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Submitted electronically: FPPconsultation@aemo.com.au

RE: Frequency Contribution Factors Procedures Consultation Draft

About Shell Energy in Australia

Shell Energy is Shell’s renewables and energy solutions business in Australia. Shell Energy delivers business energy solutions and innovation across a portfolio of electricity, gas, environmental products and energy productivity for commercial and industrial customers. Our residential energy retailing business Powershop, acquired in 2022, serves more than 185,000 households and small business customers in Australia. The company’s generation assets include 662 megawatts of gas-fired peaking power stations in Western Australia and Queensland, supporting the transition to renewables, and the 120 megawatt Gangarri solar energy development in Queensland. Further information about Shell Energy and our operations can be found on our website [here](#).

General Comments

Shell Energy thanks AEMO for the opportunity to comment on the Frequency Contribution Factors Procedure Consultation Draft Report. Whilst supportive of many of AEMO’s conclusion in the draft report, there are some areas where in our view the Procedure would benefit from some small adjustments.

Measurement of power system frequency

We support AEMO’s proposal to move from a single central frequency measurement point to at least regional based measurement points. We also agree that measurement at each connection point in the power system would lead to an unsatisfactory level of costs and complexity which in this instance is unwarranted. However, we consider there would be benefit in measuring frequency based on key sub-regional locations as opposed to a single measurement point in each region. These key sub-regional locations could be defined based on historical points of line failure which resulted in generating units and potentially scheduled load providing primary frequency response (PFR) being electrically located in areas other than their nominal region. We offer the following initial frequency measurement points for AEMO’s consideration.

Queensland	New South Wakes	Victoria	South Australia	Tasmania
South Pine	Sydney West	Thomastown	Torrens Island	George Town
Braemar	Armidale	Heywood	Davenport	Chapel Street
Calvale	Upper Tumut	Dederang		
Nebo				

Units would be allocated to each frequency measurement point based on their relative strength of electrical connection to each measurement point under system normal conditions. The allocation database should also contain sufficient flexibility to allow temporary reassignment of a generating unit or scheduled load to an alternative measurement point, if required. Non-Scheduled load and generation, (what is currently defined as the residual), would remain allocated to its primary regional frequency reference point at all times.

Whilst this is nine additional frequency measurement points compared to AEMO’s proposal, we consider setting the measurement points on a more granular basis in the initial systems change process offers a cost effective outcome that provides higher accuracy resilience to the Procedure under a wide range of power system operating conditions and one that is preferable to AEMO’s proposed solution to not pay generating units or scheduled load for the provision of PFR when an electrical islanding event does not align with the regional boundaries. This proposed amendment to AEMO’s proposal would provide clear incentives to PFR service providers to continue to provide the required service even during challenging power system operating conditions. AEMO’s proposal would incentivise energy storage systems or schedule load to remove service provision under some power system operating conditions. Shell Energy does not support AEMO’s proposal to not provide frequency performance payments (FPP) in the event that an electrical islanding event is not aligned with a regional boundary.

In the event of a SCADA data failure which impacted one of the frequency measuring points, the affected measuring point would default to the electrically closest alternative measuring point. This default failover provision could be set and communicated to participants in advance. This amendment to AEMO’s proposal would also provide additional benefit in facilitating AEMO implementation of Recommendation 2 from the Final Report – Queensland and South



Australia system separation on 25 August 2018 dated 10 January 2019, to automate reconfiguring of AEMO's systems including AGC and NEMDE after separation and large system events. Post this event on 28 August 2018, AEMO's systems continued to dispatch units based on an incorrect reference frequency and inter-regional network status in the Queensland and South Australia regions for what the Report regarded was an unacceptable time period from a power system security perspective.

#### Determination of the frequency measure

Shell Energy is supportive of AEMO's proposal to use an exponential weighted moving average (EMA) for the frequency measure based on the analysis as presented in the draft report. Whilst acknowledging the proposed EMA does not result in perfectly accurate measurement under all power system conditions, based on AEMO analysis it remains the best of the range of options considered. Notwithstanding, we recommend that the procedure contain clear provisions for regular annual review of the proposed EMA method comparing it to alternative methods, in addition to the proposed review of the EMA smoothing factor key inputs.

