Shell ENERGY

11 March 2021

James Lindley
Australian Energy Market Operator
Level 2, 20 Bond St
Sydney NSW 2001

Dear Mr Lindley

Re: Market Ancillary Services Specification

Shell Energy Australia Pty Ltd (Shell Energy) welcomes the opportunity to respond to the Australian Energy Market Operator's (AEMO) Issues Paper on the Market Ancillary Services Specification (MASS) ("the Paper").

About Shell Energy in Australia

Shell Energy is Australia's largest dedicated supplier of business electricity. We deliver business energy solutions and innovation across a portfolio of gas, electricity, environmental products and energy productivity for commercial and industrial customers. The second largest electricity provider to commercial and industrial businesses in Australia[1], we offer integrated solutions and market-leading[2] customer satisfaction, built on industry expertise and personalised relationships. We also operate 662 megawatts of gas-fired peaking power stations in Western Australia and Queensland, supporting the transition to renewables, and are currently developing the 120 megawatt Gangarri solar energy development in Queensland.

Shell Energy Australia Pty Ltd and its subsidiaries trade as Shell Energy.

General comments

Shell Energy considers that AEMO has undertaken a thorough and considered process as it prepares for this review of the MASS. This is an opportune time to review the MASS given the scale of change underway in the market. However, we note that there are rule changes ongoing which would influence the outcome of this MASS Review, notably the Fast Frequency Response (FFR) and Primary Frequency Response (PFR) rule changes under consideration by the Australian Energy Market Commission (AEMC). The results of these rule changes will need to be factored into the MASS if necessary. We recommend that as part of this review AEMO consider what changes will be required to the MASS in the event a decision is made to introduce a market for the provision of FFR.

Distributed Energy Participation in Frequency Control Ancillary Services (FCAS) markets

Shell Energy supports AEMO's proposed option 2 to continue the exemption for systems 1 MW or less to only require response measurement at 1 second or lower. We believe that this approach will allow for a diversity in supply of fast (< 6 second) FCAS in a way that will minimise any distortion to the market. We consider that the Consultation Paper adequately demonstrates that the response provided by Virtual Power Plant (VPP) services was delivered as requested.

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[1] By load based on Shell Energy analysis of publicly available data

[2] Utility Market Intelligence (UMI) survey of large commercial and industrial electricity customers of major electricity retailers, including ERM Power (now known as Shell Energy) by independent research company NTF Group in 2011-2020

Option 1, which would see all such services require high-speed metering (50ms or less) required for fast FCAS less than 1 MW, would all but remove such VPP services from the market given the costs involved in installing such metering configurations. While the cost and installation of the meter alone would amount to around $15,000, there are additional costs required to handle the additional data and communications. In all likelihood, the total cost would be more like $20,000-$30,000, which for installations of that size would be a barrier to entry. Should AEMO reconsider a faster measurement requirement, we note that a metering requirement of 200ms would be substantially cheaper than a 50ms metering installation.

Shell Energy also agrees with AEMO that pursuing Option 2, to embed the measurement requirements that were tested in the VPP Demonstrations in the ongoing MASS, will meet the National Electricity Objective. Given the small size of most of these providers, we consider that there is at this stage very limited scope for market distortions to occur. Further, the Issues Paper highlights that the delivery of fast FCAS can be reliably verified using the Option 2 measuring requirements. As such, these considerations along with the benefits of increased competition in the fast FCAS market means that the benefits are highly likely to outweigh any risks.

We question the need for a high-speed metering configuration for every 5MW of response. It is unclear what AEMO's rationale is for this. While the Paper notes that AEMO will have discretion to allow exceptions to this, we would prefer to see a clear justification as to why this is necessary. Further, Shell Energy would prefer to see a clear guideline for where exceptions may be granted.

Shell Energy considers there is a case to increase the threshold for eligibility for these arrangements from 1 MW to 1.5 MW, given that this is level at which some Distribution Network Service Providers (DNSP), including Ausnet Services, place more stringent requirements on small embedded generators.

Shell Energy also seeks clarification on the proposed requirement that all controllable units within the same VPP must operate with the same type of FCAS controller. While we believe AEMO is suggesting that the controllers must all be either proportional/variable or switched, we have concerns this may be implying that the controllers must have identical hardware or that any devices within the VPP must also be identical (e.g. same battery and inverter type). Shell Energy accepts the rationale for the controller alone needing to be either proportional/variable or switched but would oppose more onerous requirements to create homogenous VPPs using identical hardware.

General MASS issues

Shell Energy agrees with AEMO's proposal to clarify references to specific frequency by referring directly to the Frequency Operating Standard. We consider that this change will improve the current treatment of differing frequency bands relating to the Normal Operating Frequency Band (NOFB).

