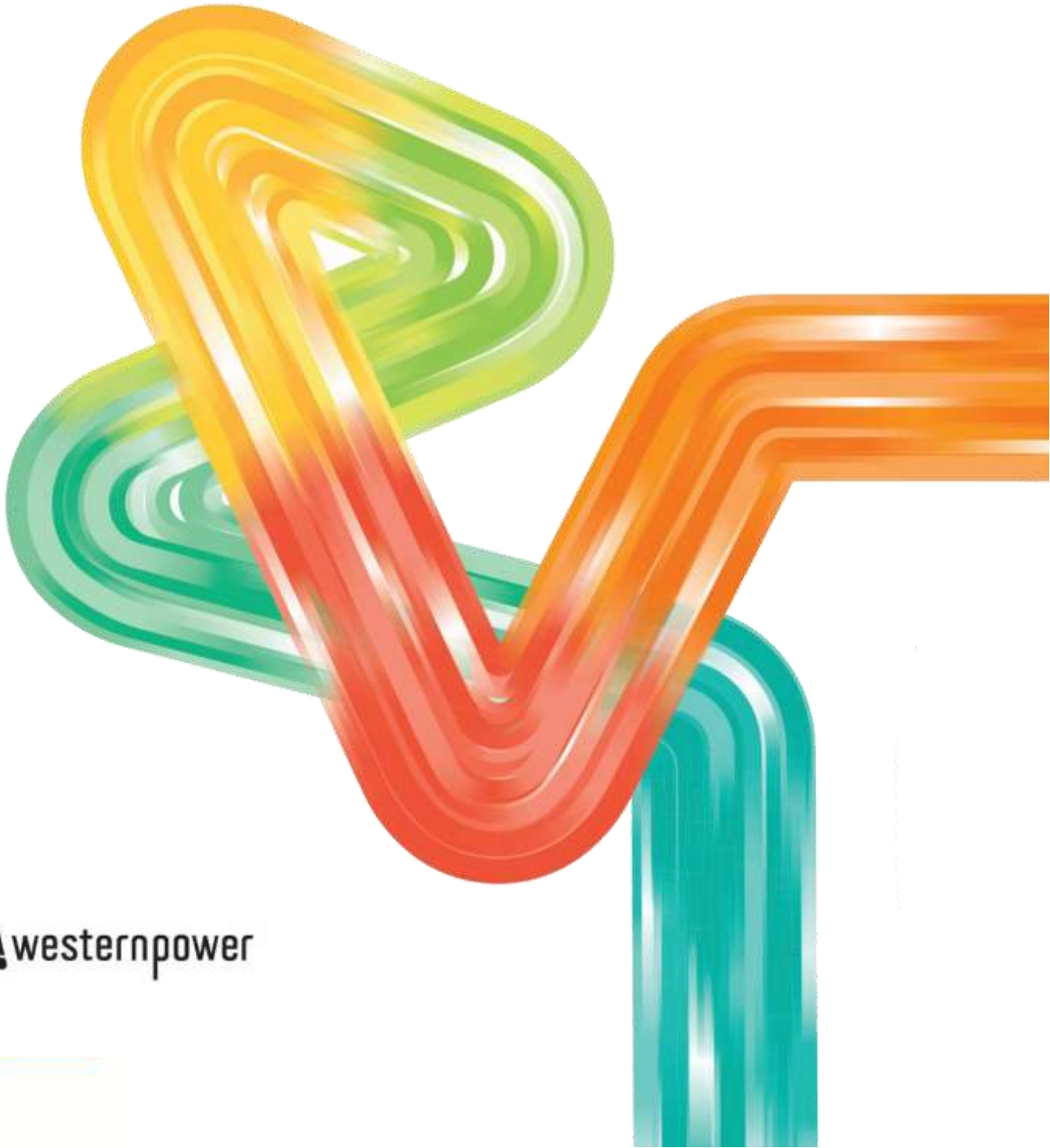
Electricity Networks Access Code 2004

Services Standard Performance Report for the year ended 30 June 2018

6 September 2018



westernpower

Contents

1. Executive Summary

Western Power publishes the Service Standard Performance Report (**Report**) annually to detail its performance against the 17 Service Standard Benchmarks (**SSBs**) defined in Western Power's current approved Access Arrangement (**AA3**). This information is published in accordance with the *Electricity Networks Access Code 2004* (**Access Code**).

This report covers the period 1 July 2017 to 30 June 2018 (**2017/18 period**).

1.1 Performance summary

- During the 2017/18 period, Western Power's overall performance surpassed the required levels in 14 of the 17 service standard benchmarks.
- Distribution performance surpassed the required level for all nine service standard benchmarks.
- Performance against target improved in 10 of the 17 service standard benchmarks.
- The benchmarks were not met for three transmission network service standard benchmarks as outlined in section 6.

1.2 Introduction

As a regulated business, Western Power is required to comply with a broad range of obligations covering many facets of its activities. This report presents information on Western Power's reliability performance against levels agreed for AA3.

The Economic Regulation Authority (**ERA**) is not expected to make a final decision on the fourth access arrangement (**AA4**) prior to the submission of this Report. As part of the AA4 process, Western Power proposed to report against the AA3 SSBs for the 2017/18 period and assumes no Service Standard Targets (**SST**) will apply for the 2017/18 period.

In its AA4 submission, Western Power proposed that until an AA4 decision is made and commences, it would be prudent to maintain the AA3 SSBs for the 2017/18 period. By applying the current suite of SSBs during the 2017/18 period, Western Power and its customers were provided certainty of the expected minimum service standards for the 2017/18 period.

