAS markets, even the shorter 6 and 60 second markets. Rules that are too strict or that preclude over-provision may simply make it too difficult for some participants to remain in the market.<br><br>If considering potential limits to switching controllers, it is also reasonable for AEMO to consider different limits for each FACS market. For instance, the limit for proportion of switching controller could potentially be stepped up between the 6 second and 60 second markets, with no limit on the 5 minute markets. Given |

[2] AEMO, *Renewable Integration Study Stage 1, Appendix B: Frequency Control*, March 2020

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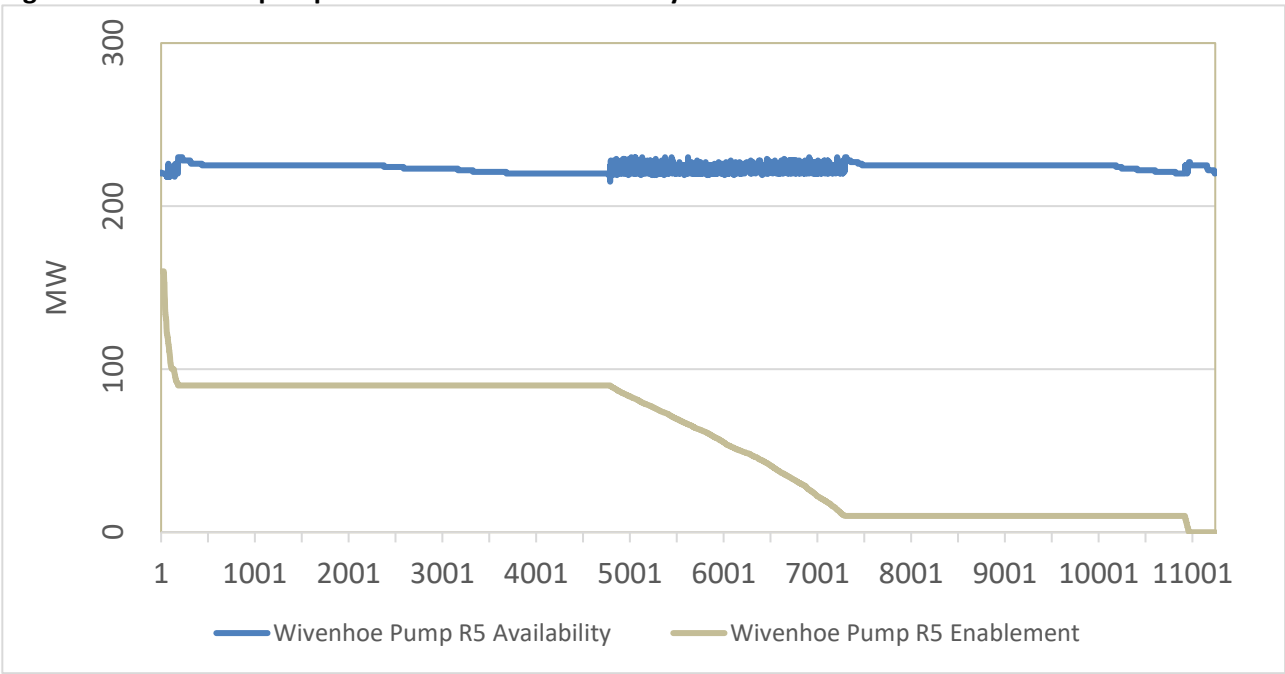
| | the broad benefits switching controllers provide the market, it may also be appropriate to have a minimum target.<br><br>It will also be necessary to differentiate between different types of switching controllers, recognising that each has different capability. For example, Wivenhoe's generators could be programmed to target a MW output and it can reduce generation quickly once frequency recovers. On the other hand, the Wivenhoe pumps have no control over MW and, in the instance of raise services, would take some time (up to ten minutes) to re-enter the market after frequency has recovered. We expect providers in the 6 and 60 second market would have a similar mix of attributes and capabilities.<br><br>3.(a)(i)<br><br>Amending control system or trading system logic to respond only when a participant is enabled is possible in most instances, depending on the age and flexibility of a participant's systems and their connectivity to AEMO's MMS. Making this type of change seems simple, but it opens a range of new risks because the control system has more steps to consider when a frequency event occurs. Each of these steps is a new potential point of failure. One of the benefits of the existing system is its simplicity; the unit measures local frequency and responds if it leaves a predetermined band. Depending on the revenue they receive from FCAS markets, some participants may consider the costs of making these changes and the added risk of non-compliance outweigh the benefits of participating in the market.<br><br>3(a)(ii)<br><br>Requiring providers to limit their response to a particular MW (or MW band) will likely preclude a significant number of switching providers from participating in FCAS markets.<br><br>While we recognise AEMO is targeting 6 and 60 second markets for these changes, we expect the below example of Wivenhoe's pumps illustrates the challenges some participants face. As noted above, CleanCo has no flexibility over the MW from its pumps; the pumps are either on or off. Even if a broad +50% target range was applied, we would not be able to offer our pump services. Figure 2 illustrates a duration curve of Wivenhoe pump enablement levels over 2020 in comparison to its likely response – the pump only could have complied with this rule 0.3% of dispatch intervals. |