Shell Energy also notes AEMO's proposal to include secondary condition benchmarks to deal with the issue as noted by AEMO, that in some instances, the proposed EMA may not accurately reflect the need for PFR or the correct direction of its provision. We are supportive of such secondary conditions. However, we do have some concerns that AEMO proposal to implement a calculation dead band between 49.990 and 50.010 hertz may result in undervaluing the actual amount of PFR being supplied. The power system could remain within this boundary simply because of the level of PFR actually supplied at that point in time, yet no frequency performance payment (FPP) would be made.

We would also like to raise what we consider to be a third secondary condition for AEMO's consideration. Data provided to AEMO technical workshop on 21 February 2023<sup>1</sup>, indicated that at times the proposed EMA measure is misaligned with actual power system frequency which is the physical metric that generating units or scheduled loads providing PFR respond to. This results in a financial distortion of the physical signals which incentivise the provision of PFR. This is similar to the current issue in the contribution factor calculation where at times the Frequency Indicator (FI) is misaligned with power system frequency. Currently where FI and power system frequency are misaligned the trading interval is removed from the contribution factor calculation. We recommend that the draft procedure be amended to record a Null value for those 4 second intervals when misalignment between the frequency measure and measured power system frequency occur.

#### Formulation of default contribution factors

Shell Energy does not support the continued use of the twenty-eight day averaging period for the calculation of the default contribution factor. Once additional time is added for AEMO's contribution factor calculation process and the requirement to publish five business days in advance, the time period on which participants payments is based could be forty-eight to twenty-one days misaligned with FCAS prices which are calculated in real time. This framework provides little incentive for participants to focus on causes of poor default contribution factors.

We consider that a seven-day averaging period would more accurately reflect a generating unit or scheduled loads causation of the need for regulation frequency control ancillary services (FCAS). In addition, our preference is that this be a rolling seven day averaging period with daily publication via the Electricity Markets Management System (EMMS) table as opposed to a static seven or the proposed twenty-eight day period published weekly or every 28 days via a PDF file. This would provide improved incentives for generating units and scheduled loads to improve on poor default contribution factor outcomes as it more closely aligns performance with participant payments. Publication of the contribution factor via the EMMS allows for easy automation of the contribution factor into participant's bidding and dispatch systems. In the event that dispatch or SCADA data was of poor quality, or insufficient to allow the calculation of a reasonably accurate default contribution factor for a generating unit(s) or scheduled load(s), the participant would be allocated the previous days, or last known good, default contribution factor.

We also recommend that AEMO should consult on the ongoing need for the 5 business day notification of the default contribution factor. The temporal accuracy of the default contribution factor would be further improved if this requirement was reduced to align with publication of the initial pre-dispatch for the relevant trading day via the EMMS.

Shell Energy supports AEMO's proposal to cap historical trading intervals with positive performance at zero for each trading interval that makes up the historical performance period for the calculation of the default contribution factor

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<sup>1</sup> AEMO Presentation 21/2/23 - Slide 7 - [Primary Frequency Response Incentives Rule Change \(aemo.com.au\)](https://aemo.com.au)



to apply to the unused or used regulation FCAS portions. This notes that where positive contribution occurs for the active service this will be rewarded separately to the regulating FCAS payments by the FPP. Given this separate payment, poor performance should not be netted out by good performance.

We also support AEMO's proposal to allow netting of poor and good performance, but still capped at zero, for those limited trading intervals where actual performance cannot be calculated and instead a calculated historical performance value is used as a substitute for actual performance. This would result in an outcome where a generating unit or scheduled load that "on average" was a good performing unit would not be liable for FPP.

#### Application of default contribution factors

Shell Energy does not support application (use) of the default contribution factor when an electrical islanding event is not aligned with a regional boundary. We consider that our proposal as set out above for additional frequency measurement points and temporary reassignment of a generating unit or scheduled load, if required, provides improved incentives for the ongoing provision of PFR under what could be challenging power system conditions.

We note and support AEMO's proposal to substitute with the default contribution factor were local SCADA data failure impact one or a small limited number of generating units and scheduled units. AEMO has also raised the issue of not continuing FPP in the event of a regional or global SCADA data failure. In the event there was a generalised and widespread failure of SCADA data that impacted multiple generating units or scheduled loads across all regions, then Shell Energy agrees that the FPP calculation should be suspended and default contribution factors would apply. AEMO's operating procedure SO\_OP\_3706 Market Suspension and Systems Failure in section 8.2 may provide additional guidance in this area with regards to criteria to be met to declare a global SCADA data failure. When such a rare event occurs participants should be advised by market notice that FPP has been suspended.

