Ancillary Services Report for the WEM 2019

June 2019

System Management

Important notice

PURPOSE

AEMO publishes the Wholesale Electricity Market Ancillary Services report under clause 3.11.13 of the Wholesale Electricity Market Rules.

This publication has been prepared by AEMO using information available at 10 May 2019. Information made available after this date may have been included in this publication where practicable.

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VERSION CONTROL

Version	Release date	Changes
1	31/5/2019	Submission to ERA

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1. Introduction

Each year AEMO is required to publish an Ancillary Services report for the Wholesale Electricity Market (WEM), including the Ancillary Service Requirements for the next year and an Ancillary Services plan to meet those requirements.

1.1 Purpose

Clause 3.11.2 of the WEM Rules requires AEMO to update Ancillary Service Requirements on an annual basis. The Ancillary Service Requirements must be set based on the facilities and configuration expected for the SWIS in the coming year.

Clause 3.11.6 of the WEM Rules requires AEMO to submit the Ancillary Service Requirements to the Economic Regulation Authority for approval.

Clause 3.11.11 of the Wholesale Electricity Market Rules (WEM Rules) states:

> By 1 June each year, System Management must submit to the Economic Regulation Authority a report containing information on:
>
> (a) the quantities of each of the Ancillary Services provided in the preceding year, including Ancillary Services provided under Ancillary Service Contracts, and the adequacy of these quantities;
>
> (b) the total cost of each of the categories of Ancillary Services provided, including Ancillary Services provided under Ancillary Service Contracts, in the preceding year; and
>
> (c) the Ancillary Service Requirements for the coming year and the Ancillary Services plan to meet these requirements.

Clause 3.11.12 of the WEM Rules requires the Economic Regulation Authority (ERA) to audit the Ancillary Services plan.

Clause 3.11.13 of the WEM Rules requires AEMO to publish the Ancillary Services report (including the Ancillary Services plan).

1.2 Frequency operating standards

Clause 3.11.1 of the WEM Rules requires AEMO to determine all Ancillary Service Requirements in accordance with the SWIS Operating Standards and the Ancillary Service Standards.

The SWIS Operating Standards are defined as "the standards for the operation of the SWIS including the frequency and time error standards and voltage standards set out in clause 3.1". Clause 3.1 states that the frequency, time error standards and voltage standards for a Network in the South West Interconnected System (SWIS) are as defined in the Technical Rules that apply to that Network.

Table 1 summarises the frequency operating standards for the SWIS as defined in the Technical Rules[1]. AEMO uses these frequency operating standards to assess SWIS frequency performance.

The Ancillary Service Standards are intended to enable AEMO to ensure the SWIS operates within normal frequency bands and to restore the SWIS to the normal frequency bands within the target recovery time following a contingency event.

[1] Table 2.1 of the Technical Rules.

Table 1 Frequency operating standards for the South West Interconnected Network

Condition	Frequency band	Target recovery time
Normal range: South West	49.8 to 50.2 Hz for 99% of the time	
Single Contingency Event	48.75 to 51 Hz	Normal range: within 15 minutes For over-frequency events: below 50.5 Hz within 2 minutes

There are different categories of frequency control Ancillary Services in the SWIS.

- The Load Following Service (LFAS) is used to continuously balance supply and demand. While contingency reserves arrest the frequency change following a contingency event, LFAS will restore the frequency to 50 Hz[2]. LFAS is dispatched using Automatic Generation Control (AGC). Clause 3.10.1(a) of the WEM Rules sets the standard for LFAS as a level that is the greater of 30 MW and the capacity sufficient to cover 99.9% of the short-term fluctuations in load and output of Non-Scheduled Generators and uninstructed output fluctuations from Scheduled Generators[3].
- Spinning Reserve (SRAS) and the Load Rejection Reserve (LRR) are relied on as contingency reserves to arrest a frequency change following the unplanned loss of generation or demand. While some SRAS is provided by Interruptible Loads, SRAS and LRR are mostly provided using the governor droop response on specific synchronous generators able to maintain the response for the period of service. The interaction of LFAS, SRAS, and LRR to meet the frequency operating standards is discussed in Section 1.3.

Frequency regulation in the SWIS is achieved by a combination of AGC and governor action. The Technical Rules[4] require the dead band of a generator to be less than 0.05 Hz; therefore, unless exemptions to the Technical Rules apply, generators that have available headroom will respond to changes in frequency, even within the normal frequency operating band. This includes generators specifically assigned to provide SRAS, as well as all other governor-controlled generators[5] not running at maximum output. The effect of AGC and generator governor control ensures frequency is kept within the normal operating band.

The frequency performance of the SWIS for the period under review is provided in Figure 1. The frequency remained in the normal operating band for 99.992% of the time. This meets the frequency operating standards specified in the Technical Rules. This performance was a product of the combination of active frequency control of the LFAS generators via AGC and the governor responses from all online generators.

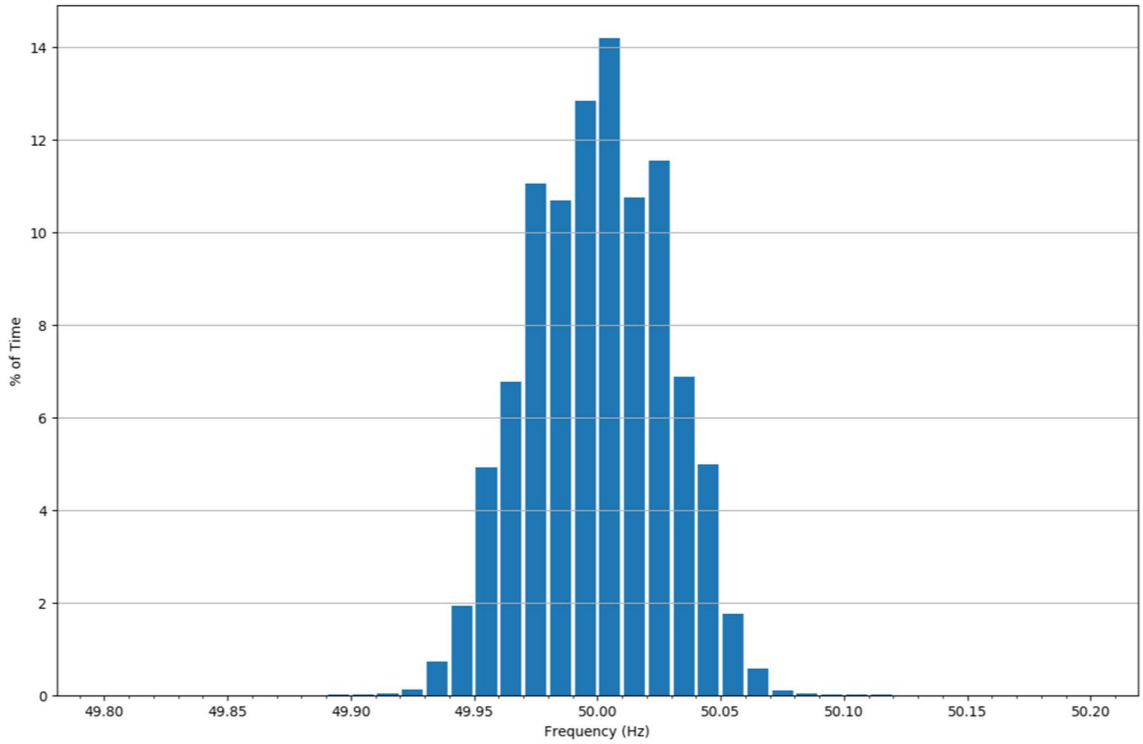
[2] Depending on the size of the contingency, rebalancing may be required to restore frequency to 50 Hz.

[3] In practice, 30 MW is not considered to be sufficient, and AEMO uses clause 3.10.1(a)(ii) of the WEM Rules to determine LFAS requirements.

[4] Clause 3.3.4.4(d) of the Technical Rules states that "[t]he dead band of a generating unit (the sum of increase and decrease in power system frequency before a measurable change in the generating unit's active power output occurs) must be less than 0.05 Hz".

[5] For any frequency disturbance, dispatchable thermal generating units with initial output up to 85% of rated output are required to respond within 6 seconds and sustain this response for not less than a further 10 seconds.