**Figure 2 – Wivenhoe pump R5 enablement v availability**




AEMO's proposal could also lead to unintended consequences. While some switching controllers may not have control over MW output, they may have control over when they respond. This could see participants delaying their start when a frequency event occurs to comply with their target. Figure 3 below illustrates two compliant options for responding to a 10MW enablement in delayed raise market (similar scenarios could happen in 6 and 60 second markets). The blue line reflects how we think AEMO would like the service to be provided. The red line reflects what a switching controller with a fixed 100MW of response could provide to comply with the MASS. Importantly, compared to the over-provision option (green line) there is no reduction in the maximum output, but there is three minutes where the unit could have been providing frequency support.

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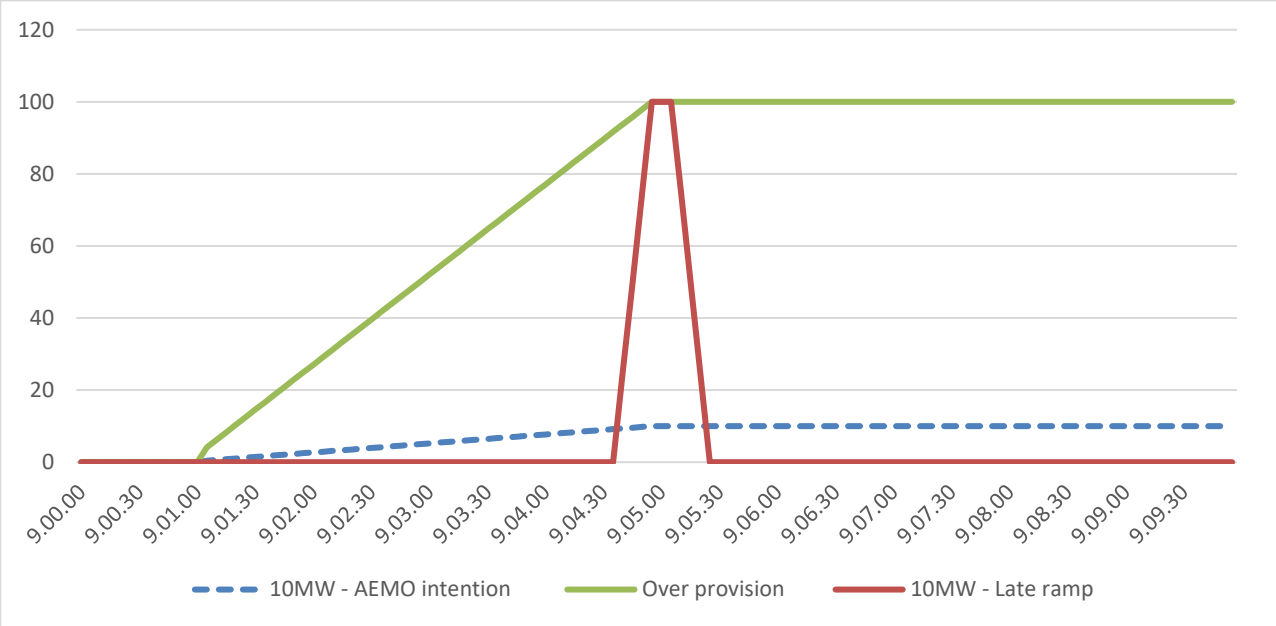
| | **Figure 3 - Potentially outcomes of strict MW target – 10MW delayed raise response**<br>  <br> |
| Do any alternative options exist to manage over-delivery? | <u>Alternative Options</u><br>While we acknowledge that response from switching units could create challenges in particular situations, we believe the alternative – prolonged under/over-frequency events while willing capable plant sit idle – appears unreasonable.<br>There are a few alternative options that AEMO should consider in response to this:<br>(a) Apply rules around following targets on a best endeavours basis, so that units that can target a particular MW (or MW range) do. This would minimise over-provision where possible, while still maintaining the largest number of participants in the market;<br>(b) For large inflexible units, expand their deadbands so they only provide response in the instance of more significant frequency events. While they may not respond as frequently as participants on tighter deadbands, in most instances they will also only be being paid for a small fraction of their total response; |