In the AA4 Draft Decision the ERA stated it: *considers the proposal to maintain service standard benchmarks for the 2017/18 financial year at the level set for the AA3 period to be reasonable and consistent with the Code objective.*

Further, Western Power also proposed in the AA4 initial submission to not determine SSTs for the 2017/18 period, however to continue to apply incentive rates for the 2017/18 period.

As per the AA4 initial submission, as an incentive regime with its associated financial rewards and penalties, the design of the Service Standard Adjustment Mechanism (SSAM) should continue to be the subject of well-measured and reasoned analysis. It should not be:

- a transitional measure, as would be the case with Western Power operating and investing in the network in line with the proposed AA4 SSAM and the associated SSTs
- retrospectively applied after the point that Western Power would be able to affect the outcome, as would be the case with the back-dated application of the AA4 SSAM and the associated SSTs

- applied in a context different to the one in which it was intended, as would be the case with the continued use of the AA3 SSAM and the associated SSTs [determined for financial years 2012/13 to 2016/17].[1]

In practice, this means that Western Power will not receive any SSAM rewards or penalties for the 2017/18 period, however Western Power continued to be subject to minimum standards for service standards to its customers through the continued application of AA3 SSBs in the 2017/18 period.

In the AA4 submission, Western Power proposed updates to the methodology used to determine the "major event day" (**MED**) threshold as applied to SAIDI, SAIFI and Call Centre Performance, to enable alignment with Australian industry practice. More specifically:

1. Using daily unplanned SAIDI (after permitted exclusions), rather than daily SAIDI, to calculate the major event day threshold.
2. Applying a Box-Cox transformation to daily unplanned SAIDI data to calculate the major event day threshold, rather than a logarithmic transformation.

In the AA4 Draft Decision the ERA stated that it:

- *considers the use of daily unplanned SAIDI, derived after interruptions permitted to be excluded for the purposes of measuring distribution reliability, to be reasonable and sufficiently detailed and complete to enable a user or applicant to determine the value of the reference service at the reference tariff.*[2] (para 982 and 983, p. 221)
- *approves the proposed amendment to the access arrangement specifying that daily unplanned SAIDI, calculated over the five immediately preceding financial years after permitted exclusions, be used in calculating the major event day threshold*. [3]

The ERA also approved the proposal to apply the Box-Cox transformation to daily unplanned SAIDI in the AA4 Draft Decision, subject to transparent reporting of the method applied:

- *Subject to transparent reporting of the method applied by Western Power in determining the major event day threshold, the ERA considers the proposal to apply the Box-Cox transformation to daily unplanned SAIDI data to be reasonable and sufficiently detailed and complete to enable a user or applicant to determine the value of the reference service at the reference tariff.*[4]
- *The ERA approves the proposal to apply the Box-Cox transformation to daily unplanned SAIDI data to determine the major event day threshold where the logarithmic transformation of the data does not conform to a normal distribution, subject to Western Power providing the following information in annual service standard performance reports.*[5]

Western Power has since agreed to provide the requested information during AA4.

To assist with understanding the impact of the approved revised methodology, Table 6.1 contains an extra column to enable a comparison to be made between the AA3 MED definition and the AA4 MED definition.

The trend analysis in section 6.2.2 and Appendix B, presents performance based on the AA3 major event day definition to allow direct comparison to prior financial year performance.

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1 Paragraph 1173, Draft Decision on Proposed Revisions to the Access Arrangement for the Western Power Network, ERA, May 2018.
2 Paragraph 982, Draft Decision on Proposed Revisions to the Access Arrangement for the Western Power Network, ERA, May 2018.
3 Paragraph 983, ibid.
4 Paragraph 999, ibid.
5 Paragraph 1000, ibid.

1.3 Service standard performance

The minimum levels of service required of Western Power are defined by 17 SSBs covering distribution and transmission reliability and security of supply, call centre performance and street lighting performance.

Reliability of supply reflects the service Western Power provides to its customers by measuring the reliability of electricity supplied and is a direct measure of the performance of its transmission and distribution networks.

As part of the AA3 Determination, Western Power was required to:

- maintain service at levels consistent with historical averages of the five years to 30 June 2012 for the transmission network measures and call centre performance
- maintain service at levels consistent with historical averages of the three years to 30 June 2012 for distribution network reliability measures, due to expenditure to improve performance in the years prior to AA3
- maintain minimum levels of service for street light repair time consistent with the targets specified in the previous approved Access Arrangement covering 1 July 2009 to 30 June 2012 (AA2)
- improve service levels only where this was of value to customers and could be done efficiently.

Western Power's obligations under its transmission and distribution licences require it to:

- meet the service levels defined by the SSBs
- publish a report annually on SSB performance.

2. Background

In accordance with section 11.1 of the Access Code, Western Power must provide reference services at a service standard at least equivalent to the service standard benchmarks set out in the access arrangement. Section 11.2, requires the ERA to annually publish Western Power's actual service standards performance against the SSBs.

The purpose of this report is to provide information on the actual service standards performance against the SSBs contained in Western Power's AA3, for the 2017/18 period.

The Western Power Network is defined by the Access Code as the portion of the South West Interconnected Network (**SWIN**) that is owned by the Electricity Network Corporation t/a Western Power. For the purposes of this Report and in referencing the Access Code, the Electricity Distribution Licence (EDL1), the Electricity Transmission Licence (ETL2) and AA3, the terms distribution network and transmission network are used throughout this Report.