For clarity, Shell Energy recommends that AEMO (and the MASS) should use the term "continually frequency responsive" to refer to proportional controllers. Switched controllers are also frequency responsive but this occurs at a known (trigger) frequency. The proposed approach to refer to switched controller as non-frequency responsive as set out in the Paper implies that switched controllers do not respond to frequency, despite the fact they do respond, just in a different manner to proportional response. As such, "switched frequency responsive" would be a better way to describe the response provided by switched controllers.

AEMO's proposal to introduce additional requirements on switched controller response creates some challenges, particularly for suppliers with older control systems to comply. Older systems are designed to provide a binary response, based on the setting of a switching relay which continues to be active regardless of whether the provider has been enabled for the provision of FCAS or not. In addition, in general, they are not capable of providing a part response. While new digital control systems should be able to facilitate the proposed changes, there would be a cost involved with replacing existing systems. We consider it preferable for the NEMDE to be required to consider if the switched frequency responsive load is a binary outcome (i.e. 0 or 100 per cent only) and not part enable that load when selecting loads to be enabled for frequency response.

Shell Energy considers the proposed switching controller trigger ranges to be reasonable. However, given the difference between the frequency response settings on the mainland and in the Tasmanian region, it is unclear how switched frequency response service providers in the Tasmanian region could continue to be enabled to provide switched frequency response on the Mainland.

AEMO indicates that Contingency FCAS response may be weak or withdrawn as frequency approaches the edge of the NOFB. Under current arrangements this is entirely to be expected, as it is a function of AEMO procurement of contingency response to only procure sufficient services to restore frequency to the edge of the NOFB. The inclusion of load relief in the procurement calculation further reduces the procurement of contingency services to restore frequency to within the NOFB. If AEMO is concerned by this, then they should adjust their procurement to reflect the required recovery to within the NOFB rather than just the edge.

AEMO is proposing that the MASS require proportional FCAS controllers not affected by the Interim Primary Frequency Response Rule to have frequency deadbands no wider than +/-0.1 Hz. Shell Energy queries whether it would be acceptable for response to trigger at +/-0.15 Hz but sustain recovery until +/-0.10 Hz. This may be achievable with modern control systems on asynchronous service providers. We consider that this approach would still provide AEMO with the desired response but at a lower implementation cost.

We contest AEMO's assertion that a general deadband specification of +/-0.15 Hz or +/-0.1 Hz is unsuitable for managing frequency. AEMO's assertion has not been demonstrated in reality. In the case of a wider deadband, the speed and level of response are as important as the setting of the deadband. We add that the AEMC is currently considering market provision of regulation PFR so that AEMO's proposed requirements in Section 3.3 would also apply to service providers providing contingency but not regulation PFR.

The original requirement in the MASS to prioritise Contingency FCAS over Regulation FCAS when power system frequency is outside the NOFB was based on prioritising frequency control for system security. This recognised that line loading is managed by the NEMDE on an N-1 basis and the geographical spread of multiple contingency FCAS providers would generally limit the change in flow on any individual transmission element. This was always an intended outcome which AEMO managed for via the inclusion of additional safety margins in all constraint equations with line flows then corrected by the NEMDE at the next dispatch interval. We also note that any form of mandated or market based regulated PFR as opposed to secondary (AGC) PFR would also respond to prioritise frequency control over compliance with a dispatch instruction or AGC signal.

Mandatory or Market regulation PFR based on a tight deadband setting will automatically prioritise frequency control over AGC response. It cannot do otherwise unless AEMO wants the generator to defeat the deadband setting if the generator is in an active constraint equation for the direction of response that would make the network congestion worse. Pragmatically, AEMO's proposal is unworkable and shows one of the main weaknesses created by mandatory PFR where a unit will respond based on its available, headroom, foot room or stored energy based on the observed local frequency deviation. Units with little or no headroom, foot room or stored energy may not respond at all or by a small amount whereas units with larger levels of headroom, foot room or stored energy will respond by a large amount, leading to less control of flows over network elements. The NEMDE, by procuring known FCAS reserves from generators has greater control over generator response levels and if calculated correctly network flows. From a compliance perspective it would create an unmanageable outcome for generators to have to disable an automated response under certain conditions such as being impacted by a binding network constraint. Going forward in calculating FCAS enablement, the NEMDE shouldn't enable FCAS on a unit in the direction that would make the network congestion worse. Shell Energy strongly argues that market participants should not be responsible for managing this, if it is actually required for secure operation of network flows, it should be a feature embedded in the NEMDE. The development of a market for the provision of primary regulation response reserves should assist AEMO to procure PFR from units that will improve as opposes to worsen network congestion when utilised.