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| | (c) Build inflexibility into NEMDE either through –<br>a. optimising to enable switching providers up to their full output. Inflexible providers could nominate full/minimum response to AEMO. AEMO can, based on least cost, optimise for providers while only enabling full output from switching providers.<br>b. optimising dispatch based on the existing equation, but then have a secondary loop which limits enablement of switching controller based on max output.<br>c. optimising across raise and lower services. As prices for lower services are consistently lower than raise services, AEMO could optimise to enable more lower services in instances where there is a significant proportion of switching providers enabled for raise services.<br>Importantly, these options would maximise the competition in FCAS markets and provide AEMO with more options to identify the lowest cost mix of services for customers.<br>(d) Provide more guidance on AEMO's expectations for when FCAS response should finish. This could include clarifying when generators are to stop providing services and options for the orderly reintegration of demand side participants into the market. As a further step, AEMO could consider removing incentives that encourage the provision of frequency support after frequency has recovered. To clarify AEMO's expectations, the specification for Fast Raise Service could be amended to:<br>(a) twice the Time Average of the Raise Response starting at the Contingency Event Time and ending 6 s from the Frequency Disturbance Time, excluding any Inertial Response; and<br>(b) twice the Time Average of the Raise Response between 6 s and 60 s (or until frequency returns to the NOFB, whichever is sooner) from the Frequency Disturbance Time, excluding any Inertial Response,<br>This could potentially be expanded to remove entitlement to revenue from energy after the frequency has recovered. |
| 3(b) Please provide feedback on the proposed revised trigger ranges for switching controllers set out in Table 1 and Table 2 of section 3.3. | Decreasing the deadbands for switching controllers appears at odds with the problem AEMO is trying to solve in 3(a) above. Decreasing deadbands will see switching controllers react to frequency issues more often and potentially increases the likelihood over overshoot. Notwithstanding this, CleanCo recognises the significant improvement in frequency performance since primary frequency response has been implemented across the NEM, a tightening of deadbands could likely be achieved with limited impact to most switching controllers. Any impacts that do occur could be dealt with through higher offer prices. |