The Western Power Network covers a geographic area from Kalbarri to Albany, and from Perth to Kalgoorlie (Figure 2.1) of 255,064 square kilometres. It has a diverse asset base which includes more than 820,000 poles and over 102,000 circuit kilometres of power lines. The distribution network consists of over 820 feeders, connected to the transmission network at 151 terminal and zone substations, providing an electricity supply to over 1,100,000 customers and over 267,000 street lights.

Figure 2.1: Map of the Western Power Network

3. How to read this report

In accordance with the ERA's Report Template:

- section 4 outlines and describes the reference services provided by Western Power relevant to the Access Code, section 11.1, within the AA3 period
- section 5 outlines and describes the SSBs relevant for the AA3 period
- section 6 outlines and describes the actual performance against the AA3 SSBs for the 2017/18 period
- section 7 outlines and describes the recognised exclusions defined for the AA3 SSBs
- section 8 outlines and describes the recognised events known as Momentary Interruptions, which are excluded from the AA3 SSBs
- appendix A provides charts for each of the AA3 SSBs and targets with the trend of historical performance for the preceding eight-year period
- appendix B provides charts showing the trends over the past five years up to 30 June 2018, by key causes of interruptions (overhead equipment failure, unknown fault causes and lightning) which contribute to the distribution performance of the Western Power Network.

4. Reference services

Under AA3 and in accordance with the Access Code sections 5.1 and 11.1, Western Power provides reference services for entry, exit and bi-directional services.

There are:

- two *reference services*[6] at network *entry points* for *users* (entry services)
- 11 *reference services* at network *exit points* for *users* (exit services)
- four bi-directional *reference services* at network entry/exit points (bi-directional services).

4.1 Reference services for network entry points

An *entry service* is a covered service provided by Western Power at an *entry point* under which the user may transfer electricity into the network at the *entry point*.

An *entry point* is a point on a *covered network* identified as such in an *access contract* at which, subject to the *access contract*, electricity is more likely to be transferred into the network than transferred out of the network. The following table lists the *entry point reference services*.

Table 4.1: Network entry point reference services

Reference Service		Reference Service Description
B1	Distribution *Entry Service*	An *entry service* combined with a connection service and a standard metering service at an *entry point* on the distribution system.
B2	Transmission *Entry Service*	An *entry service* combined with a connection service and a standard metering service at an *entry point* on the transmission system.

4.2 Reference services for network exit points

An *exit service* is a *covered service* provided by Western Power at an *exit point* under which the *user* may transfer electricity out of the network at the *exit point*.

An *exit point* is a point on a *covered network* identified as such in an *access contract* at which, subject to the *access contract*, electricity is more likely to be transferred out of the network than transferred into the network. The following table lists the *exit point reference services*:

Table 4.2: Network exit point reference services

Reference Service		Reference Service Description
A1	Anytime Energy (Residential) Exit Service	An exit service combined with a connection service and a standard metering service at an exit point on the low voltage (415 volts or less) distribution system.
A2	Anytime Energy (Business) Exit Service	An exit service combined with a connection service and a standard metering service at an exit point on the low voltage (415 volts or less) distribution system.

6 All terms shown in italics refer to those terms as defined in the Access Code

Reference Service		Reference Service Description
A3	Time of Use Energy (Residential) Exit Service	An exit service combined with a connection service and a standard metering service at an exit point on the low voltage (415 volts or less) distribution system.
A4	Time of Use Energy (Business) Exit Service	An exit service combined with a connection service and a standard metering service at an exit point on the low voltage (415 volts or less) distribution system.
A5	High Voltage Metered Demand Exit Service	An exit service combined with a connection service and a standard metering service at an exit point on the high voltage (6.6 kV or higher) distribution system.
A6	Low Voltage Metered Demand Exit Service	An exit service combined with a connection service and a standard metering service at an exit point on the low voltage (415 volts or less) distribution system.
A7	High Voltage Contract Maximum Demand Exit Service	An exit service combined with a connection service and a standard metering service at an exit point on the high voltage (6.6 kV or higher) distribution system
A8	Low Voltage Contract Maximum Demand Exit Service	An exit service combined with a connection service and a standard metering service at an exit point on the low voltage (415 volts or less) distribution system.
A9	Street lighting Exit Service	An exit service combined with a connection service at an exit point on the low voltage (415 volts or less) distribution system for the purpose of public street lighting, plus the service of the provision and maintenance of the streetlight.
A10	Un-Metered Supplies Exit Service	An exit service combined with a connection service at an exit point on the low voltage (415 volts or less) distribution system.
A11	Transmission Exit Service	An exit service combined with a connection service and a standard metering service at an exit point on the transmission system.

4.3 Reference services for bi-directional network entry and exit points

A bi-directional service is a *covered service* provided by Western Power at a bi-directional point under which the *user* may transfer electricity into and out of the network. A bi-directional point is a point on a *covered network* identified as such in an *access contract* at which, subject to the *access contract*, electricity is both transferred into the network and transferred out of the network. The following table lists the bi-directional point *reference services*.

Table 4.3: Network bi-directional reference services

Reference Service		Reference Service Description
C1	Anytime energy (residential) bi-directional service	A bi-directional service combined with a connection service and a standard meter service at a bi-directional point on the low voltage (415 volts or less) distribution system.
C2	Anytime energy (business) bi-directional service	A bi-directional service combined with a connection service and a standard meter service at a bi-directional point on the low voltage (415 volts or less) distribution system.