Figure 1 Frequency performance of the SWIS from May 2018 to April 2019



1.3 Interaction of LFAS, SRAS, and LRR to meet frequency operating standards

The WEM Rules contemplate that some LFAS Upwards capacity is counted towards SRAS capacity. Clause 3.10.2(b) states that "the SRAS standard level must include capacity utilised to meet the LFAS standard under clause 3.10.1, so that the capacity provided to meet the LFAS requirement is counted as providing part of the SRAS requirement".

LFAS and SRAS are two technically distinct services. Facilities provide LFAS by means of AGC. AGC, an algorithm within the central Energy Management System, calculates and apportions the power imbalance resulting from fluctuations in load or Non-Scheduled Generation to LFAS-enabled Facilities in order to keep the power system frequency within the normal operating band[6]. The time it takes for a Facility to respond to an AGC signal depends on the communication route and may be up to 10 seconds or more from the time a signal is sent. As a result, AGC is not effective in managing large rapid power imbalances resulting from generator contingencies which requires immediate response to prevent underfrequency load shedding.

SRAS exists to manage large power imbalances as a result of failure of one or more generators or transmission equipment[7], and can only be provide d by Facilities able to immediately respond to a frequency deviation. The Technical Rules[8] require most Facilities to respond to frequency changes. However, this is not in a manner that meets SRAS response requirements[9].

[6] The normal frequency operating band in SWIS is 49.8 Hz and 50.2 Hz.

[7] Clause 3.9.2(a) of the WEM Rules.

[8] Clause 3.3.4.4 of the Technical Rules.

[9] Under the Technical Rules, generating units with a capacity of 10 MW or greater must be capable of achieving an increase in the generating unit's active power in response to system frequency excursion. However, the output may only be sustained for 10 seconds where the initial output is 85% of the rated active power output or less.

To arrest frequency decline and prevent under frequency load shedding, AEMO must ensure an adequate SRAS quantity can respond within 6 seconds. As a result, SRAS Facilities[10] do not use AGC to provide the spinning reserve response, responding instead by means of governor droop action.

Under the current Rules, Synergy, as the default provider of Ancillary Services, provides Facilities capable of providing SRAS. The capabilities of these Facilities are stated in the Synergy Dispatch Guidelines provided to AEMO which are updated from time to time. For other Market Participants, the SRAS Contracts include detailed technical and performance requirements (which are customised for SRAS) and testing procedures. These are designed to ensure that the non-Balancing Portfolio Facilities are (and continue to be) technically capable of providing SRAS.

AEMO's view is that LFAS Upwards capacity can only be counted towards SRAS capacity if it is provided by a Balancing Portfolio Facility[11], or by a non-Balancing Portfolio Facility under an SRAS Contract. AEMO's view is supported by the WEM Rules amendment history as detailed in Appendix A4. In summary, the LFAS and SRAS Ancillary Service Standards have remained unchanged since the WEM Rules commenced, but the manner in which LFAS and SRAS are provided has changed.

As such, AEMO counts the following Facilities providing LFAS Upwards towards the Spinning Reserve requirement:

- Facilities in the Balancing Portfolio as provided by Synergy in their Dispatch Guidelines[12]; and
- Facilities outside the Balancing Portfolio that are the subject of an Ancillary Services Contract for Spinning Reserve.

While not required by the WEM Rules, AEMO also counts the following Facilities providing LFAS Downwards towards the Load Rejection Reserve requirement:

- Facilities in the Balancing Portfolio as provided by Synergy in their Dispatch Guidelines; and
- Facilities outside the Balancing Portfolio that are the subject of an Ancillary Services Contract for Load Rejection Reserve[13].

This is not precluded by the WEM Rules and is consistent with the practice for SRAS.

[10] Facilities in this context refer to generating systems. Interruptible loads respond to frequency drops by tripping loads at a specified frequency.

[11] Synergy is the default provider of Ancillary Services. Based on Synergy's Dispatch Guidelines provided to AEMO as well as the observed response to past system events, Balancing Portfolio Facilities that provide LFAS have proven to be capable to provide SRAS.

[12] Synergy Dispatch Guidelines are updated from time to time. AEMO validates the technical capability of the units based on response to past events.

[13] There are currently no Load Rejection contracts.

2. Ancillary Services quantities

This section describes the quantity of each Ancillary Service provided in the preceding year and the adequacy of those quantities. The period of reporting is May 2018 to April 2019.

2.1 Overview

Clause 3.9 of the WEM Rules defines the following Ancillary Services:

1. Load Following Service (LFAS).
2. Spinning Reserve Service (SRAS).
3. Load Rejection Reserve Service (LRR).
4. Dispatch Support Service (DSS).
5. System Restart Service.

2.2 Load Following Service (LFAS)

The LFAS requirement approved for the 2018-19 Financial Year was 72 MW for LFAS Upwards and 72 MW for LFAS Downwards to be enabled for each Trading Interval.

There were three LFAS providers in the 2018-19 Financial Year, one of which was certified to provide the service in February 2019.

Backup LFAS was utilised on three occasions, due to volatility in Non-Scheduled Generation and rooftop photovoltaic (PV) significantly exceeding the cleared quantities. This is the first time when Backup LFAS as allowed for under clause 7B.4.1(b) of the WEM Rules has been utilised since the market commenced. More details are provided in Appendix A1.3.

The average quantity of LFAS Upwards and LFAS Downwards enabled by all providers in the reporting period is shown in Table 2.

Table 2 LFAS quantities

	LFAS Upwards	LFAS Downwards
Average quantity enabled[A]	103 MW	104 MW
Average number of minutes per day requirement not met	10.9 minutes	5.8 minutes
% of time requirement met[B]	99.2%	99.6%
Frequency within normal operating range for > 99.9% of the time[C]	Yes	

A. For non-Balancing Facilities, the quantity enabled is the LFAS Market cleared volume, while for Balancing Portfolio Facilities, it is the entire operating range. For the purpose of this analysis, half of the quantity enabled for Balancing Portfolio Facilities is assumed to be LFAS Upwards and the other half is assumed to be LFAS Downwards. This is explained further in Appendix A1.1.

B. Whilst AEMO endeavours through its operational planning to have the required level of LFAS available, real time events results in less than 100% achievement to this target.

C. Clause 3.10.1(a) of the WEM Rules sets the standard for LFAS as a level that is the greater of 30 MW and the capacity sufficient to cover 99.9% of the short-term fluctuations in load and output of Non-Scheduled Generators and uninstructed output fluctuations

from Scheduled Generators. In practice, 30 MW is not considered to be sufficient, and AEMO uses clause 3.10.1(a)(ii) of the WEM Rules to determine LFAS requirements.

AEMO enables specific Facilities to provide LFAS based on LFAS Market outcomes. A Facility may provide LFAS Upwards, LFAS Downwards, or both. If a non-Balancing Portfolio Facility is cleared in the LFAS Market, it is automatically enabled via AGC to provide LFAS Upwards, LFAS Downwards, or both, for the quantity at which it was cleared. It is therefore possible to specify the exact quantity of LFAS that is enabled from a non-Balancing Portfolio Facility.

The dispatch of the Balancing Portfolio, however, requires AEMO to manually select the Facilities. Balancing Portfolio Facilities enabled via AGC provide a combination of services, including LFAS and energy balancing services for the Synergy Portfolio. Therefore, each Facility in the Balancing Portfolio is enabled for its entire operating range, providing LFAS Upwards and LFAS Downwards depending on the output at the time. Further details are provided in Appendix A1.1.

Consequently, the LFAS contribution from individual generators in the Balancing Portfolio is not limited to a defined range, and the quantity of LFAS enabled may exceed the requirement.

Based on the observed frequency performance, the quantity of LFAS provided during the reporting period was adequate.

2.3 Spinning Reserve Service (SRAS)

For the 2018-19 Financial Year, SRAS was provided by Balancing Portfolio Facilities and by non-Balancing Portfolio Facilities under three Ancillary Service Contracts. Generation Facilities in the Balancing Portfolio are not specifically enabled to provide SRAS. The available quantity from Balancing Portfolio Facilities is based on the spare capacity of SRAS-capable Balancing Portfolio Facilities operating. The available quantity from a non-Balancing Portfolio Facility is based on the Ancillary Service Contract, which requires the non-Balancing Portfolio Facility to satisfy technical criteria and operate within a specific range.

Table 3 shows the availability of the non-Balancing Portfolio Facilities that provided SRAS under Ancillary Service Contracts. SRAS was not available at all times due to outages.