At the first instance, Shell Energy considers that it is incumbent on the MASS to provide a clear definition of what regulation (AGC) frequency response actually is. As the Paper notes, the current MASS states that providers must act in an accurate and timely manner, however the definition of what service is actually required to be provided is not set out in the MASS. In addition, the definition of accurate and timely is left to AEMO's discretion. Clearly, this creates a situation with little clarity or transparency for participants.

We therefore welcome AEMO's approach to better define the requirements of Regulation FCAS (notwithstanding the need for an overall definition). In assessing AEMO's proposed requirements we note the following about each of the requirements:

- Telemetered data rate – AEMO proposes no more than 8 seconds data latency. We urge AEMO to recognise that this may be beyond a participant's control if the cause of the latency is AEMO or AEMO's agents' systems.
- AGC controllable – AEMO proposes that for setpoint controlled facilities, the minimum change of the control request (setpoint change deadband) must be no larger than half the facility's allowed minimum bid size. Shell Energy disagrees and recommends that the level of change should be no greater than 20 per cent per minute of the facility's enabled quantity. This is to ensure that the MASS does not inadvertently require the service provider to exceed its stable bid ramp rate.
- Minimum bid size – AEMO proposes that batteries or other inverter-based resources have a minimum bid size of 2 MW, with other facilities having larger minimum bids, e.g. 5 or 10 MW. We do not consider that AEMO has adequately explained why a change from the current minimum bid size is required. We consider that Regulation services minimum requirements should be the same for all technologies.
- Maximum control response delay – AEMO proposes allowing a maximum time of 150 seconds. We consider this to be an acceptable delay, provided it is 150 seconds from the time the AGC output change request is received at the facility.
- Minimum ramp rate – AEMO proposes that the telemetered value for the facility's ramp rate should be large enough that the market cleared Regulation FCAS capacity can be fully deployed in 3 minutes without exceeding the telemetered ramp rate. Shell Energy agrees with the concept and rationale. However, we believe that the obligation should be on AEMO not to enable regulation secondary frequency response above the level which can be achieved by full deployment within 3 minutes. The obligation should be on AEMO to procure to meet this requirement rather than a service provider to alter settings to meet this requirement.

AEMO also lists a range of data that facilities providing Regulation FCAS will be required to convey to AEMO in real time. AEMO is requesting that all of these values be provided through SCADA with a latency of no more than 8 seconds. As above, this may be beyond the provider's control if AEMO or AEMO's agents' systems are causing the latency. We have additional comments on certain required measurements:

- Ramp rate (MW/min) – AEMO states that providers would be expected to ensure that the telemetered ramp rate can cover changes in energy dispatch, plus any Regulation capacity cleared in NEMDE. We disagree with this requirement. Instead, AEMO's enablement of secondary AGC frequency response must be based on the bid ramp rate, any change in a provider's energy dispatch target, plus secondary AGC frequency response. A generator utilising all its bid ramp rate to meet a change in energy dispatch targets should not be enabled for secondary AGC frequency response in the same direction as the change in energy dispatch target.
- Maximum AGC control limit (MW) – AEMO is requesting providers include the maximum available MW capacity for AGC-issued control requests as facilities may have additional capacity above that reported as maximum availability that is not currently available to AGC control but is available to the

plant operator (e.g. overload capability). We would like to see AEMO provide justification for this request as it is unclear to Shell Energy why this is strictly necessary when a provider has already provided advice in the form of maximum availability in the dispatch offer. There may be a case for this data to be provided if it is to ensure AEMO procures only the capable quantity from a service provider.

- Local PFR (MW) – AEMO is requesting the current MW equivalent of any local PFR as extracted from the local plant controller or equivalent. Again, it is unclear why this should be required or how it would be measured. As such, we wish to see a clear justification for the reasoning behind requesting this data.
- Minimum limit duration (seconds) – For batteries, AEMO requests the duration the Minimum AGC control limit can be sustained for the current state of battery charge. Essentially, AEMO is requesting dynamic feedback of storage levels. We consider that it is the responsibility of the battery energy storage system (BESS) operator to submit dispatch offers and bids based on storage capability and not on AEMO to decide a BESS's capability or how it should be utilised. Clause 4.9 of the National Electricity Rules make it clear that BESS operators would have to do this in any case. It is therefore unclear why AEMO requires this data.

