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RE: Interim Primary Frequency Response Requirements

ERM Power Limited (ERM Power) welcomes the opportunity to respond to the Australian Energy Market Operator's (AEMO) consultation on AEMO's Interim Primary Frequency Response Requirements (PFRR)

About ERM Power

ERM Power (ERM) is a subsidiary of Shell Energy Australia Pty Ltd (Shell Energy). ERM is one of Australia's leading commercial and industrial electricity retailers, providing large businesses with end to end energy management, from electricity retailing to integrated solutions that improve energy productivity. Market-leading customer satisfaction has fuelled ERM Power's growth, and today the Company is the second largest electricity provider to commercial businesses and industrials in Australia by load¹. ERM also operates 662 megawatts of low emission, gas-fired peaking power stations in Western Australia and Queensland, supporting the industry's transition to renewables.

<http://www.ermpower.com.au>

<https://www.shell.com.au/business-customers/shell-energy-australia.html>

Whilst generally supportive of the Interim PFRR, ERM Power offers the following comments with regards to some specific areas of the Interim PFRR as they apply to affected generating systems (Affected GS).

Section 3 – primary frequency response parameters

AEMO has indicated that "Each Affected GS must provide PFR outside the Affected GS' Deadband, which must be no wider than the *primary frequency control band* (PFCB)". We note however that the amended rules specify that PFCB is the minimum settings that AEMO may make the governor deadband setting for an Affected GS rather than the maximum allowable setting under the National Electricity Rules (NER). We also note that an Affected GS may apply for an exemption for actual governor deadband setting based on the inherent technical capability of the Affected GS. Therefore, we recommend that section 3.2 be amended to indicate;

Each Affected GS must provide PFR outside the Affected GS' deadband, which must be no wider than the **deadband setting agreed between AEMO and the Market Participant for the Affected GS.**

We also note that the Final Determination of the Mandatory primary frequency response rule change determined that;

¹ Based on ERM Power analysis of latest published information.



"As part of meeting the requirements of the PFRR, generators will be required to provide a frequency response to a deadband no narrower than the primary frequency control band. However, other response characteristics such as droop and response time will only be specified by AEMO as part of the requirements if practical to do so."²

As the amended rule requires AEMO to develop and publish the interim PFRR in consultation with Market participants³, it is our view that the amended rules intended that the requirements for characteristics such as droop and response time would form part of the consultation process for the development of the PFRR, as opposed to characteristics already set by AEMO prior to consultation commencing. We believe that in considering these characteristics as part of the consultation process AEMO should set out why the values proposed by AEMO for these additional characteristics are technically required to meet the PFRR with regards to operation of the power system.

ERM Power notes and supports the inclusion of cross referencing to Section 4.2 with regards to the specification of "response time". However, we recommend that AEMO consider if the response time requirement set out in Section 3 would be better defined as an additional performance requirement in Section 4. This would result in the requirements around response time being specified in one section only of the PFRR.

Section 4 – additional performance requirements

With regards to section 4.2 we suggest the following amendment;

maintain operation between the Affected GS' current prevailing Maximum Operating Level and Minimum Operating Level

This will ensure that the current prevailing operating conditions, including ambient temperature, are considered when assessing this outcome.

Also, we request further clarity with regards to section 4.2 with regards to the requirements for the Affected GS to provide PFR outside the Normal Operating Frequency Band (NOFB) based on the following;

AEMO in its rule change request indicated that;

"The decline in the primary frequency response (PFR) of generating systems has resulted in this lack of effective frequency control within the normal operating frequency band,"⁴

Consistent with the argument of requiring mandated PFR to improve frequency within the NOFB, AEMO argued that the cost impact for the provision of mandatory PFR within the NOFB on an individual generator would be small.

"If all capable scheduled and semi-scheduled generation in the NEM were required to provide PFR in accordance with AEMO's specifications, all the objectives of this rule would be met with lowest impact on the operation of each affected Generator."⁵

This was further supported by the submission by AEMO of a case study detailing dispatch deviations for five generators over a 24 hour and 7-day period in the Western Australia Electricity Market (WEM).⁶

The Australian Energy Market Commission (the Commission), in its Final Determination to the rule change request, accepted AEMO's arguments that the provision of a widespread requirement for the provision of mandatory PFR on all registered generating units in the NEM would result in only small cost impacts on individual Affected GS.