Table 3 SRAS Ancillary Service Contracts

	Interruptible Load	Scheduled Generator 1	Scheduled Generator 2
Contract quantity	42 MW	13 MW	13 MW
% of time available	97%	88%	86%

The SRAS requirement approved for the 2018-19 Financial Year was the maximum of:

1. 70% of the largest generating unit; and
2. 70% of the largest contingency event that would result in generation loss.

AEMO may relax the SRAS requirement by up to 12% where it expects that a shortfall will be for a period of less than 30 minutes[14].

In the case of a shortfall of up to 12% for a period of less than 30 minutes, the availability of SRAS was considered to be adequate.

There was adequate Spinning Reserve for about 99.4% of the time during the reporting period. The average shortfall was 17 MW. Analysis has shown that about 82% of the time, when there was a shortfall in SRAS, this

[14] Clause 3.10.2(c) of the WEM Rules.

was as a result of LFAS Upwards being utilised[15]. The inclusion of LFAS in SRAS means it is likely that there will be times when the available SRAS is less than the requirement as some of the LFAS Upwards is utilised. In such situations, AEMO will assess the risk and where necessary take appropriate measures to minimise the risk to power system security. It is possible in such a scenario, if the largest contingency were to occur during a time when there was inadequate SRAS and there was no other available response from other generators on the system, that under-frequency load shedding could occur.

During the reporting period, 13 contingencies resulted in High Risk Operating States or Emergency Operating States. These contingencies varied in loss of generation from 114 MW to 340 MW. The lowest frequency recorded was 49.01 Hz following the loss of 330 MW of generation. There were no under-frequency load shedding events recorded during the reporting period.

Overall, the quantity of SRAS provided during the reporting period was adequate.

Table 4 SRAS availability

	Quantity
Highest minimum requirement (catering for 340 MW contingency)[A]	238 MW
Average spinning reserve availability (peak periods)	288 MW
Average SRAS requirement on which payment based (peak)[B]	224 MW
Average SRAS availability (off peak periods)	262 MW
Average SRAS requirement on which payment based (off-peak)[B]	189 MW
% of time requirement met[C]	99.4%
Average minutes per day requirement not met	8 minutes
Frequency excursions below 48.75 Hz[D]	0

A. The largest single generating unit in the SWIS is 340 MW.
B. This figure is the amount used in the modelling done for the Margin Values determination for the 2018-19 Financial Year.
C. Whilst AEMO endeavours through its operational planning to have the required level of SRAS available, real time events result in less than 100% achievement to this target.
D. Clause 3.9.2 of the WEM Rules defines the purpose of SRAS as, among other things, to retard frequency drops following the failure of one or more generating works or transmission equipment. Table 2.1 of the Technical Rules sets the minimum frequency operating standard for a single contingency event as 48.75 Hz.

2.4 Load Rejection Reserve Service (LRR)

LRR was provided by generation Facilities in the Balancing Portfolio that were capable of doing so. These generators are not specifically enabled to provide LRR. A generator can provide LRR when it is online, and its output is in the correct range. The quantity of the available reserve is determined by the generator's output and its ability to respond when the frequency increases.

Since the beginning of April 2019, AEMO has been conducting a LRR trial using a dynamic requirement in real time. The dynamic formulation incorporates physical aspects of the power system, including:

1. Setting the upper limit of the LRR requirement based on the largest credible contingency in real time[16];
2. Allowing for the consequential corresponding change in load as a result of an increase in frequency, known as load relief; and

[15] This relates to LFAS provided by generators that is counted towards SRAS under the WEM Rules SRAS.

[16] This has been set to a maximum of 120 MW.

3. Where required by the Network Operator as a requirement of connection to the SWIS, allowing for the operation of Facility protection systems in response to frequency.

The purpose of the trial is to determine whether it is possible to practically manage a dynamic LRR requirement while still ensuring system security. If the trial is successful, AEMO will use the experience to determine the requirements in the 2020-21 Financial Year.

The LRR requirement approved for the 2018-19 Financial Year was a maximum of 120 MW (with a 25% reduction allowance if AEMO considers that the probability of transmission faults is low). During the year, AEMO planned for 120 MW LRR in the planning timeframe and the level was relaxed to 90 MW in real time based on the control room risk assessment on the probability of transmission faults[17].

The adequacy of LRR is described by the percentage of time that the quantity of LRR provided at each point in time was in the indicated range in real time. These values were determined for each 4-second period.

Although adequate LRR was planned for and made available pre-dispatch, there were periods when the minimum requirement for LRR was not met in real time (approximately 4.5% of the time). This was a consequence of changes in power system conditions, particularly where variability in non-scheduled generation and load affected the availability of LFAS Downwards (which is considered as providing part of LRR, as discussed in Section 1.3). Based on experience of past events, even when the quantity of LRR available was lower than the requirement, the standard for LRR service was still met, as the frequency would not have exceeded 51 Hz for credible load rejection events.

During the reporting period there were no frequency excursions greater than 50.2 Hz.

Overall, the quantity of LRR provided during the reporting period was adequate.

Table 5 LRR availability

	Quantity
LRR requirement	Up to 120 MW
Relaxed LRR requirement[A]	90 MW
Average LRR	151 MW
% of time 120 MW requirement met	75.7%
% of time 90-120 MW provided	19.8%
% of time less than 90 MW was provided[B]	4.5%
Frequency excursions above 51 Hz[C]	0

A. Clause 3.10.4(b) of the WEM Rules allows the LRR standard to be relaxed by up to 25% (to 90 MW) where AEMO considers that the probability of a transmission fault is low.
B. Whilst AEMO endeavours through its operational planning to have the required level of LRR available, real time events results in less than 100% achievement to this target.
C. Clause 3.10.4(a) of the WEM Rules requires the LRR standard to be a level sufficient to keep over-frequency below 51 Hz for all credible load rejection events.

2.5 Dispatch Support Service (DSS)

There was one DSS Ancillary Service Contract in place during part of the 2018-19 Financial Year. This contract compensated Synergy for energy provided from the Mungarra and West Kalgoorlie Facilities. This arrangement was required to manage network reliability issues in these regions, which are significant enough

[17] The real time risk assessment considers the probability of transmission faults as high when there is lightning or storms that could result in loss of the transmission line supplying Eastern Goldfields or Boddington Gold Mine.

to affect Power System Reliability in the SWIS. The energy provided under this DSS contract for the reporting period is provided in Table 6.

Table 6 Energy provided under DSS Ancillary Service Contract

Dispatch Support Facility	Energy provided (MWh) 1/5/2018 - 30/09/2018	Energy provided (MWh) 1/5/2017 - 30/4/2018
Mungarra Power Station	1,965	5,270
West Kalgoorlie	1,063	564

The DSS Ancillary Service Contract ended in September 2018 as the service was no longer required.

There were significant network outages that required generation from the West Kalgoorlie Facility prior to this date, resulting in an increase in energy provided by the West Kalgoorlie Facility compared to the previous year.

2.6 System Restart Service

There were three System Restart Service Ancillary Service Contracts in place during the 2018-19 Financial Year. The previous contract with Synergy for the Kwinana Facility ended on 30 June 2018[18].

After a competitive tender process, AEMO signed a new contract with Synergy for a System Restart Service from the Kemerton Facility in the South West Region to increase geographic diversity. The service commenced in October 2018 after the Kemerton Facility was commissioned.

Successful restart tests under the other two contracts were completed during the reporting period.

No events occurred during the reporting period that required a system restart.

Table 7 System Restart Service availability

Facility	Market Participant	% of days available[A]
Pinjar	Synergy	96%
Kwinana Donaldson	Perth Energy	83% [B]
Kwinana	Synergy	100%[C]
Kemerton	Synergy	100%[D]

A. Availability calculations are based on the number of days that each Facility was unavailable to provide the service as a result of planned or unplanned outages.
B. Kwinana Donaldson had a reduced availability due to a combination of planned and forced outages.
C. The availability for the Kwinana Facility is from 1 May 2018 to 30 June 2018 as the contract ended on 30 June 2018.
D. The availability for the Kemerton Facility is from the contract commencement date of 23 October 2018.

[18] The Facility retired on the 30 June 2018.

3. Cost of Ancillary Services provided

Clause 3.11.11(b) of the WEM Rules requires this report to include the total cost of each Ancillary Service category provided in the preceding year. The period of reporting is April 2018 to March 2019.[19]

The cost of Ancillary Services as calculated by AEMO for the period 1 April 2018 to 31 March 2019 is set out in Table 8. This period reflects the most recently available settlement data.

For comparative purposes, the costs of the previous year are also provided.