AEMO begins its discussion on requirements for Delayed FCAS by referring to the purpose as defined in section 5.1 of the MASS which is "*to return System Frequency to 50 Hz within the first five minutes of a Frequency Disturbance that resulted in System Frequency being outside the normal operating frequency band*". As such delayed FCAS should be seen as a frequency restoration service as opposed to a frequency control or Rate of Change of Frequency (RoCoF) control service. To enable restoration of frequency to 50 Hz, AEMO should procure sufficient services to restore frequency to 50 Hz following the largest credible contingency. It is unclear this is always the case. We also recommended that AEMO consider a change of name for the delayed contingency FCAS to frequency restoration contingency FCAS to more accurately describe the intent of the service.

AEMO suggests a "switched" response is necessary to achieve frequency restoration to nominal frequency. Alternatively, AEMO indicates that frequency restoration could be provided via and AGC type response. We question AEMO's views in this area. Latency delays with AGC dispatch particularly around the cutover between dispatch intervals when the issue of the new dispatch targets, including new AGC targets, can be significantly delayed may result in delays to an AGC type service restoring frequency. We believe the service would be best achieved by a known level of response at known trigger levels.

The frequency trigger outcomes could potentially be used to trigger the appropriate levels of additional restoration response to match the level of frequency deviation as opposed to a reliance on service providers delivering the exact amount of response. However, to achieve this the NEMDE would need to know the exact trigger level at which every restoration service provider was set. This could be a difficult requirement. Instead, it may be easier for the MASS to stipulate that the facility ceases to provide response when 50 Hz is achieved or alternatively, maintain the enabled level of response for up to a 10 min duration in the event that 50 Hz is not achieved. We consider the required response should not be expected by AEMO to exceed the enablement amount nor should it be expected to substitute for the publication of incorrect dispatch targets by AEMO following an islanding event where AEMO should be considering automation of their systems in line with the recommendations of the Queensland and South Australia Islanding event on 25 August 2018,[3] for which no implementation date has been indicated by AEMO.

AEMO also queries whether AGC controls should be aware of the Delayed FCAS controls at a plant. Shell Energy does not support this outcome as the AGC system could then incorrectly rely on services that were not enabled for restoration FCAS dispatch during the current dispatch interval and seek to utilise a service that is not

[3] Recommendation 2 - Final Report – Queensland and South Australia system separation on 25 August 2018 – pp 8

actually available during a frequency restoration period. As discussed previously, there are inherent latency issues under AEMO's direct control which delay AGC effectively responding to a frequency event.

Despite our disagreement on certain issues, Shell Energy ultimately agrees with AEMO's suggestion to pursue future work to better understand the impacts of altering the MASS requirements for Delayed FCAS. However, at the first instance, we contend that AEMOs need to consider this need for future work when setting the revised switched frequency response controller set point values.

Shell Energy notes that there is a range of other work ongoing relating to frequency control, notably the Fast Frequency Response and Primary Frequency Response rule changes. Shell Energy provided a submission to the AEMC on these rule changes (sent as ERM Power) in February 2021. We recommend that as part of this consultation AEMO should consider what amendments to the MASS would be required to implement a dedicated very fast contingency response service in addition to maintaining the existing 6 second service. We note work has already been undertaken in this area and supplied to the AEMC. This could be set out as a discussion paper as an appendix to the draft and final reports to promote discussion now so as to facilitate a prompt response should a rule change be made. The Appendix could set out the amendments to the MASS that would occur if a new very fast (sub one second[4]) contingency response market is added to the Rules. This would allow its quick implementation without the need for additional consultation.

As the Paper discusses the need for, in AEMO's view a significant proportion of facilities being frequency responsive, we consider that this is where the need for improved terminology becomes apparent. As we have argued, both proportional and switched controllers do respond to frequency, but AEMO's classification of the former as frequency-responsive and the latter as non-frequency response muddies the issue. We have interpreted AEMO's arguments in section 3.7 of the Paper as suggesting that continuous frequency response – that provided by proportional controllers – are required to adequately maintain control of frequency. Shell Energy disagrees with this assertion. In our view, AEMO's under procurement of services has been the primary factor in deteriorating frequency control in the NEM. In our view the number of facilities actually providing a response is less important than the level of actual response being provided within the required time duration.

AEMO proposes that a set of constraint equations is needed to ensure an appropriate level of FCAS on the mainland, in line with the constraint equations that already exist for the Tasmanian region. AEMO provides scant detail on what this may look like. Given the little amount of detail provided, we recommend AEMO provide additional details regarding what AEMO is actually proposing. Certain constraint equations could restrict the level of enablement of switched frequency responsive facilities in the very fast, fast and slow contingency FCAS to a known value as opposed to requiring a minimum requirement from continuous frequency responsive facilities. The two approaches could produce vastly different results.