² Page iv Final Determination - Mandatory primary frequency response rule change

³ Page 51 Final Determination - Mandatory primary frequency response rule change

⁴ Page 1, Cover letter – AEMO Mandatory primary frequency response rule change proposal

⁵ Page 30 – AEMO Mandatory primary frequency response rule change proposal

⁶ AEMO - WEM primary frequency response case study



“The Commission accepts the views expressed by AEMO in its rule change request and supported by its expert advice that a mandatory requirement for primary frequency response applied to a broad cross-section of the generating fleet would mean that costs incurred by each individual generator would likely be minimised. If every scheduled and semi-scheduled generator provides primary frequency response then this will minimise the costs for each individual generator, since no one generator will bear the burden of responding — instead, this will be shared across the entire fleet.”⁷

Further, AEMO in its rule change request acknowledge that the provision of PFR in the National Electricity Market (NEM) outside the NOFB is already provided by procurement by AEMO of contingency frequency control ancillary services (FCAS);

“Contingency FCAS when delivered from a proportional controller is a form of PFR, albeit with a very wide zone of insensitivity not seen in other comparable power systems.”⁸

This was also acknowledged and agreed to by the Commission in the Final Determination;

“Under current arrangements, PFR is provided by fast and slow contingency FCAS services that operate outside the normal operating frequency band (NOFB). The NOFB is defined in the frequency operating standard as 49.85 Hz — 50.15 Hz. PFR may also be voluntarily provided by generator governor response and active power control within the NOFB. Providers of PFR within the NOFB are not directly paid for being frequency responsive”.⁹

In considering the above, it should be noted that AEMO only procures sufficient contingency FCAS response to restore power system frequency to within the NOFB, not to return power system frequency to close to 50 Hertz.

The Rules indicate in several sections the importance of FCAS procurement to the management of power system frequency.

“Ancillary services are services that are essential to the management of power system security, facilitate orderly trading in electricity and ensure that electricity supplies are of acceptable quality.”¹⁰

“AEMO may give dispatch instructions in respect of scheduled generating units, semi-scheduled generating units, scheduled loads, scheduled network services and market ancillary services pursuant to rule 4.9;”¹¹

“AEMO may at any time give an instruction (a dispatch instruction) to a Market Participant which has classified one or more of its generating units or loads as an ancillary service generating unit or an ancillary service load:

- (1) stating that the relevant generating unit or load has been selected for the provision of a market ancillary service;
- (2) stating the market ancillary service concerned; and
- (3) nominating the range to be enabled.”¹²

AEMO is also required to ensure that in meeting its requirements under 4.4.2(a) that;

⁷ Page 19 – AEMC Final Determination Mandatory Primary Frequency Response

⁸Page 6 – AEMO Mandatory primary frequency response rule change proposal

⁹ Page 5 – AEMC Final Determination Mandatory Primary Frequency Response

¹⁰ NER Subclause 3.11.1(a)

¹¹ NER Subclause 4.4.2(a)

¹² NER Subclause 4.9.3A(a)



“AEMO must use reasonable endeavours to arrange to be available and allocated to regulating duty such generating plant as AEMO considers appropriate for automatic control or direction by AEMO to ensure that all normal load variations do not result in frequency deviations outside the limitations specified in clause 4.2.2(a);”

where 4.2.2(a) indicates that;

“the frequency at all energised busbars of the power system is within the normal operating frequency band, except for brief excursions outside the normal operating frequency band but within the normal operating frequency excursion band;”

Given that the amended rule stipulates that AEMO may not require an Affected generator to maintain stored energy, headroom or foot room, (included in the definition of headroom), to ensure the provision of mandatory PFR,

“The Commission has specified in the final rule that the PFRR cannot require generators to maintain additional headroom or stored energy for the purpose of providing primary frequency response. The Commission acknowledges that AEMO did not propose to include a requirement in the PFRR that generators maintain headroom as part of its proposed rule”¹³

it is unclear to ERM Power how section 4.2 may require the provision of mandatory PFR outside the NOFB given AEMO’s and the Commission statements that; the provision of mandatory PFR is only expected to require small deviations from dispatch targets and incur minimal costs, and seek clarity from AEMO regarding this. From ERM Powers perspective we are concerned that the provision of mandated PFR should not be the case for large power system frequency excursions outside the NOFB and doing so place providers of mandatory PFR outside the NOFB at a commercial disadvantage to service providers paid for the provision of PFR via the contingency FCAS markets. Provision of PFR outside the NOFB would not in our view result in the minimisation of costs on these Affected GS as set out in the rule change request and Final Determination.

Section 5 – initiation of application

Given the need to acquire a high level of technical assistance in determining the inherent technical capability of the generating units and also the internal engineering resource that will be required for commissioning and testing at a time when COVID-19 is resulting in reduced capability in these areas, we recommend AEMO consider an additional blanket extension of 40 business days to the timeframes set out in Table 2.