Table 8 Ancillary Services costs for 2017-18 and 2018-19

Ancillary Service	WEM Rule	1 April 2018 – 31 March 2019		1 April 2017 – 31 March 2018	
		Quantities	Cost ($)	Quantities	Cost ($)
LFAS total			87,060,056		78,715,234
LFAS capacity	9.9.2(q)	72 MW	9,027,097	72 MW	8,410,926
LFAS Upwards	9.9.2(a)	72 MW	29,590,394	72 MW	22,135,877
LFAS Downwards	9.9.2(b)	72 MW	48,442,565	72 MW	48,168,431
SRAS peak **SRAS off-peak**	9.9.2(f)	224.1MW 189.0MW	17,092,678	221.8 MW 190.2 MW	22,206,622
Contract LRR[A]	9.9.4(a)	-	-	-	-
LRR[B]	9.9.1	120 MW	795,706	120 MW	1,023,342
Contract DSS[C]	9.9.4(a)	3028 MWh	620,185	5,000 MWh	644,702
Contract System Restart Service	9.9.4(a)	3 facilities	1,176,494	3 facilities	934,908
Total			**106,745,119**		**103,544,808**

A. AEMO has not entered into any LRR Ancillary Service Contracts.
B. Synergy's payment for LRR as the default provider.
C. The DSS Ancillary Service Contract ended on 30 September 2018 and the costs shown here are from April 2018 to September 2018.

LFAS capacity quantities for 2018-19 were unchanged from 2017-18, but LFAS capacity costs have increased due to an increase in the Reserve Capacity Price.

[19] The period is one month earlier than that used in Section 2. This reflects the most recently available settlement data.

LFAS availability costs, for both LFAS Upwards and LFAS Downwards, have increased despite the LFAS quantities remaining constant from the previous year. LFAS is provided through a market mechanism, and the availability costs are driven by the prices offered by Market Participants in the LFAS Market.

SRAS costs include services provided by Synergy and those provided under Ancillary Service Contracts. They are driven predominantly by the Margin Values, which are determined annually by the ERA[20], and by the Balancing Prices occurring during the year. Margin Values reduced from 36% and 64% in 2017-18 (peak and off-peak respectively) to 25% and 50% in 2018-19.

The total quantity of SRAS that is paid for is the average requirement for peak and off-peak periods assumed in the modelling done for the Margin Values determination[21]. Synergy, the default provider of SRAS under the WEM Rules, receives an administered payment for the difference between the determined average quantity less any available contracted SRAS and less any component allocated to LFAS Upwards under the WEM Rules. The quantity paid to other Market Participants under SRAS Ancillary Service Contracts is subject to the availability of the service and is based on a contract price that is lower than Synergy's administered payment.

AEMO did not enter into any LRR Ancillary Service Contracts for 2018-19. LRR was provided by Synergy as the default provider of LRR under the WEM Rules. Synergy's LRR costs are settled through the Synergy AS Provider Payment, in accordance with clause 9.9.1 of the WEM Rules, which relates to Synergy's provision of SRAS, LRR, and the System Restart Service as the default provider of Ancillary Services under the WEM Rules.

The LRR cost is calculated from the Cost_LR parameter as determined by the ERA, less any payments for System Restart Service Ancillary Service Contracts and LRR Ancillary Service Contracts. There was no LRR contracts in 2018-19 Financial Year. The reason for the lower LRR payment of $795,706 in 2018-19 from $1,023,342 in 2017-18 was that System Restart Service contract amounts paid were higher than the amount for System Restart Services determined by the ERA. This resulted in less being available to be paid to Synergy, as the default provider of Ancillary Services, for the provision of LRR.

There has been an increase in System Restart Service costs as a result of a new service from the Kemerton Facility that commenced during the 2018-19 Financial Year.

[20] See https://www.erawa.com.au/electricity/wholesale-electricity-market/ancillary-services-parameters/spinning-reserve-margin_peak-and-margin_off-peak

[21] Clauses 3.22.1(e) and (f) of the WEM Rules require the quantities assumed in the Margin Values determination process to be used for settlement.

4. Ancillary Services Requirements for 2019-20 Financial Year

Clause 3.11.11(c) of the WEM Rules requires this report to include the Ancillary Services Requirements for the coming year, and the Ancillary Services plan to meet those requirements. Clause 3.11.12 requires the ERA to audit this plan.

Clause 3.10 of the WEM Rules defines the Ancillary Services Standards. Clause 3.11.1 requires that AEMO determine all Ancillary Service Requirements in accordance with the SWIS Operating Standards (defined in clause 3.1) and the Ancillary Services Standards.

4.1 LFAS

Further to the study reported in the 2018 Ancillary Services Report, AEMO has reviewed the outcome and done similar analysis with more recent data. A discussion of this is provided in Appendix A3.1. The analysis suggests that the increasing volatility due to higher PV penetration and more Non-Scheduled Generation is leading to different LFAS requirements. For the 2019-20 Financial Year, AEMO proposes having two LFAS requirements based on time of the day reflecting that overnight there is no variability from PV systems. Further analysis will be done to explore the possibility of having an even more sculpted requirement.

The following LFAS requirement is proposed for the 2019-20 Financial Year[22]:

1. **LFAS Upwards: 85 MW between 5.30 AM and 7.30 PM; 50 MW between 7.30 PM and 5.30 AM.**
2. **LFAS Downwards: 85 MW between 5.30 AM and 7.30 PM; 50 MW between 7.30 PM and 5.30 AM.**

While this requirement is expected to be sufficient for most of the year, AEMO may require additional LFAS to be provided in real time during short-term periods of high variability in non-scheduled generation or rapidly changing levels of output from rooftop PV systems. New PV systems continue to be installed at record rates and there are a number of utility scale renewable projects expected to be commissioned during 2019-20 which will continue to increase variability in the power system. AEMO will continue to monitor this situation and, where necessary, take appropriate action to maintain frequency and power system security.

4.2 SRAS

The SRAS requirement must meet the SWIS Operating Standards and the Ancillary Service Standards. The SWIS Operating Standards require that the frequency remain within the band of 48.75-51 Hz for a single contingency event. Clause 3.10.2(a) of the WEM Rules requires the standard for SRAS to be a level that is sufficient to cover the greater of:

i. 70% of the total output, including Parasitic Load, of the generation unit synchronised to the SWIS with the highest total output at the time; and

[22] Respecting that AEMO may only publish this Ancillary Services Report by 1 July and the need to update processes and systems by AEMO and participants, this new LFAS proposal will be implemented as soon as possible in 2019-20. Prior to that implementation the 72 MW utilised in 2018-19 will continue to be applied.

ii. the maximum load ramp expected over a period of 15 minutes[23].

The SRAS requirement proposed for 2019-20 is at least the maximum of:

1. **70% of the largest generating unit; and**
2. **70% of the largest contingency event that would result in generation loss[24].**

AEMO will adjust the available SRAS in close to real time to match the operational conditions.

4.3 LRR

The LRR Requirement must meet the SWIS Operating Standards and the Ancillary Service Standards. The SWIS Operating Standards[25] require that frequency be maintained below 51 Hz and to be restored below 50.5 Hz within 2 minutes following a single contingency event. Clause 3.10.4(a) of the WEM Rules requires the standard for LRR to be the level sufficient to keep over-frequency below 51 Hz for all credible load rejection events (this requirement may be relaxed by up to 25% if AEMO considers that the probability of transmission faults is low).

The largest credible load rejection event is approximately 120 MW[26], and is typically the loss of a transmission line. This may be a radial line feeding the Eastern Goldfields region under specific conditions, or a single line feeding a particular customer.

LRR is a response of the power system to a sudden drop in load. The mandatory generator governor droop response capability required by the Technical Rules for all generators operating above their minimum stable load will also act to mitigate the loss of load as the frequency initially increases.

As discussed in Section 2.4, AEMO is conducting a trial for a dynamic LRR requirement. If the trial is successful, AEMO will use the experience to influence the requirements in the 2020-21 Financial Year.

The proposed LRR requirement for 2019-20 is up to a maximum of 120 MW[27].

4.4 DSS

There are no current requirements for DSS.

4.5 System Restart Service

AEMO requires three system restart facilities with the capability to start up under black system conditions and energise the rest of the system. The three system restart facilities should not be in the same location, to mitigate the risk of common failure in the same geographic or electrical area. Three facilities are required, to ensure service provision following a failure of one when another is undergoing planned maintenance.

The proposed System Restart Service requirement for the 2019-20 Financial Year is three facilities with system restart capability.