However, for a regional SCADA data failure, we question if FPP should be suspended as proposed by AEMO as doing so would remove the incentive for generating units and scheduled loads in non-affected regions to continue to supply the required service. RCR could still be calculated for non-affected units and in this case the default contribution factor would be applied to the affected units. A generating unit or scheduled load that "on average" was a good performing unit would not be liable for FPP, however, poor performing units would continue to incur a FPP liability. This maintains the incentives for the continued provision of the required service and for good performance overall.

#### Formulation of requirement for corrective response

Shell Energy does not support capping of the requirement of corrective response (RCR) value. However, we acknowledge AEMO's reasoning as to why an RCR cap may be beneficial for the initial years of FPP operation to allow the market to develop confidence in this new framework. What is not clear in the draft procedure is how the FPP would be calculated and distributed to participants who have provided PFR in good faith when the actual RCR value exceeds the RCR cap value. Would each service provided receive a simple prorate share of the payment. The framework regarding this should be detailed in the Procedure.

AEMO has proposed that any RCR cap should not be active for greater than 0.4% of trading intervals in any year. This equates to 420 trading intervals per year. Shell Energy considers that a threshold of 0.1% or 104 trading intervals would be a more acceptable threshold.

We note that AEMO proposes to use a multiplication constant applied to the regulation FCAS left-hand side term in the applicable regulation FCAS constraint equation review to give effect to this RCR cap and to review the RCR multiplication constant annually. Shell Energy is comfortable with this proposed methodology, however, in addition, this annual review should include a review of the continuing need for the RCR cap with a view to removing the RCR cap when appropriate or by a defined period not exceeding three years. This would prevent a degree of free riding by poorly performing entities on PFR service providers.

With regards to the calculation of the RCR value, this should only represent the sum of the deviation values on individual generating units and scheduled loads values for which good SCADA data is available.

#### Formulation of usage of regulation FCAS

Shell Energy supports AEMO's proposal to use the of the sum of positive deviations for all eligible units with appropriate metering that are enabled to provide the relevant service (capped at the level each unit is enabled for regulation FCAS) that determines what percentage of regulation FCAS costs are recovered on the basis of contribution factors (based on measured performance within a trading interval) and what percentage are recovered on the basis of historical default contribution factors.



For the calculation of overall primary frequency response for FPP, this should be calculated on the sum of positive deviations for all eligible units with appropriate metering regardless of enablement for the provision of regulation FCAS excluding any regulation FCAS enablement cap.

#### Impact of delays in AEMO issuing dispatch instructions

We note the analysis undertaken by AEMO on the impact of SCADA data communication delays in the dispatch process. However, we consider that the issue of AEMO delays in issuing a dispatch instruction has not been adequately address. Currently the deviations from the defined reference trajectory calculation is based on an assumption that the issuing of a dispatch instruction by AEMO perfectly aligns with the start of the trading interval. This is not correct. AEMO can issue a dispatch instruction at any time during a trading interval and historically the dispatch instruction has been issued by AEMO anywhere between 20 to 60 seconds after the start of the trading interval.

In addition to this delay this causes in a generating unit or scheduled load commencing an alteration to its dispatch output to align with the latest dispatch instruction, a generating unit or scheduled load will continue to move towards its latest dispatch instruction until the time at which a new dispatch instruction is issued. This includes continuation of this action into the next trading interval. This outcome occurs for both EMMS and AGC based dispatch.

We recommend that this observable delay in issuing of the dispatch instruction by AEMO should be included in defining the baseline trajectory to account for positive and negative deviations across the entire dispatch period which may include time periods across trading interval boundary times as required. This could be undertaken via offsetting the time period allocated to the reference trajectory by the calculated historical average delay in the issue of the dispatch instruction by AEMO. We also consider that routine monitoring of this time delay in the issuing of the dispatch instruction is warranted with annual review and adjustment of the time offset value if required.

#### Determination of reference trajectories

Shell Energy supports the calculation of the reference trajectory as a linear straight line between the two sequential active energy output dispatch instructions issued by AEMO. As indicated above, this trajectory should be calculated based on the time at which the dispatch instruction is issued and not simply based on the trading interval boundary time.