Reference Service		Reference Service Description
C3	Anytime energy (business) bi-directional service	A bi-directional service combined with a connection service and a standard meter service at a bi-directional point on the low voltage (415 volts or less) distribution system.
C4	Time of use (business) bi-directional service	A bi-directional service combined with a connection service and a standard meter service at a bi-directional point on the low voltage (415 volts or less) distribution system.

5. Current Service Standard Benchmarks

As explained in section 1.2, in the AA4 Draft Decision the ERA accepted the continuation of the AA3 SSBs for the 2017/18 financial year.

Under AA3 and in accordance with the Access Code section 11.2, there are 17 SSBs which Western Power is required to monitor and meet. These measures set minimum service levels which need to be achieved by Western Power. The SSBs were agreed with the ERA in November 2012, as part of the AA3 Further Final Decision, after the commencement of the AA3 period.

The SSBs were set based on maintaining the levels of service performance throughout the AA3 period consistent with average service performance experienced by customers over the previous five years (except for SAIDI and SAIFI measures, which were based on three years).

5.1 Distribution network service standards

For the *reference services* A1 to A10, B1 and C1 to C4, the SSBs are expressed in terms of:

- System Average Interruption Duration Index (SAIDI).
- System Average Interruption Frequency Index (SAIFI).
- Call centre performance: – percentage of fault calls responded to in 30 seconds or less (after exclusions).

The SAIDI and SAIFI metrics are defined in accordance with the National Regulatory Reporting Requirements[7] (NRRR) and can be described as:

- SAIDI –Total number of minutes, on average, that a customer on a distribution network is without electricity in a year.
- SAIFI – The average number of times a customer's electricity supply is interrupted per year.

5.1.1 System Average Interruption Duration Index

SAIDI, measured over a 12-month period, by NRRR definition is the sum of the duration of each customer interruption (customer minutes interrupted) - lasting more than one minute, attributable solely to the distribution network (after exclusions), divided by the average of the total number of connected customers at the beginning and the end of the reporting period.

The unit of measure is minutes per year and the lower the minutes per year, the higher the level of service performance.

The following exclusions apply to SAIDI:

- A MED in accordance with IEEE1366-2003 definitions.
- Interruptions shown to be caused by a fault or other event on the transmission network or a third-party system (for instance, without limitation interruptions caused by an inter-trip signal, generator unavailability or a customer installation).
- Planned interruptions.
- Force majeure events.

[7] National Regulatory Reporting for electricity distribution and retail businesses, Utility Regulators Forum discussion paper, March 2002 © Commonwealth of Australia

The SSBs expressed in terms of SAIDI for each year of the AA3 period are shown in Table 5.1.

Table 5.1: SAIDI SSBs for each year ending 30 June

SAIDI	Minutes per year
	SSB
CBD	39.9
Urban	183.0
Rural Short	227.8
Rural Long	724.8

5.1.2 System Average Interruption Frequency Index

SAIFI, measured over a 12-month period, by NRRR definition is the total number of customer interruptions, lasting more than one minute, attributable solely to the distribution network (after exclusions), divided by the average of the total number of connected customers at the beginning and the end of the reporting period.

The unit of measure is interruptions per year and the lower the number of interruptions per year, the higher the level of service performance.

The exclusions for SAIDI discussed above, also apply to SAIFI.

The SSBs expressed in terms of SAIFI for each year of the AA3 period are shown in Table 5.2.

Table 5.2: SAIFI SSBs for each year ending 30 June

SAIFI	Interruptions per year
	SSB
CBD	0.26
Urban	2.12
Rural Short	2.61
Rural Long	4.51

5.1.3 Distribution network feeder classifications

The feeder classification, consistent with the NRRR, applied to Western Power's distribution network and used to report service standards performance in accordance with AA3, include: CBD, Urban, Rural Short, and Rural Long. Definitions are provided in Table 5.3.

Table 5.3: Feeder classifications

Feeder Category	Description
CBD	A feeder supplying predominantly commercial, high-rise buildings, supplied by a predominantly underground distribution network containing significant interconnection and redundancy when compared to urban areas
Urban	A feeder, which is not a CBD feeder, with actual maximum demand over the reporting period per total feeder route length greater than 0.3 MVA/km

Feeder Category	Description
Rural Short	A feeder which is not a CBD or urban feeder with a total feeder route length less than 200 km
Rural Long	A feeder which is not a CBD or urban feeder with a total feeder route length greater than 200 km

5.1.4 Call centre performance

Call centre performance, measured over a 12-month period, is the number of fault calls responded to in 30 seconds or less (after exclusions), divided by the total number of fault calls.

The unit of measure is percentage of calls per year and the higher the percentage of calls per year, the higher the level of service performance.

The following exclusions apply to call centre performance:

- Calls abandoned by a caller in four seconds or less of their postcode being automatically determined or when a valid postcode is entered by the caller.
- All telephone calls received on a MED which is excluded from SAIDI and SAIFI.
- A fact or circumstance beyond the control of Western Power affecting the ability to receive calls to the extent that Western Power could not contract on reasonable terms to provide for the continuity of service.

The SSB expressed in terms of call centre performance for each year of the AA3 period is shown in Table 5.4.

Table 5.4: Call centre performance SSB for each year ending 30 June

Call centre performance	Percentage of calls per year
	SSB
	77.5%

5.2 Transmission network service standards

In respect of the *reference services* A11 and B2 available to users directly connected to the transmission network, the SSBs are described below.