[23] Analysis was done to review the load ramp over a 15-minute period during the last year. While the largest ramp was 196 MW (less than the maximum spinning reserve requirement), this will continue to be monitored.

[24] AEMO's obligation to ensure Power System Security may require AEMO to reduce the size of the largest contingency or carry more SRAS, particularly during periods of low system inertia levels.

[25] See clause 2.2.1 and Table 2.1 of the Technical Rules.

[26] This is based on loss of Eastern Goldfields region or the Boddington Gold Mine, which are connected to the SWIS by a single transmission line.

[27] This requirement is a response to a sudden drop of 120 MW load. AEMO will continue to plan for 120 MW LRR dependent on the outcome of the dynamic LRR trial.

5. Ancillary Services Plan for 2019-20 Financial Year

While this report focuses on the requirements for 2019-20 and the plan to meet these requirements, it should be noted that as part of the government's Energy Transformation Strategy[28], a key focus will be a move to cooptimised energy and ancillary services. This will result in a clearer definition of services, improving the ability to more accurately determine the requirements.

5.1 LFAS

While this is the first period when a more sculpted approach to LFAS is being proposed, it is understood that there may be occasions when these average requirements for LFAS at a specific point in time are inadequate. Under such conditions additional LFAS may be required. This will be reviewed on an ongoing basis and depending on the outcome, the requirements may change in accordance with clause 3.11.3.

There is significant work being done under the WEM Reform to consider the interaction of the various frequency control Ancillary Services, which will likely result in a different outcome going forward.

To meet the requirements for 2019-20, LFAS will be sourced through the LFAS market. 85 MW LFAS Upwards and LFAS Downwards between 5.30 AM and 7.30 PM, and 50 MW between 7.30 PM and 5.30 AM will be required from Market Participants. The price paid for LFAS will depend on the clearing price within the LFAS Market.

The increase in Non-Scheduled generation and rooftop PV systems has shown that under certain weather conditions, the average LFAS requirement is inadequate to manage extreme events. This is evidenced by AEMO's use of Backup LFAS in response to an increased requirement. There were three such instances of Backup LFAS in the reporting period[29]. The observed rate and magnitude of change is not yet equivalent to a generator or load contingency event.

Two additional Facilities were certified to provide LFAS in the third quarter of this Financial Year. AEMO anticipates that there will be an additional LFAS provider in the 2019-20 Financial Year, which is likely to increase competition in the LFAS market.

Ongoing analysis will identify further opportunities for improvement.

5.2 SRAS

For the 2019-20 financial year, SRAS will be sourced as follows:

1. 42 MW from a long-term interruptible load contract.
2. A quantity contracted from one or more non-Synergy providers on a short-term basis (currently being finalised, with contract prices to be at a discount to the Synergy administered price).
3. Remainder of the real-time requirements to be provided by the Balancing Portfolio.

[28] Further details can be found at https://www.treasury.wa.gov.au/Energy-Transformation/Delivering-the-Future-Power-System/

[29] An example of such events was shared at the WAECF. https://www.aemo.com.au/-/media/Files/Stakeholder_Consultation/Working_Groups/WA_Meetings/WAECF/2018/WAE-CF-17-Minutes.pdf

The challenges associated with the current process around Spinning Reserve procurement, and particularly enabling new contractual providers, are a concern within the industry. The iterative process and timing in terms of determination of Margin Values and subsequently what a service provider could expect to be paid are examples of these challenges. The introduction of a new Ancillary Services framework as part of WEM Reform will assist in alleviating these challenges. This is expected to increase competition in the provision of SRAS.

Due to the connection of new generators in 2020, it is likely that a single transmission line could be the largest generation contingency for certain periods of time. Depending on system conditions at the time, AEMO may need to increase the SRAS requirements or reduce the size of this largest contingency.

AEMO is currently working with Western Power and the broader industry to determine the most appropriate action while maintaining power system security.

5.3 LRR

A maximum of 120 MW of LRR will be provided by the Balancing Portfolio.

As discussed in Section 2.4, AEMO is conducting a trial for a dynamic LRR requirement. The objective of the trial is to improve efficiency in providing LRR while ensuring that system security is not compromised. If the trial is successful, AEMO will use the experience to influence the requirements in the 2020-21 Financial Year.

5.4 DSS

AEMO is not currently party to any DSS Ancillary Service Contracts.

No new DSS has been identified at the time of writing this report. However, AEMO may seek approval from the ERA for a DSS Ancillary Service Contract should emerging challenges such as low system inertia, due to an increase in non-synchronous generation, threaten power system security.

5.5 System Restart Service

The contract with Synergy for the System Restart Service at the Pinjar Facility (units 3 and 5) will continue to apply for the 2019-20 Financial Year[30]. This contract ends on 30 June 2021.

The contract with Perth Energy for the System Restart Service at the Kwinana Donaldson Facility will continue to apply for the 2019-20 Financial Year. This contract ends on 30 June 2021.

The contract with Synergy for the System Restart Service at the Kemerton Facility will continue to apply for the 2019-20 Financial Year. This contract ends in October 2028.

In addition to the tests done during the commissioning of the Kemerton Facility, a "load pickup"[31] test is planned to be performed during this year. This test is planned to be conducted during the 2019-20 period with some of the costs to be incurred by AEMO.

[30] This is a single contract covering both unit 3 and unit 5. Due to the potential common mode failure at a single generating location, these are not considered two individual system restart facilities.

[31] The Facility will be started from conditions equivalent to a system black event and some load actually picked up and loaded onto the island created.

5.6 Summary Ancillary Services Plan for 2019-20 Financial Year

Table 9 Summary of Ancillary Services requirements and plan to procure for 2019-20 Financial Year

	Requirement	Method to procure	Cost
LFAS Upwards	85 MW between 5.30 AM and 7.30 PM. 50 MW between 7.30 PM and 5.30 AM.	LFAS Market	LFAS Market clearing price
LFAS Downwards	85 MW between 5.30 AM and 7.30 PM. 50 MW between 7.30 PM and 5.30 AM.	LFAS Market	LFAS Market clearing price
SRAS	At least the maximum of 70% of largest generating unit and 70% of largest contingency event that would result in generation loss	42 MW from long-term interruptible load contract	Contract price
		Quantity from short-term contracts currently being finalised	Contract price as discount of Synergy administered price
		Remainder provided by Balancing Portfolio	Administered price to be paid based on the ERA's Margin Values determination.
LRR	Up to 120 MW[32]	A maximum of 120 MW of LRR will be provided by the Balancing Portfolio.	Annual price paid based on the ERA's Cost_LR determination for 2019-20 to 2021-22
DSS	None		N/A
System Restart Service	Three facilities	Contracts with three providers	Contract price

[32] AEMO is trialling a dynamic LRR requirement. In the meantime, AEMO will continue to plan for 120 MW LRR until a dynamic LRR requirement is implemented.

A1. LFAS provision

As discussed in Section 2.2, the quantity of LFAS enabled on average throughout the 2018-19 reporting period exceeded the target 72 MW quantity. There are reasons for this. LFAS is used to respond to uncertainty in the power system and to generator or load movements that affect the balance between supply and demand within a Trading Interval. The uncertainty includes the volatile output of Non-Scheduled Generators, as well as variations in actual demand from forecast demand. LFAS is also used to cover for generation ramping at the beginning of an interval. Large movements in the output of individual generators between Trading Intervals require sufficiently fast movement of other generators to compensate. In addition, Facilities in the Balancing Portfolio that contribute towards LFAS also provide energy balancing services for the Synergy Portfolio. It is not possible to specifically determine how much of Synergy's AGC-enabled quantity was used for LFAS or energy balancing.

These issues are being investigated as part of the WEM Reform program of work with a view to resolving them under the proposed security-constrained, co-optimised energy and Ancillary Services market design, with Facility bidding for the Synergy portfolio. AEMO is committed to supporting the WEM Reform program and is continuing to work with the Energy Transformation Implementation Unit on developing and implementing the market design.

A1.1 Enabling generators to provide LFAS

The LFAS Market determines which Market Participants provide LFAS. The practical implementation of LFAS provision is different for Synergy (Balancing Portfolio) generators and non-Synergy generators (independent power producers, or IPPs). This difference is due to the manner in which the Balancing Portfolio is dispatched.

In the Balancing Market, IPPs are given a balancing base point per Facility, representing their Dispatch Instruction for a trading interval. For IPPs providing LFAS, this balancing base point is used as the target from which the LFAS limits are specified either up (LFAS Upwards), down (LFAS Downwards), or in both directions.