With regards to the requirement to specify a date to achieve a deadband of +/- 0.015 Hz and noting our request to amend Section 3 with regards to the required deadband setting, we offer the following amendment to 5.1 (b);

nominate using the form in **Error! Reference source not found.** whether it wishes to alter the Affected GS’ Deadband to ~~±0.015Hz~~ the final deadband setting agreed between AEMO and the Market Participant for the Affected GS. in one step, or to ±0.05Hz, or another interim deadband setting agreed between AEMO and the Market Participant for the Affected GS. and then to ~~±0.015Hz~~ the final deadband setting agreed between AEMO and the Market Participant for the Affected GS. on another date, to be coordinated by AEMO; and

Section 7 – exemptions and variations

AEMO in 7.1.1 set out the basis for full or partial exemption based on the technical capability of the Affected GS. To improve clarity in this area with regards to interaction with the original equipment manufacturers technical envelope, we recommend that this subsection be amended to;

¹³ Page21 – AEMC Final Determination Mandatory Primary Frequency Response



If an Affected Generator's application for exemption or variation is on the basis that an Affected GS is inherently incapable of operating in frequency response mode, or meeting some particular PFRP, the Affected Generator must demonstrate this incapability no matter what changes are made to the Affected GS by providing AEMO with copies of relevant original equipment manufacturer (OEM) specifications, ~~or test results~~, or advice."

For the avoidance of doubt, AEMO acknowledge that an Affected GS cannot be required to operate outside the technical envelope approved by the original equipment manufacturer.

We believe it is critical that the final interim PFRR must not set out a requirement that would lead to the Affected GS being operated in a way that is detrimental to generating unit operations as set out by the OEM.

Section 8 – stability tests

In order to eliminate the possibility of misinterpretation from the second paragraph of subsection 8.1, we recommend re-ordering of the initial words of the paragraph to make it read:

"Where material changes are only made to governor or plant load controller deadbands, or to the DCS, modelling and testing beyond that described in section 8.2 will not be required by AEMO until expiry of the testing cycle detailed in an Affected GS' compliance program under clause 4.15(b) of the NER.

We also note AEMO's inclusion of recorded test outcomes of "Values are to be provided to AEMO at a sample rate of no less than one sample per cycle, unless agreed by AEMO" We note that the Final Determination for the Mandatory primary frequency response rule change and final rule had both the intent and clearly stipulated that AEMO may not require either the installation of new or the modification of monitoring equipment to monitor and record the response of the relevant generating system to changes in power system frequency.

"In response to stakeholder concerns made on the draft rule, the final rule also provides that the PFRR must not require the installation or modification of monitoring equipment to monitor and record the response of the relevant generating system to changes in power system frequency for the purpose of verifying compliance with the mandatory PFR requirement. The final rule does require, including consulting with industry, AEMO to document the details of the information to be provided by Generators to verify compliance with the PFRR, including any compliance tests or audits and testing requirements for the purpose of verifying compliance through its PFRR."¹⁴

We are concerned that the inclusion of words "Values are to be provided to AEMO at a sample rate of no less than one sample per cycle, unless agreed by AEMO" in the interim PFRR seeks to circumvent this area of the final rule change and recommend that the wording be changed to;

Values are to be provided to AEMO at a sample rate agreed between AEMO and the registered Market Participant for the Affected GS based on the capability of existing monitoring equipment in accordance with the requirements of NER subclause 4.4.2A (c)."

This ensures that an agreement must be reached following consultation to the satisfaction of both AEMO and the Market Participant rather than just AEMO.

Section 9 – compliance

We recommend that two additional dot points be added to section 9.1 to indicate;

- prevailing ambient temperature conditions

which is a critical consideration for gas turbines, and

¹⁴ Page iv Final Determination - Mandatory primary frequency response rule change



- [when operating in accordance with the provisions of NER Clause 3.8.19 – Dispatch inflexibilities](#)

The need for an Affected GS to operate in a mode where it is unable to comply with a dispatch instruction predominantly occurs in real time and the ability for a generator to request exemption from AEMO in accordance with subsection 9.2 in this circumstance, is in our view impractical.

Further, the Rules are clear and substantive as to when an Affected GS may submit a *dispatch inflexibility* dispatch bid or offer and that a generator may only submit a *dispatch inflexible* dispatch bid or offer where the Affected GS is unable to follow dispatch instructions and is subject to the Market Participant for the Affected GS supplying to the Australian Energy Regulator (AER) upon written request;

“such additional information to substantiate and verify the reason for such *inflexibility* as the *AER* may require from time to time.”¹⁵

We consider that the requirements of Clause 3.8.19 of the NER are sufficiently clear and substantive so as to provide to AEMO clear evidence for the reasoning where PFR is not provided during a period where an Affected GS has submitted a dispatch bid or offer and is operating under the provisions of Clause 3.8.19. This would remove a potential compliance burden on both market participants and the AER.

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

Yours sincerely

[signed]

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¹⁵ NER subclause 3.8.19(b)(2)