5.2.1 Circuit Availability

Circuit Availability is the availability of the transmission network and is measured by the actual number of hours the transmission network circuits are available, divided by the total possible hours available (after exclusions).

The unit of measure is percentage of hours per year and the higher the percentage of hours per year, the higher the level of service performance.

The following exclusions apply to circuit availability:

- Interruptions on non-transmission primary equipment (primary equipment operating at voltages less than 66 kV, including zone substation power transformers).
- Unregulated transmission network assets.

- Supply interruptions shown to be caused by a fault or other event on a '3rd party system' e.g. inter-trip signal, generator outage, customer installation.
- Force majeure events.
- Duration of planned interruptions for major construction work, including periods where availability is temporarily restored, is to be capped at 14 days in calculating transmission line availability.

The SSB expressed in terms of Circuit Availability for each year of the AA3 period is shown in Table 5.5.

Table 5.5: Circuit Availability SSB for each year ending 30 June

Circuit Availability	Percentage of hours per year
	SSB
	97.7%

5.2.2 System Minutes Interrupted

System Minutes Interrupted is the summation of Mega Watt – minutes (**MW-min**) of unserved energy at substations which are connected to the transmission network (Meshed or Radial) divided by the system peak MW.

The unit of measure is minutes per year and the lower the minutes per year, the higher the level of service performance.

The following exclusions apply to System Minutes Interrupted:

- Unregulated transmission network assets.
- Supply interruptions shown to be caused by a fault or other event on a '3rd party system' e.g. inter-trip signal, generator outage, customer installation.
- Force majeure events.

The SSBs expressed in terms of System Minutes Interrupted for each year of the AA3 period are shown in Table 5.6.

Table 5.6: System Minutes Interrupted SSBs for each year ending 30 June

System Minutes Interrupted	Minutes per year
	SSB
Meshed	12.5
Radial	5.0

5.2.3 Loss of Supply Event Frequency

Loss of Supply Event/Frequency is the frequency of unplanned customer interruption events where the loss of supply:

- exceeds 0.1 system minutes interrupted
- exceeds 1.0 system minutes interrupted.

The unit of measure is number of events per year and the lower the number of events per year, the higher the level of service performance.

The exclusions applied to System Minutes Interrupted also apply to Loss of Supply Event Frequency. In addition, planned interruptions and interruptions with a duration lasting less than one minute are excluded.

The SSBs expressed in terms of Loss of Supply Event Frequency for each year of the AA3 period are shown in Table 5.7

Table 5.7: Loss of Supply Event Frequency SSBs for each year ending 30 June

Loss of Supply Event Frequency	Number of events per year
	SSB
> 0.1 system minutes interrupted	33
> 1 system minutes interrupted	4

5.2.4 Average Outage Duration

Average Outage Duration is total number of minutes duration of all unplanned interruptions on the transmission network divided by the number of unplanned interruption events (after exclusions).

The unit of measure is minutes per year and the lower the minutes per year, the higher the level of service performance.

The exclusions that apply to Loss of Supply Event Frequency also apply to Average Outage Duration. In addition, any event contribution to Average Outage Duration is capped at 14 days.

SSB expressed in terms of Average Outage Duration for each year of the AA3 period is shown in Table 5.8.

Table 5.8: Average Outage Duration SSB SST for each year ending 30 June

Average Outage Duration	Minutes per year
	SSB
	886

5.3 Street lighting repair time

For the *reference service* A9, the SSBs are expressed in terms of street lighting repair time.

Street lighting repair time is the average number of business days to repair a faulty streetlight. The unit of measure is average number of business days and the lower the average number of business days, the higher the level of service performance.

The following exclusions apply to street lighting repair time:

- Force majeure events.
- Street lights for which Western Power is not responsible for maintenance.

SSBs expressed in terms of street lighting repair time for each year of the AA3 period are shown in Table 5.9.

Table 5.9: Street lighting repair time SSBs for each year ending 30 June

Street lighting repair time	SSB – average number of business days
Metropolitan area	5
Regional area	9

5.3.1 Areas

The areas defined for street lighting repair times are defined as follows:

Metropolitan area

Areas of the State defined in the *Code of Conduct for the Supply of Electricity to Small Use Customers 2016*.

Regional area

All areas in the Western Power Network other than the metropolitan area.

6. Actual service standard performance

6.1 Summary of service standards performance

During the 2017/18 period, Western Power's performance surpassed the required levels in 14 of the 17 service standard benchmarks. The benchmark was not met for the following transmission network service standard benchmarks:

- System Minutes Interrupted – Meshed Network.
- System Minutes Interrupted – Radial Network.
- Loss of Supply Events >1 system minute interrupted.

Because of these service standard benchmarks being below the required performance level, Western Power was non-compliant with clause 11.1 of the Access Code.

Distribution performance surpassed the required level in all nine SSBs. The overall reliability performance of the distribution network improved in CBD and Rural Short SAIDI and SAIFI compared to the 2016/17 period. This was due largely to fewer underground cable failures in the CBD and reduced impact of fauna, equipment failures and vehicles damaging network assets in the Rural areas. The service standard performance is detailed in Table 6.1 below. This table includes actual performance for SAIDI, SAIFI and Call Centre Performance using the AA3 MED definition and also the AA4 MED definition.

