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Dear Adrian

Implementation of proposed increase to the Load Following Ancillary Service (LFAS) requirements

Thank you for your request for further explanation in regard to AEMO's letter dated 25 August 2020 seeking a revision to the LFAS requirements under clause 3.11.3.

The following summarises AEMO's proposed approach to implementing the new requirements which are:

Service	Current approved requirement for 2020/21	Proposed requirement for 2020/21
LFAS Upwards	85 MW between 5.30 AM and 7.30 PM 50 MW between 7.30 PM and 5.30 AM	Up to 105 MW between 5.30 AM and 7.30 PM Up to 80 MW between 7.30 PM and 5.30 AM
LFAS Downwards	85 MW between 5.30 AM and 7.30 PM 50 MW between 7.30 PM and 5.30 AM	Up to 105 MW between 5.30 AM and 7.30 PM Up to 80 MW between 7.30 PM and 5.30 AM

As the actual impact on the SWIS of the additional non-synchronous generation that is currently being commissioned remains uncertain, AEMO has proposed an upper bound on the required LFAS quantities. AEMO proposes to implement the additional LFAS requirements in a staged approach as operational experience with the new facilities is developed.

AEMO proposes an initial increase to the current LFAS quantities of 10 MW during the day (increasing the quantities to 95 MW) and 20 MW at night (increasing the quantities to 70 MW) from late September as:

- The current daytime LFAS requirements already cater for a greater amount of volatility than the current night-time requirements; and
- The relative contribution of additional volatility is expected to be higher during the night-time.

AEMO will monitor the adequacy of the LFAS quantities by analysing the cause of any increased volatility as well as reviewing actions taken in real time in response to that increased volatility which may include the use of Backup LFAS or redispatch of the Balancing Portfolio beyond what would have been required in the absence of any additional volatility.

Should AEMO's analysis indicate that the initial LFAS quantities are inadequate, AEMO will increase the LFAS quantities to the upper boundary during the day, night, or both. That is, AEMO will again increase the quantities by the remaining amount as required, which will be up to:

- An additional 10 MW during the day (increasing the quantities to 105 MW), and
- An additional 10 MW during the day (increasing the quantities to 80 MW).

Note that the ability to manage frequency within the Normal Operating Frequency Band is not the only measure of adequacy of the LFAS requirements.

AEMO will review the LFAS requirements again by December 2020 as further operational experience is gained.

Please do not hesitate to contact me if you have any queries.

Yours sincerely



Dean Sharafi
Group Manager – System Management

ATTACHMENT – 2020 LFAS Ancillary Service Requirement calculation methodology

In the absence of a full data set to analyse the actual system outcomes, the initial approach to determining the additional requirements for the remainder of the 2020-21 financial year, was to estimate the additional requirements expected to be introduced through the addition of the new NSG facilities compared to the year 1 April 2019 to 1 April 2020. The two key considerations are 130 MW of additional grid-connected solar PV and 390 MW of wind.

The solar generation is split into two geographically and electrically diverse areas, as well as being distant from Perth where most of the rooftop PV is located. Without sufficient data to provide an alternative perspective, it is assumed for this year that the new solar facilities will not materially impact the requirement during sunlight hours, as any fluctuations in cloud cover are unlikely to impact all sites at the same time. When compared to the 1.5 GW of rooftop PV installed, which is the largest driver of the daytime LFAS requirements, the impact of the new solar farm is expected to be minimal.

To estimate the additional LFAS requirements introduced by the connection of the new wind facilities, a comparison was done from a base case (excluding the new facilities) with the requirements considering possible output of the facilities. The base variability in generation requiring LFAS response was determined for the period 1 April 2019 to 1 April 2020. This was used as an estimate for the amount of LFAS that would have been used if there were no other frequency controlling mechanisms in the system. The data was segmented into day and night time periods as per the current LFAS requirements i.e. from 5:30 AM to 7:30 PM and from 7:30 PM to 5:30 AM. Analysis was done to determine what an adequate LFAS Upwards and LFAS Downwards requirement would be to counter the downward and upward fluctuations for 99% of the time respectively¹.

1.1. Comparison with requirements scaled from existing facilities over an annual period

As a first pass estimation of the output of the new windfarms, the possible (unconstrained) output of existing windfarms in the vicinity of these new windfarms was scaled up to estimate what the new windfarms would have generated if they were in operation. As a persistent forecast is utilised in the real time dispatch engine (RTDE) to forecast each 5 minute instant in time, for each 5 minute datapoint a 10 minute look ahead forecast error in the modelled wind output was calculated as a proxy for the additional fluctuation that would require LFAS to respond. This was combined with the base case scenario and the analysis was repeated to determine what an increased LFAS Upwards and Downwards requirement would be to respond to the downward and upward fluctuations for 99% of the time respectively.

When the difference between these results and the base case results was considered, an estimate of the additional LFAS required was 21MW for both peak and off-peak periods.

¹ Clause 3.1.1 of the WEM Rules states that the frequency and time error standards for a Network in the SWIS are as defined in the Technical Rules that apply to that Network. The frequency standards in the Technical Rules require that frequency should be within the normal operating band for 99% of the time.

1.2. Comparison with possible output from new facilities

An analysis has also been undertaken to validate the extrapolation approach (scaling of existing facilities) using operational measurements available to date (wind speeds recorded at the two new facility sites for up to 29 days).

Similar to the previous approach, a base case was considered, which did not include the impact from commissioning facilities, which was then compared to a case where the estimated output of the facilities was calculated based on the actual wind speeds and assuming they had been fully commissioned. Results from this limited data set indicated an additional requirement of 23 MW and 41 MW for peak and off-peak periods respectively.

As the two approaches both support an increased requirement of approximately 20 MW for the peak requirement, it is proposed that the peak LFAS Upwards and Downwards requirements be increased from 85 MW to 105 MW.

With the limited data available for the analysis of data from the new windfarms, it is not possible to confirm the reason for the larger increase of 41 MW in off-peak periods. While it may be correct, there is also a possibility that there is insufficient data to produce a valid outcome or that it may indicate some seasonal behaviour. As the two approaches suggest that an increase of between 21 MW and 41 MW is required for the off-peak period, it is considered that an increase of 30 MW will allow AEMO to manage power system security given the limited data and the ability to procure Backup LFAS. Thus, the recommendation is to increase the off-peak period LFAS Upwards and Downwards requirements from 50 MW to 80 MW.

As this analysis is based partially on a limited data set, it may not accurately reflect the annual impact. Consequently, AEMO proposes to implement these requirements in a staged approach to increase the values to what is needed to manage power system security. AEMO intends to review the LFAS Ancillary Service Requirement again in December 2020, or earlier if deemed necessary.

The proposed LFAS requirements for the remainder of the 2020-21 Financial Year are as follows;

1. LFAS Upwards:

- Up to 105 MW between 5.30 AM and 7.30 PM;
- Up to 80 MW between 7.30 PM and 5.30 AM.

2. LFAS Downwards:

- Up to 105 MW between 5.30 AM and 7.30 PM;
- Up to 80 MW between 7.30 PM and 5.30 AM.