As the example in Figure 2 shows, if a 100 MW IPP were to receive a Dispatch Instruction of 70 MW for a particular trading interval and was cleared to provide 20 MW LFAS Upwards and 20 MW LFAS Downwards in the same trading interval, the low and high operating limits would be set to 50 MW and 90 MW respectively. In this way, the capability to provide exactly 20 MW LFAS Upwards and 20 MW LFAS Downwards has been provided.

Balancing Portfolio Facilities do not receive Dispatch Instructions. AEMO dispatches Balancing Portfolio Facilities manually to the total levels determined through the market, for energy and ancillary services, according to dispatch guidelines provided by Synergy[33].

AEMO is able to remotely change the output of some Balancing Portfolio Facilities and, for others, can issue telephone instructions regarding an output change. However, this output does not automatically become the balancing base point to be used in the AGC algorithm.

AEMO also dispatches the Balancing Portfolio Facilities to adjust for plant movements within the Balancing Portfolio – for example, the movement of steam and gas units from interval to interval – while ensuring sufficient levels of Ancillary Services remain available. AEMO reviews how much LFAS is being provided by IPPs and enables specific Balancing Portfolio Facilities to provide the balance, as well as ensuring sufficient energy balancing and other required Ancillary Services remain available.

When a Balancing Portfolio Facility is enabled to provide LFAS, it does not have a set balancing base point like IPP Facilities do, as the facility is providing multiple services. Therefore, a Balancing Portfolio Facility's full

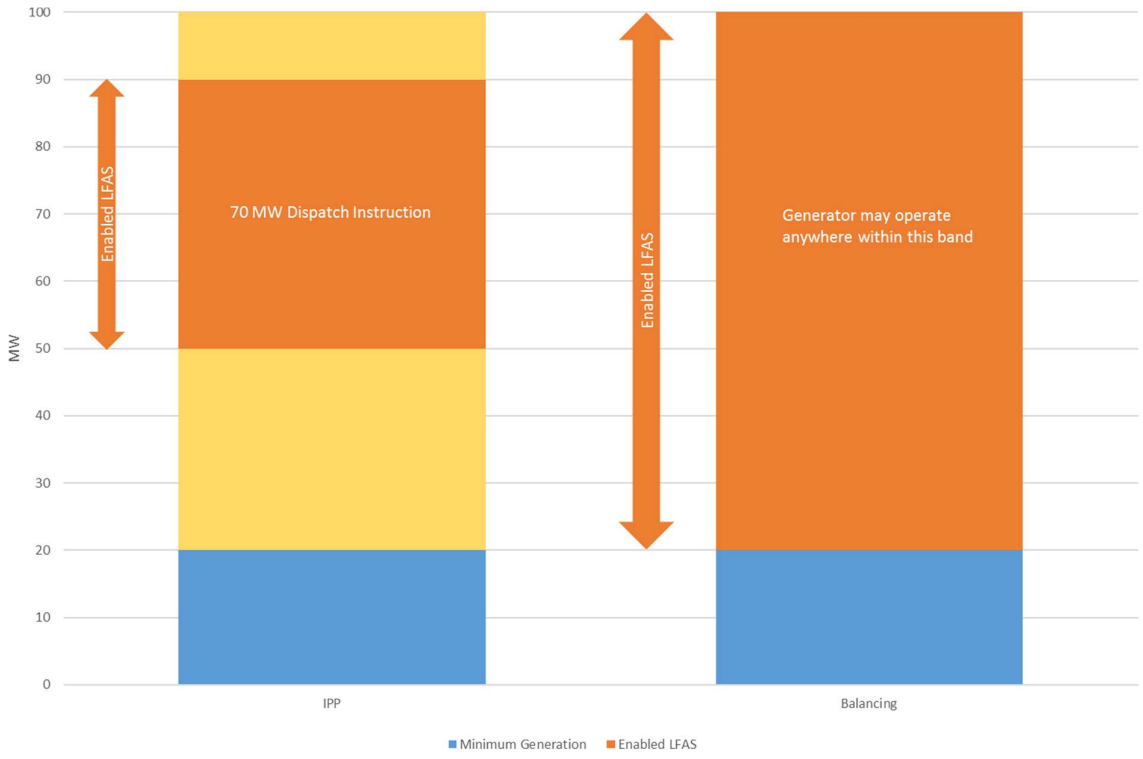
[33] The dispatch guidelines apply to Balancing Portfolio Facilities for dispatch of energy and ancillary services.

range of output is available to AGC, which means it can also be used to provide LFAS and is used to calculate the enablement quantity.

As the example in Figure 2 shows, if a 100 MW Synergy generator with a minimum capability of 20 MW was enabled for LFAS, it could move anywhere between 20 MW and 100 MW. It is considered to be enabled for 80 MW of LFAS – 40 MW for LFAS Upwards and 40 MW for LFAS Downwards. The actual available response in either direction at any point in time depends on its output at the time.

When all Facilities are bidding and dispatched individually, this issue will no longer be a constraint.

Figure 2 Comparison of LFAS Enablement for IPPs and Balancing Portfolio



A1.2 Contribution of LFAS Upwards to SRAS

Another factor which contributes to LFAS enablement exceeding the requirement relates to the interaction between SRAS and LFAS. Available SRAS capacity includes the capacity associated with LFAS Upwards, where those Facilities are Balancing Portfolio Facilities or non-Balancing Portfolio Facilities for which SRAS Ancillary Service Contracts are in place.

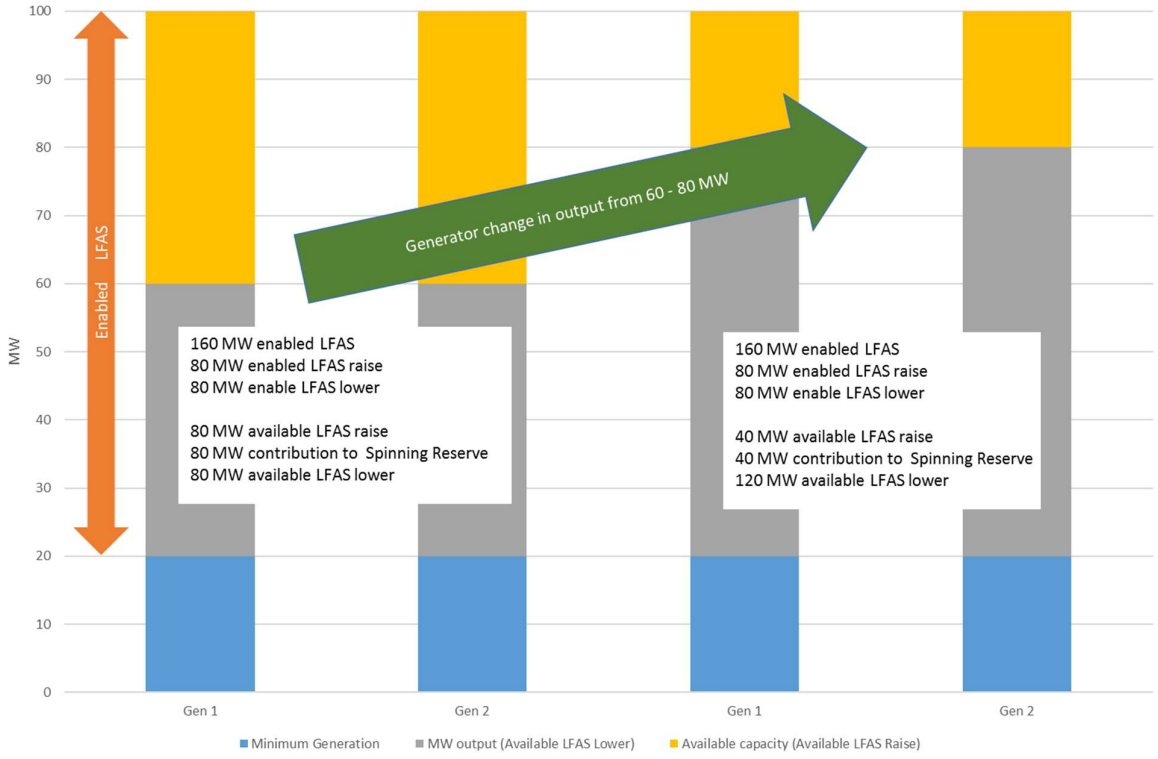
The enablement of adequate LFAS assists with frequency regulation and the requirement to keep frequency within the normal operating band.