Table 6.1: Service Standard performance summary for the 2017/18 period

			SSB	2013/14 actual	2014/15 actual	2015/16 actual	2016/17 actual	2017/18 Using AA3 MED definition		2017/18 Using AA4 MED definition
								Actual	Bench mark met?	Actual
Distribution	SAIDI	CBD	39.9	18.3	26.2	22.6	13.8	1.3	√	1.3
		Urban	183	107.4	103	91.3	104.4	103.1	√	104.5
		Rural Short	227.8	171.2	182.6	168.4	175.6	147.8	√	151.9
		Rural Long	724.8	673.8	677.5	582.6	626.2	684.9	√	718.1
	SAIFI	CBD	0.26	0.20	0.17	0.1	0.11	0.04	√	0.04
		Urban	2.12	1.13	1.09	0.91	1.02	1.02	√	1.03
		Rural Short	2.61	1.83	1.98	1.75	1.76	1.56	√	1.59
		Rural Long	4.51	4.98	4.41	3.99	3.95	3.83	√	3.96
	Call Centre Performance		77.50%	92.80%	93.70%	91.40%	91.80%	91.90%	√	91.70%
	Circuit Availability		97.70%	98.04%	98.53%	98.66%	98.90%	99.10%	√	99.10%
Transmission	System Minutes Interrupted	Meshed Network	12.5	4.8	6.6	6.8	8.2	13.8	×	13.8
		Radial Network	5	3.7	1.6	0.5	0.7	12.6	×	12.6
	Loss of Supply Events	>0.1 system minute interrupted	33	17	24	15	16	11	√	11
		>1 system minute interrupted	4	1	0	1	2	6	×	6
	Average Outage Duration		886	795	720	1,265	653	560	√	560
Street	Metropolitan area		5 business days	1.14	1.26	1.55	2.47	3.06	√	3.06
	Regional area		9 business days	1.07	1.18	0.89	4.59	7.00	√	7.00

6.2 Distribution network

The reliability performance of the distribution network remained relatively consistent in the 2017/18 period compared to the 2016/17 period. The CBD showed improvement, while there was an increase in SAIDI for the Rural Long network.

Factors primarily contributing to reliability performance include:

- Overhead and underground cable failures.
- Environmental factors such as vegetation and wind-borne debris impacting on the network.
- Interruptions where the cause of the outage could not be identified.

All distribution measures performed within their prescribed benchmarks.

6.2.1 Distribution network – areas of focus

Key strategies and activities continued to be implemented during the 2017/18 period to maintain or deliver targeted improvements in the reliability of supply.

- **Routine and targeted maintenance**

  This activity involves Western Power's routine and targeted asset inspection and maintenance programs, inspections and monitoring of assets. This is done in conjunction with vegetation management plans, as well as the replacement of deteriorating assets and defective assets, such as poles and conductors. The purpose of this activity is to positively influence reliability performance and target a reduction in public safety risk.
  Reliability performance is impacted by reducing the number and duration of faults caused by equipment failure, wildlife, and vegetation interacting with the Network. Where assets are targeted for zone-based replacement, alternative options may be considered for additional reliability and customer benefit, such as re-routing feeders through areas that have a lower reliability risk. Overall, this activity contributes directly to improving the condition of the assets and is expected to positively influence reliability performance and assist in reducing public safety risk.

- **Grid Augmentation**

  This activity involves additional capital expenditure where the network is modified or where new assets are installed. Specific areas may be targeted based on their long-term reliability performance and underlying reliability risk factors. The nature of augmentation will depend on the systemic factors that negatively affect reliability and the suitability of options at that location on the grid.

6.2.2 Trends in interruption causes (refer to Appendix B)

Instances of overhead asset failure declined in the 2017/18 period and there was a marginal increase in customer interruptions where the cause could not be identified. Lightning activity has been volatile over the past five years, and while there was a reduced impact compared to prior periods, the usual seasonal impact occurred during the 2017/18 period.

Table 6.2: Distribution performance and commentary for the 2017/18 period using AA3 MED definition

Service Standard	2017/18		Comments
	SSB	Actual	
CBD SAIDI	39.9	1.3	Performance was better than the AA3 benchmark and better than the 2016/17 period (13.8 minutes per year). When compared to the 2016/17 period, the biggest decrease was due to reductions in equipment failure, specifically underground cable failure. Note: The CBD SAIDI performance is volatile over short periods of time due to the combined effects of fewer connections and the relatively long repair times for faults in an underground CBD network.

Service Standard	2017/18		Comments
	SSB	Actual	
Urban SAIDI	183.0	103.1	Performance was better than the AA3 benchmark and an improvement on the 2016/17 period (104.4 minutes per year). The main contributors to the actual performance were equipment failures and emergency outages to remove hazards.
Rural Short SAIDI	227.8	147.8	Performance was better than the AA3 benchmark and the 2016/17 period (175.6 minutes per year). The primary contributors to better performance were the reduction of impacts of fauna, vegetation and equipment failure.
Rural Long SAIDI	724.8	684.9	Performance was better than the AA3 benchmark but lower than the 2016/17 period (626.2 minutes per year). The primary contributors to the decline in performance during the 2017/18 period were increases in inclement weather, unplanned outages for hazards and overhead equipment failure.
CBD SAIFI	0.26	0.04	Performance was better than both the AA3 benchmark and the 2016/17 period (0.11 interruptions per year). The primary contributor to improved performance was reductions in equipment failure, specifically underground cable failure.
Urban SAIFI	2.12	1.02	Performance was better than the AA3 and unchanged from the 2016/17 period (1.02 interruptions per year). The primary contributors to the performance level were the impact of equipment failure and other unknown causes.
Rural Short SAIFI	2.61	1.56	Performance was better than both the AA3 benchmark and the 2016/17 period (1.76 interruptions per year). The primary contributors to better performance were the reduction of impacts of fauna, equipment failure and vehicles.
Rural Long SAIFI	4.51	3.83	Performance was better than the AA3 benchmark and the 2016/17 period (3.95 interruptions per year). The primary contributors to the performance level were unplanned outages for hazards, overhead equipment failure and other unknown causes.
Call centre performance	77.5%	91.9%	This year's performance of 91.9% of fault calls answered within 30 seconds was better than the AA3 benchmark, and better than the 2016/17 period (91.8%). A new telephony platform helped maintain service performance, together with a continuation of customers utilising Western Power's website for self-service information about outages.