We also consider that more detail is required on AEMO's indication that it will reassess the maximum allowable frequency response rate (droop). We believe that more details are required in this area and must include consideration of the replacement of mandatory PFR with a market-based PFR in line with the AEMC's current considerations through the Primary Frequency Response rule change.

While we support AEMO's consideration of area-based limitations on FCAS procurement, greater details regarding any proposal must be supplied in the Draft Report. We agree that it should be implemented as a maximum as opposed to a minimum requirement in any region and that pricing must remained based on the marginal cost of supply on a global basis. Price differentiation between regions should only apply where a region specific (local) FCAS procurement requirement is imposed.

[4] As set out in AEMO's advice to the AEMC which was discussed at the AEMC FFR TWG on Thursday 4 March 2021.

Draft MASS

Shell Energy proposed the following amendments and questions to the proposed, redrafted MASS.

Definitions

Shell Energy recommends the inclusion of a definition for *Enablement amount* defined as: The amount of procured frequency control ancillary service reserves procured by AEMO for the current Dispatch Interval that represents the limit for which a frequency control ancillary services facility may be dispatched or required to respond.

The definitions of *Raise Control Limit, Raise Rate Limit, Regulating Lower Response* and *Regulating Raise Response* should then all include "subject to the *Enablement amount*".

Switching Controller. Add "It can also provide an increase or decrease in generation output or load consumption not just a digital on/off control outcome"

Variable Controller: Replace "Corresponding" with "proportional".

Section 2

2.1 Open Access: Add "on a technology neutral basis" at end.

2.4 Inertia: This should be subject to deletion if very fast contingency services (sub one-second) are included in the MASS. Inertia response should be included as a component of FCAS response.

2.5 Delivery of FCAS by Ancillary Service Facilities. Add "subject to dispatch instructions issued in the Energy Market" at end.

Section 3

"AEMO procures FCAS reserves to manage System Frequency during normal operating conditions and following contingency events. FCAS usually takes the form of an increase or decrease in active power output or consumption by an Ancillary Service Facility to address the impact of supply/demand imbalances on System Frequency from the theoretical dispatch trajectory for the Ancillary Service Facility at any given point in time within the 5-minute dispatch interval. Each type of FCAS is delivered to different specifications to address different needs."

3.2 Regulation FCAS: Regulation FCAS is the deviation away from the theoretical dispatch trajectory at any given point in time within the 5-minute dispatch interval subject to the bid Energy ramp rate limitations of the provider. The maximum deviation from the theoretical dispatch trajectory is based on the enablement amount in any dispatch interval.

Section 4

4.2.1 Replace "dealing" with "detailing"

Section 5

5.2 Enablement: Add "FCAS providers are only required to provide FCAS response based on their Enablement Amount"

Section 9

Shell Energy asks whether there should be a Section 9.3, to replicate the wording of the existing sections 7.3 and 8.3.

Sections 7 to 10

Shell Energy requests clarification on the definition of *price band* and whether this refers to Market Ancillary Services Offer price band. If so, it should explicitly state this. Alternatively, *price band* could be included as a defined term in the Glossary – Section 1.2 in the MASS and be defined as applicable only to a Market Ancillary Services Offer in accordance with NER Clause 3.8.7A

Section 10

10.5 Verification: Where it refers to the sum of the enabled price bands, Shell Energy wishes to understand if this refers to the sum of both the raise and lower price bands, or the sum of the enable raise price bands, or the sum of the lower price bands.

We have noted an error in paragraph (a). We believe it should read "...equal to the lesser of the sum of the enabled price bands of the relevant market ancillary services offer ~~and~~ or the corresponding..."

Additionally, the procedure as described should stipulate that measurements are only to be made during a period where a contingency event does not occur. If a contingency event occurs, the test must be repeated. The procedure should also set out the conditions which would apply where a mandatory regulation PFR response in the opposite direction to that required under the regulation secondary (AGC) frequency response test occurs.

Conclusion

Shell Energy believes that there are a range of changes required to the MASS as part of this review, and that the MASS should be drafted to be ready for the possibility of very fast (sub one-second) services should the AEMC make a rule change to introduce very fast FCAS into the NEM.

We accept AEMO's proposal to maintain the measurement requirements for Fast Contingency FCAS services that formed part of the VPP demonstrations. We consider this will help to diversify supply of these services and improve market competition, leading to better outcomes for consumers. Nonetheless, we believe greater detail is required on some aspects of AEMO's proposal for Distributed Energy Resource (DER) participation in these markets.

Please contact me if you would like to discuss this submission further.

Yours sincerely,

[signed]

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