The requirement for adequate SRAS has an immediate power system security impact. If, in some periods of time, the LFAS Upwards quantity has been used (i.e. LFAS-enabled generators have increased their output in response to AGC signals) then the quantity of available Spinning Reserve may not meet the requirement, resulting in a power system security risk[34]. In these circumstances, additional Synergy Facilities may be started to meet the SRAS requirement.

[34] The WEM Rules require sufficient allocation of capacity to provide SRAS, not actual SRAS availability.

In the example shown in Figure 3, two generators generate 60 MW each. They provide LFAS and contribute 80 MW to SRAS. If their output increases, the LFAS enablement stays the same. However, the contribution to SRAS between the two generators drops to 40 MW. If this change persisted, additional SRAS would need to be made available, potentially by bringing on another generator. If enabled, this generator could also provide LFAS which could be in excess of the requirement.

Figure 3 Interaction of LFAS and SRAS



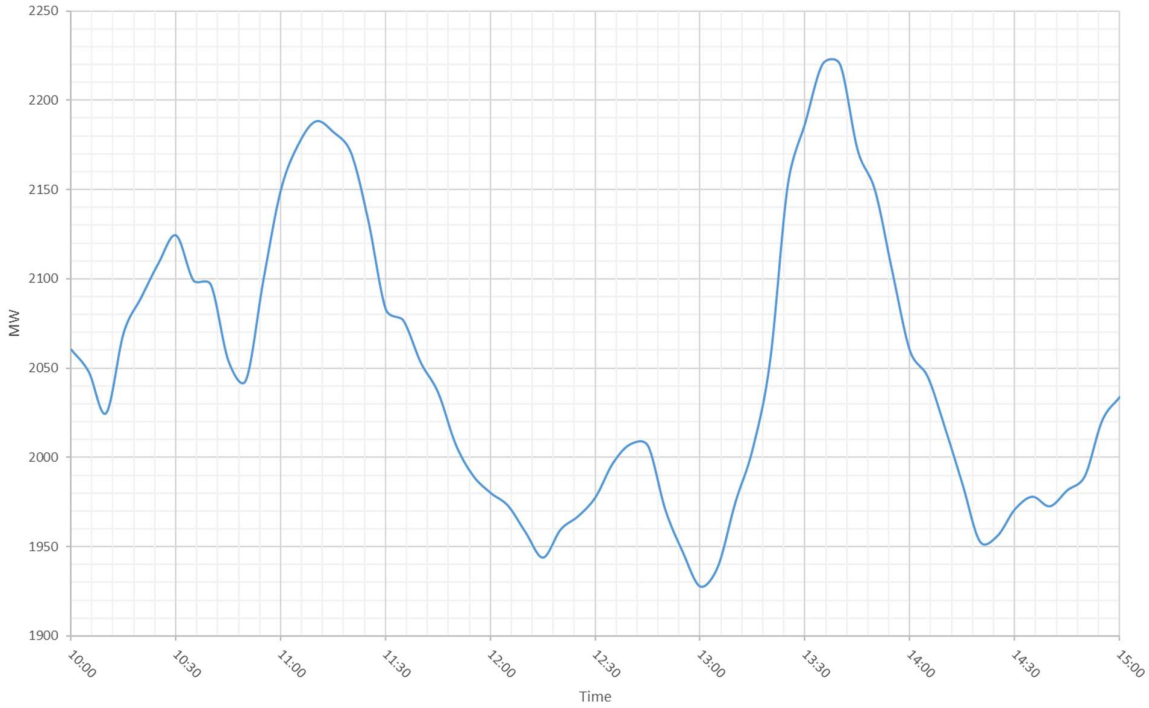
A1.3 Backup LFAS

The increase in penetration of non-scheduled generation, including rooftop PV, is greatly impacting the operation of the power system. This is manifested in the reduction of system load, resulting in baseload synchronous generation being displaced with low cost Non-Scheduled generation. This year the instantaneous proportion of non-scheduled generation, including rooftop PV, reached 48% of total generation – a trend that is expected to increase in the coming years.

AEMO called on Backup LFAS from 11.30 AM to 15.00 PM on 18 October 2018. This was in response to significant demand swings of over 250 MW due to cloud cover in 30 minutes, as shown in Figure 4.

AEMO is investigating different ways to more accurately forecast variability in non-scheduled generation and load as an integral input in forecasting LFAS requirements in the current and future market. In the meantime, AEMO will continue to monitor and take appropriate actions to maintain power system security.

Figure 4 System load fluctuations due to PV volatility, 18 October 2018



A2. Response to ERA recommendations from 2018 Ancillary Services Report

The ERA made three recommendations in response to AEMO's 2018 Ancillary Services Report:

1. AEMO should consider future changes in demand from rooftop PV systems and increases in non-scheduled generation capacity when determining future years' requirements.
2. AEMO should consider whether it is possible to develop varying LFAS requirements in future reporting periods.
3. AEMO should keep the ERA informed of progress with replacing its energy management system (EMS) and investigating the opportunity to improve the enablement quantity calculation process.

A2.1 Changes in demand from rooftop PV and increased non-scheduled generation capacity

As part of the review of the LFAS requirements, AEMO has considered the change in demand from rooftop PV systems and increase in non-scheduled generation capacity. The increase in non-scheduled generation and rooftop PV systems has shown that under certain weather conditions, the current LFAS requirement is inadequate to cover all power system variations, as particularly evidenced by the three occasions when AEMO utilised Backup LFAS (see Section 2.2). This is expected to increase in the coming years as more Non-Scheduled Generators connect to the system.

In addition to volatility in non-scheduled generation affecting LFAS requirements, AEMO has seen a decline in the daytime minimum load. This has resulted in reduction in system inertia as synchronous generators are replaced by low-cost renewable generation during low load conditions. Low levels of system inertia threaten power system security, as this could trigger involuntary load shedding following a contingency.

AEMO is currently working with the wider industry in reviewing the current generator performance standards to manage these emerging challenges. However, such changes take some time to be implemented, and AEMO will continue to monitor the situation and may propose additional Ancillary Services in future should system inertia levels threaten power system security. Dispatch Support Services may need to be utilised under existing frameworks in the short term. AEMO has considered the impacts of rooftop PV systems for LRR. The AS/NZS 4777.2 standard requires inverter connected generation, such as solar PV, to trip or decrease output when over-frequency[35] events occur. However, the uncertainty that not all inverter connected generation systems meet the present Australian Standard, means AEMO cannot currently accurately forecast any contribution from these systems. AEMO will monitor the situation should reliable information become available.

[35] AS/NZS 4777.2 Default Setting F_{stop} = 52 Hz.

A2.2 Varying LFAS requirements

The analysis for this review has more closely focused on varying uncertainty at different times of the day. This has contributed to the proposed requirement for the 2019-20 Financial Year. Further details are provided in Appendix A3.

A2.3 Replacement of the Energy Management System (EMS)

As part of the replacement of AEMO's EMS which is due to be commissioned before the end of 2019, AEMO has investigated the configuration of LFAS enablement. The current processes are discussed in Section 2.2.

Options were considered to estimate a pseudo base point for Balancing Portfolio Facilities, thus allowing specific limits to be set, adjusting the limits around a moving base point and reviewing the allocation of contribution from the Balancing Portfolio Facilities.

The incorporation of a pseudo base point for LFAS providing generators would require multiple assumptions for various scenarios and would result in frequent manual intervention for the remainder of the Balancing Portfolio. Adjusting the limits around a moving base point would not result in any significant difference in the actual outcome of the AGC movements. The AGC tuning parameters (Unit Regulation Factors) already consider differences in ramp rate in an attempt to ensure equitable contribution from all participants.

These challenges associated with the implementation of AGC around the Balancing Portfolio have been workshopped extensively, particularly considering the current opportunity to integrate changes in the EMS. However, the key opportunity for improvement in this area will be as a result of the implementation of Facility bidding expected to be part of WEM reform.

A3. LFAS requirements calculation methodology

A3.1 2019 LFAS determination

Clause 3.11.1 requires that AEMO determine all Ancillary Service Requirements in accordance with the SWIS Operating Standards (defined in clause 3.1) and the Ancillary Services Standards. The standard for LFAS is defined in clause 3.10.1 as the level sufficient to provide Minimum Frequency Keeping Capacity, where the Minimum Frequency Keeping Capacity is the greater of:

i. 30 MW; and

ii. the capacity sufficient to cover 99.9% of the short term fluctuations in load and output of Non-Scheduled Generators and uninstructed output fluctuations from Scheduled Generators, measured as the variance of 1 minute average readings around a thirty minute rolling average.