6.3 Transmission network

The transmission network performance was lower than the benchmark for three reference services namely *System Minutes Interrupted – Meshed Network*, *System Minutes Interrupted – Radial Network* and *Loss of Supply Event Frequency - >1.0 system minute interrupted*.

The significant events that breached the *Loss of Supply Event Frequency >1.0 SMI* are detailed in Table 6.3 below.

Table 6.3: Loss of Supply Event Frequency >1.0SMI for the 2017/18 period

Events	Date	Load Area	Network Configuration	System Minutes	Connected Load MW	Contributing Factor
1	11/12/2017	EC/EGF	Meshed	4.5	85.0	Lightning and thunderstorm
2	15/12/2017	EGF	Radial	8.1	22.6	Pole failure (3) due to high winds, lightning and thunderstorm
3	30/03/2018	EC	Meshed	1.3	7.4	Pole failure (1) due to high winds
4	02/04/2018	EGF/EC/MU	Meshed	1.4	83.8	Lightning and thunderstorm
5	05/06/2018	MU	Meshed	4.1	26.7	High winds/storm
6	11/06/2018	EC	Radial	4.2	7.5	Distribution equipment failure
EC = East Country, EGF = Eastern Goldfields, GSR = Great Southern Region, MU = Muja						

Five of the six events that resulted in high SMI (Radial and Meshed) were in the East Country and Eastern Goldfields. The supply to the Eastern Goldfields and parts of the East Country is assessed against the technical rules clause 2.5.2.1 as N-0 reliability. Western Power currently meets its technical rules obligations in these areas.

The long radial network in the Eastern Goldfields is highly susceptible to external factors, such as weather events. In addition, there are geographical challenges posed by a long radial network which impact on the time to repair faults. Where available, supply will be restored via the distribution network and/or the dispatch support service contract.

Of these six events, two were low probability, high impact events (which typically occur with a probability of a one-in-ten-year value) and contributed to 97.5% of SMI Radial for the 2017/18 period.

Table 6.4: Transmission performance and commentary for the 2017/18 period

Service Standard	2017/18		Comments
	SSB	Actual	
Circuit Availability	97.70%	99.10 %	Performance was better than the AA3 benchmark and the 2016/17 period (98.90%). Western Power has improved maintenance planning and coordination across planned outages, which results in planned outages that address multiple needs and minimise the outage duration. The performance excludes any extended planned interruptions for major construction work greater than 14 circuit unavailability days (refer to Section 7.3 for further details).
System Minutes Interrupted Meshed Network	12.5	13.8	Performance was lower than the AA3 benchmark and the 2016/17 period (8.2 system minutes). Due to inclement weather, failures occurred on networks where significant loads were connected. Refer to section 6.3 for further information.

Service Standard	2017/18		Comments
	SSB	Actual	
System Minutes Interrupted Radial Network	5.0	12.6	Performance was lower than the AA3 benchmark and the 2016/17 period (0.7 system minutes). Two key events, one due to environment conditions and one due to an asset failure, affected radial circuits that did not have the capability to temporarily restore customer supply via distribution systems. Some circuits in the radial network are highly susceptible to environmental factors and these events are known as Low Probability High Impact (LPHI*) events. Refer to section 6.3 for further information. *LPHI event is an incident that occurs with a probability of a one-in-ten-year value.
Loss of Supply Events >=0.1 <1.0 System minutes interrupted	33	11	Performance was better than the AA3 benchmark and the 2016/17 period (LOSEF >=0.1SMI <1.0SMI 16 events). The restoration of customers via the distribution system helped to maintain performance within the benchmark.
Loss of Supply Events >1.0 System minutes interrupted	4	6	Performance was lower than both the AA3 benchmark and the 2016/17 period (2 LOSEF >1.0SMI events). The lower performance was primarily due to six events, of which five (5) events were attributed to environmental factors (5 events during lightning/thunderstorms) and an asset failure (1 event due to distribution equipment defect) in the transmission network. Two (2) of these six events were classified as Low Probability – High Impact (LPHI) events whilst one (1) event was a consequence of the protection scheme operating in order to maintain the power system security in a network with large load connected.
Average Outage Duration	886	560	Performance was better than both the AA3 benchmark and the 2016/17 period (653 outage minutes). The improved performance was achieved through priority being placed on the maintenance, inspection and fault management on the regulated circuits. In addition, proactive measures such as on-call network switching resources and/or additional resources were employed to expedite restoration of faulted regulated circuits.

6.4 Street lighting repair time

Table 6.5: Street lighting repair time performance and commentary for the 2017/18 period

Service Standard	2017/18		Comments
	SSB	Actual	
Metropolitan area	≤ 5 business days	3.06	Performance in the metropolitan area was better than the AA3 benchmark but lower than the 2016/17 period (2.47 average business days), but still well within the SSB target of ≤ 5 days.