In addition, in our view AEMO also needs to take account of how the dispatch instruction is issued to a scheduled generating unit or scheduled load. In general, a scheduled generating unit or scheduled load receives its dispatch instruction via AEMO's Automatic Generator Control (AGC) system, as opposed to directly via the EMMS. AGC is the common mechanism for providing the signalling for both Automatic Balancing Control (ABC) and Load Following Services (regulation FCAS). Under AGC control, the facility can either be in ABC or Load Following Mode. The important distinction between ABC and when a unit is enabled for regulation FCAS is that while AGC is actively controlling the facility when providing regulation FCAS, ABC is only providing a representation of a dispatch instruction and an acknowledgement mechanism.

In either ABC or regulation FCAS mode, AEMO's AGC system issues a scheduled generating unit or scheduled load an AGC output setpoint which may vary from the EMMS dispatch instruction, and which may also vary during any dispatch interval. Unit setpoints are issued every 4 seconds by the AGC system. The revised unit setpoint will in each case take into account the initial active energy output and the participant provided rate of change of unit output in determining the latest output setpoint update. We consider that the manner in which the dispatch instruction is issued must also be considered in setting the reference trajectory. For units receiving its dispatch instruction via AEMO's AGC system, use of a simple target-to-target reference trajectory may result in the incorrect calculation of regulation FCAS and FPP liabilities and FPP payments for a generating unit or scheduled load operating under AEMO's AGC control.

AEMO have previously acknowledged the potential for use of a simple target-to-target reference trajectory to result in incorrect calculation of regulation FCAS contribution (causer pays) factors.<sup>2</sup>

*AEMO now considers that a target-to-target reference trajectory may not be the most appropriate basis of determining deviations with respect to the changing generation mix.*

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<sup>2</sup> AEMO Regulation FCAS Contribution (Causer Pays) Factor Procedure Consultation Final Report – November 2018 – Page 18.



*AEMO also acknowledges that alternative reference trajectories (including an initial-to-target trajectory) may provide a stronger incentive for frequency control, and therefore further work should be undertaken to understand the relative merits.*

*AEMO therefore intends to undertake further work to investigate the merits of alternative reference trajectories.*

However, further work in this area was deferred by AEMO focussing on achieving mandatory narrow band primary frequency response and its implementation. Shell Energy considers that this further work should be progressed as part of this consultation process.

#### Aggregated dispatch conformance

Shell Energy supports AEMO's proposal to treat individual generating units and scheduled loads which connect through a single connection point as a permanent aggregated unit for the purpose of calculation of regulation FCAS and FPP liabilities and FPP payments. Where individual generating units and scheduled loads connect through multiple connection points these should not be treated as an aggregated unit.

Where AEMO is unable to calculate and publish contribution factors within a 'reasonable' timeframe

Shell Energy does not support AEMO's proposal to not calculate the active or used service contribution factors in the event AEMO is unable to calculate these within a relatively short timeframe. Instead, we propose that AEMO adopt a process similar to the current manifestly incorrect inputs and manual over constrained dispatch frameworks.

Whilst it would be highly desirable to calculate contribution factors associated with the previous trading interval within the time period of the current trading interval, in the event of an issue occurring that prevented the publication of the factors as above, a delay of up to 30 mins in publication of the data would not impose unmanageable risks on market participants.

In the first instance, when AEMO is unable to calculate the active service contribution factors associated with the previous trading interval within the time period of the current trading interval, AEMO would issue a market notice to indicate this. AEMO would then have 30 minutes to determine if a contribution factor could be calculated and publish the factor if able to do so. In the event this was not possible, AEMO would issue a further market notice to indicate the trading interval is a manual contribution factor interval and would have until the end of the next business day to calculate the contribution factor and advise the market of the calculated value.

We consider this retains the correct incentives for the ongoing provision of the required PFR service and also aligns with well known existing AEMO price revision or determination processes.

#### Further consultation

There are a number of significant issues that are yet to be determined to allow this new framework to provide acceptable outcomes to participants. Given that implementation is scheduled for mid-2025, we consider there remains sufficient time to work through these issues to deliver the best solution of the market overall. We recommend that AEMO consider issue of a directions paper as a next step with further industry technical working groups prior to formulating their final determination report.

For further detail or questions regarding this submission please contact Peter Wormald (peter.wormald@shellenergy.com.au).

Yours sincerely,

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