AEMO assessed sample data according to the standard in clause 3.10.1. The analysis[36] compared the most recent 1-minute average to the most recent 30-minute average. The results indicated that to cover 99.9% of the short-term fluctuations in load and output of Non-Scheduled Generators, 131 MW LFAS Upwards and 131 MW LFAS Downwards would be required.

AEMO considers the results of this methodology to be inefficient and do not accurately represent current operational practices including the 10-minute dispatch cycle. As a result, AEMO replicated the approach used in 2018 to determine the LFAS requirements for 2018-19 Financial Year. The analysis for that year was based on 2017 data and considered a forecast provided 10 minutes[37] ahead of the actual time.

AEMO used a similar approach using the most recent year of data for this report. Further analysis investigated the uncertainty for each half hour of the day. The results are shown in Figure 5 below.

It is evident from the results that on average different LFAS requirements are required at different times of the day. As an initial response to this varying level of uncertainty throughout the day, two levels of LFAS will be considered for 2019-20 Financial Year. Using operational experience to influence the appropriate time blocks, an average of 50 MW of uncertainty is apparent between 7.30 PM and 5.30 AM, while an average of 85 MW is apparent between 5.30 AM and 7.30 PM.

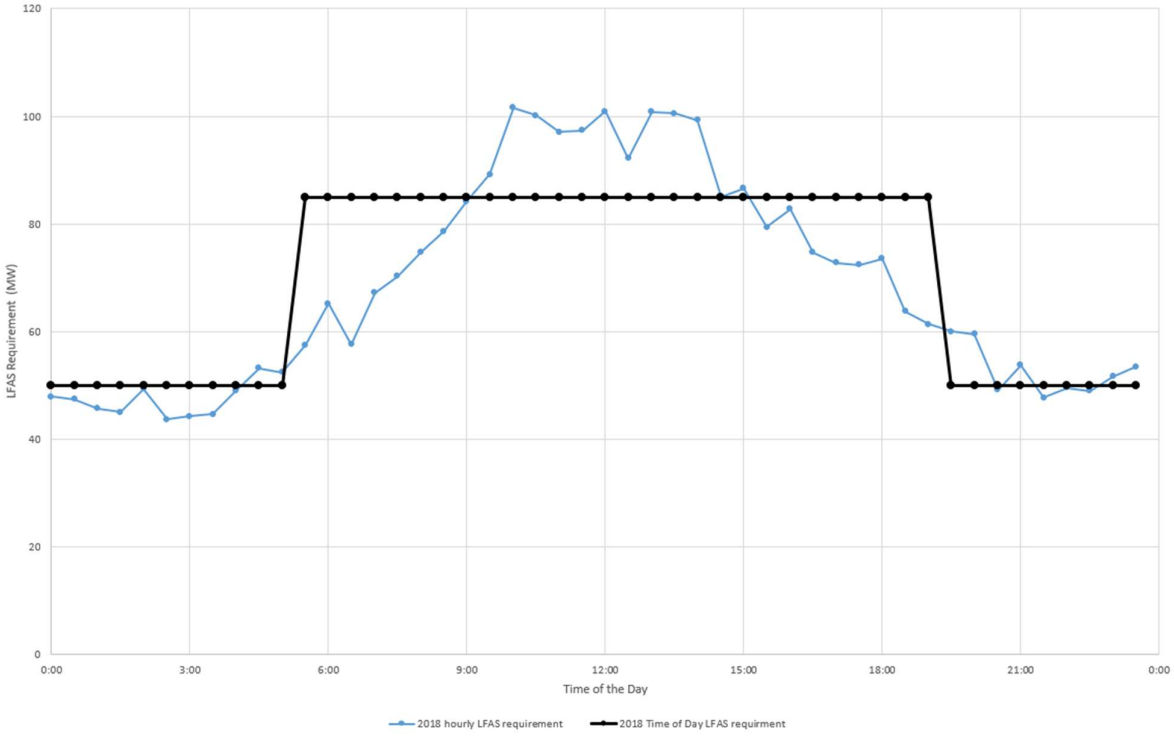
It is noted that there are certain periods of time when the average requirement is lower than the expected uncertainty. However, based on past experience when a single average figure was required for all intervals, it is anticipated that this level of uncertainty can be managed.

Experience with this approach and additional analysis may increase the opportunity to further enhance the sculpting requirements according to time and seasonal changes.

[36] The analysis covered data from the period 1 January 2018 – 18 December 2018.

[37] The current dispatch engine recalculates generation dispatch every 10 minutes.

Figure 5 Half Hourly average uncertainty for May 2018 – April 2019



A4. History of WEM Rule amendments relating to clause 3.10.2(b)

The WEM Rules contemplate that some LFAS Upwards capacity is counted towards SRAS capacity:

- Clause 3.10.2(b) states that the SRAS standard level must include capacity utilised to meet the LFAS standard under clause 3.10.1, so that the capacity provided to meet the LFAS requirement is counted as providing part of the SRAS requirement.
- Clause 9.9.2(f) specifies the formula for calculating the total payment to all Market Participants for SRAS in a Trading Interval. The formula excludes LF_Up_Capacity(t). Clause 9.9.2(k) states that LF_Up_Capacity(t) is the capacity necessary to cover the requirement for providing upwards LFAS for Trading Interval t.

AEMO's view is that LFAS Upwards capacity is only counted towards SRAS capacity if it is provided by a Balancing Portfolio Facility or by a non-Balancing Portfolio Facility under an SRAS Ancillary Service Contract.

AEMO's view is supported by the WEM Rules amendment history.

Clause 3.10.2(b) refers to the LFAS and SRAS Ancillary Service Standards. These are specified in clauses 3.10.1 and 3.10.2. They have not been materially amended since the WEM Rules commenced on 21 September 2006[38].

When the WEM Rules commenced in 2006:

- Synergy was the default Ancillary Services provider [clause 3.11.7A]; and
- System Management could enter into an Ancillary Service Contract with a Rule Participant other than Synergy for any Ancillary Service if System Management did not consider that it could meet the Ancillary Service Requirements with Synergy's Registered Facilities, or if the Ancillary Service Contract provided a less expense alternative [clause 3.11.8].

In 2008[39] the position changed:

- System Management could enter into an SRAS or LFAS Ancillary Service Contract with a Rule Participant other than Synergy if System Management did not consider that it could meet the Ancillary Service Requirements with Synergy's Registered Facilities, or if the Ancillary Service Contract provided a "less expense alternative" [clause 3.11.8].
- System Management could enter into an Ancillary Service Contract with any Rule Participant for LRR, System Restart and DSS [clause 3.11.8A].

In 2012[40] the position changed again:

- System Management could enter into an SRAS Ancillary Service Contract with a Rule Participant other than Synergy if System Management did not consider that it could meet the Ancillary Service Requirements with Synergy's Registered Facilities, or if the Ancillary Service Contract provided a "less expense alternative" [clause 3.11.8].

[38] There has been one non-material amendment to clause 3.10.2. Rule Change Proposal RC_2009_30 [Correction of Minor and Typographical Errors] changed the reference from "parasitic load" to "Parasitic Load" and made a consequential change to the Chapter 11 glossary.

[39] RC_2008_12 [Dispatch Support Ancillary Services].

[40] RC_2011_10 [Competitive Balancing and Load Following Market].

- The LFAS Market replaced LFAS Ancillary Service Contracts.

In summary, the LFAS and SRAS Ancillary Service Standards have not changed since the WEM Rules commenced, but the manner in which LFAS and SRAS is provided has changed. The current position is that SRAS can only be provided by a Balancing Portfolio Facility or by a non-Balancing Portfolio Facility under an SRAS Ancillary Service Contract. Synergy is the default Ancillary Services provider under the WEM Rules, so its Balancing Portfolio Facilities are taken to be technically capable of providing SRAS[41]. For other Market Participants, the SRAS Ancillary Service Contracts include detailed technical and performance requirements (which are customised for SRAS) and testing procedures. These are designed to ensure that the non-Balancing Portfolio Facilities are (and continue to be) technically capable of providing SRAS.

[41] Synergy's Dispatch Guidelines provided to AEMO contain Facility ancillary service capabilities which are reviewed from time to time. The technical capability of the Facilities is validated based on the observed response to past system events.