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| 3(c) Please provide feedback on the proposal in section 3.3 to require proportional controllers to set deadbands no wider than ±0.1 Hz. | Similar to above, tightening deadbands for proportional controllers could probably be achieved with minimal impact, particularly given the recent improvement frequency performance. |
| • Regulation FCAS requirements:<br>a. Are the requirements and proposed settings listed in section 3.5 adequate and achievable? In particular, can PFR (separate to other plant targets) be determined readily and communicated to AEMO?<br>b. Would a 1-year phase-in period for existing Regulation FCAS providers be satisfactory?<br>c. Do Consulted Persons believe that a 2-year Regulation FCAS testing cycle strike the right balance of stringency and reasonableness? | *Telemetered data rate*<br>Appropriate and achievable<br><br>*AGC Controllable*<br>Appropriate and achievable<br><br>*Minimum bid size*<br>Appropriate and achievable<br><br>*Maximum control response delay*<br>We recognise AEMO needs to be cautious in setting limits that could significantly reduce competition but, on face value, a control response delay of 150 seconds may be too generous. Regulation FCAS is designed help manage small deviations in the demand/generation balance within the five-minute dispatch interval. Allowing a 150 second control response delay could essentially render regulation FCAS meaningless for the first half of each dispatch interval.<br><br>We are also a little concerned that a longer control response delay is contributing to AEMO's position on the minimum ramp rates issue below, which CleanCo has reservations about.<br><br>If AEMO is concerned that setting a control response delay lower than 150 seconds would preclude too many providers, it could consider offering a premium for those with a lower control response delay. This would incentivise providers to improve their control response delay over time and reward those generators that are more likely to provide services up to their enablement level within a dispatch interval. |

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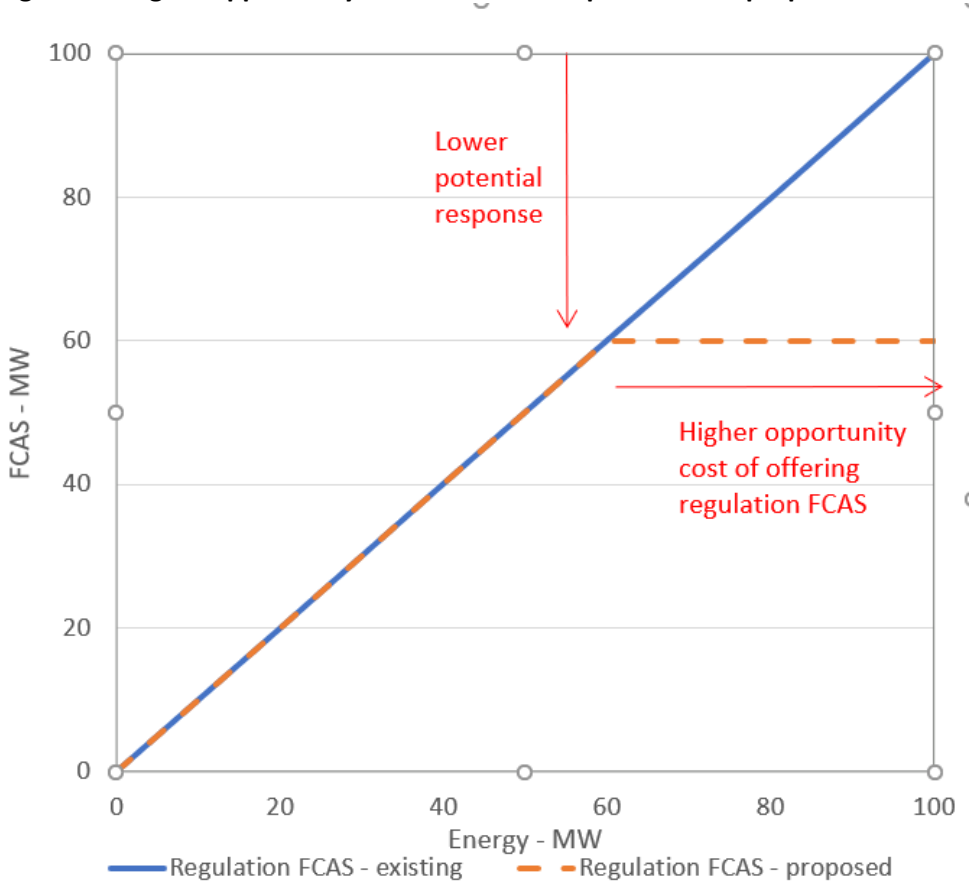
| | *Minimum ramp rate*<br>CleanCo recognises AEMO's preference for providers to be able to achieve their full enablement even if a frequency event occurs later in a dispatch interval. However, we have reservations AEMO's proposal, particularly the requirement to be able to meet the regulation FCAS enablement within three minutes. The proposal will complicate the bidding/dispatch process and increase the opportunity cost of supplying of regulation FCAS. All other things being equal, consumers would be worse off under the proposed model than under the existing model.<br>Figure 4 provides an example of this issue. The opportunity cost of a generator providing regulation FCAS is that it will not be dispatched for additional energy.<br>• Under the existing framework, there is a one for one relationship and the trade-off is relatively simple; a plant with a 20MW per minute ramp rate, can offer 100MW of regulation FCAS and additional 100MW of energy. AEMO can then optimise between FCAS and energy based on whatever outcome is best for consumers.<br>• Under the proposed framework, the plant would only be able to offer 60MW of regulation FCAS. The opportunity cost of being enabled for this 60MW is that it will still forgo a potential 100MW of additional energy. To stay whole, the generator would have to increase its regulation FCAS price by 66%. The total cost to consumers would remain about the same but they would receive less total response for the cost, particularly where frequency events occur earlier in the dispatch interval. |

**Figure 4 – Higher opportunity cost and lower response under proposed model**




Notwithstanding CleanCo's above reservations, we recognise AEMO's intent to improve the link between remuneration and likely response. Two options that could improve consumer outcomes for regulation FCAS would be:

(a) Consider a premium for generators with lower control response delay (as proposed above); and/or

(b) If implementing the three-minute target response, ensure NEMDE optimises between regulation FCAS and energy to ensure there is no increase in opportunity cost. In the above example, the

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| | generator could then be enabled for 60MW of regulation FCAS and up to 40MW of additional energy).<br><br>*Real time SCADA requirements*<br>Other than ramp rate (as discussed above) these the SCADA requirements appear broadly appropriate. CleanCo is able to determine PFR and communicate it to AEMO separately. We understand AEMO already has real time access to most of the data points requested, although some additional internal testing/review may be necessary to ensure this is fit for purpose.<br><br>*1-year phase in*<br>A 1-year phase in is possible but may be challenging. Changing SCADA communications to AEMO will require coordination between the generator, TNSP and AEMO, and will need to be undertaken during an outage. Given the 100+ units registered for regulation FCAS, it may be challenging to get this completed within a year.<br><br>CleanCo considers an automated monitoring framework would be more appropriate and valuable than periodic physical testing. An automated testing framework is better because it (a) avoids costly manual testing processes (b) identifies issues in real time, including hardware or software failure that may otherwise go unnoticed until the next physical test. Automated monitoring would also allow AEMO to focus its efforts on the plant with worst performance while minimising the burden on well-performing plants. |
| • Clarification of requirements for Delayed FCAS – please consider the implications from your perspective of clarifying that Delayed FCAS controls may be of a switched type only (rather than also proportional), and, whether other factors in addition to those outlined in section 3.6 need to be considered. | This may be appropriate given the capability of switching controllers to return frequency back to 50Hz, but CleanCo has not investigated this closely. |

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| • Regarding issues associated with the pending FFR rule change canvassed in section 3.7 and any other rule changes of concern, AEMO wishes to hear from Consulted Persons on the following issues, which would be used to help scope future changes to the MASS:<br>a. What MASS issues they consider should be addressed in subsequent reviews, including if possible, provide reasoning as to why these issues are important.<br>b. How any other desirable changes to the MASS could be managed in the context of ongoing rule changes. | The MASS should be adjusted to allow reward for inertial response. This could be reconsidered if the Australian Energy Market Commission or the Energy Security Board implement a formal inertia market or incentive framework, but this is likely to be several years off. |