Service Standard	2017/18		Comments
	SSB	Actual	
Regional area	≤ 9 business days	7.00	Performance in regional areas was better than the AA3 benchmark, and while lower than the 2016/17 period (4.59 average business days), was still within the SSB target of ≤ 9 days. Western Power has insourced regional street light repair work and this has allowed full utilisation of the regional workforce. The internal regional teams balance meeting the streetlight SSB with other maintenance and emergency repair work.

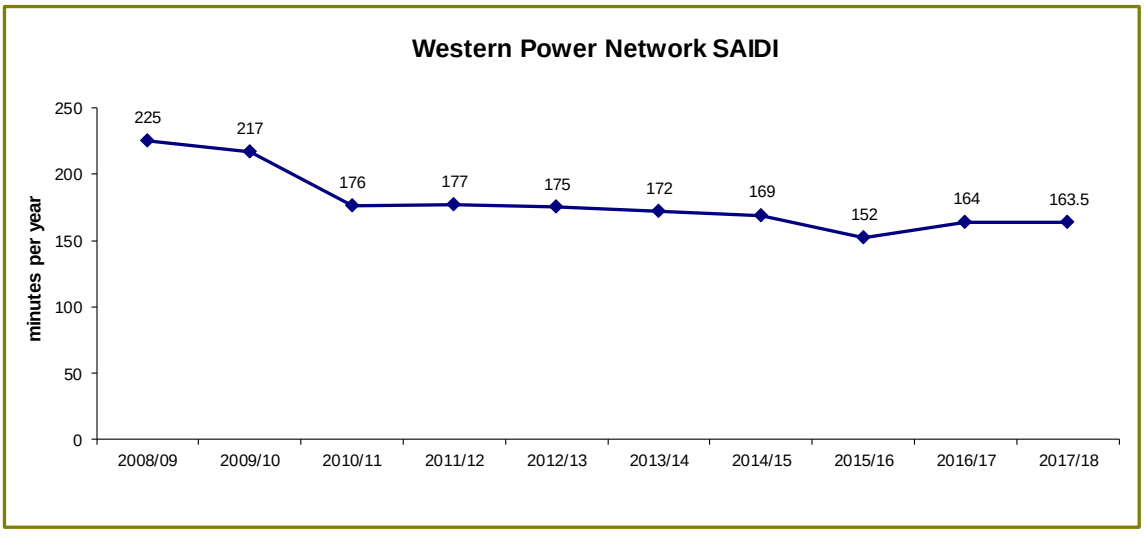
6.5 Western Power Network Performance

Western Power does not have a SSB measure for the total network. As shown in Table 6.6, the reliability performance of the Western Power Network for the 2017/18 period was lower compared to the previous year, especially Transmission Reference Services (System Minutes Interrupted). For the distribution network, the duration of outages and the frequency of interruptions decreased slightly from the previous year.

Table 6.6: Overall reliability performance of the network using AA3 MED definition

		2016/17	2017/18
Distribution	SAIDI[8]	164	163.5
	SAIFI	1.43	1.4
Transmission - System Minutes Interrupted[9]		8.92	26.4

Figure 6.1: Distribution network SAIDI (10-year history)



[8] The SAIDI figures here are based on the same rules as defined in AA3, it is not comparable to other published SAIDI figures – namely Western Power's State of the Infrastructure and corporate annual reports

[9] System Minutes Interrupted for the whole transmission network has never been a reporting measure in either the current or any previous Access Arrangement.

Figure 6.2: Distribution network SAIFI (10-year history)

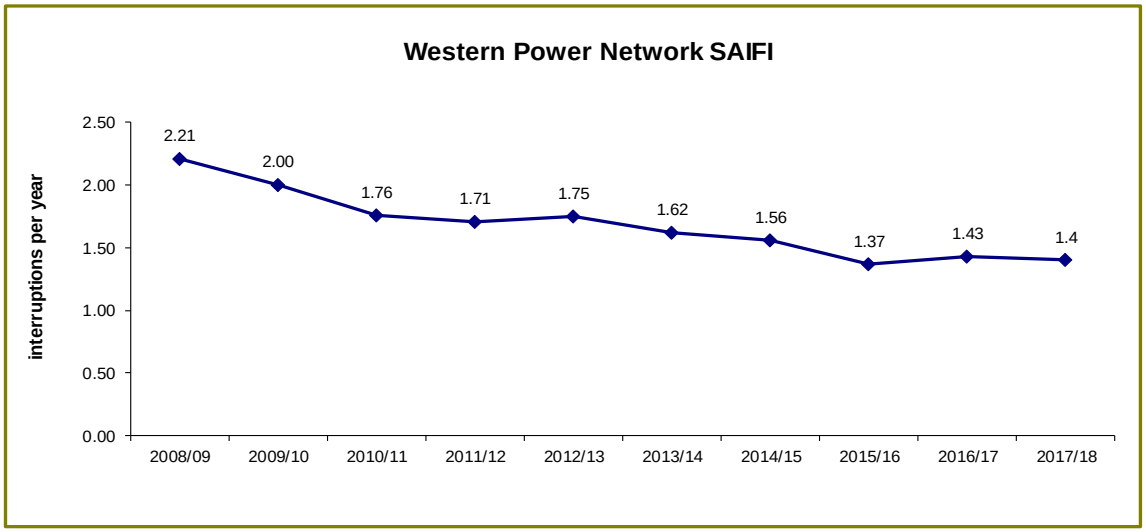
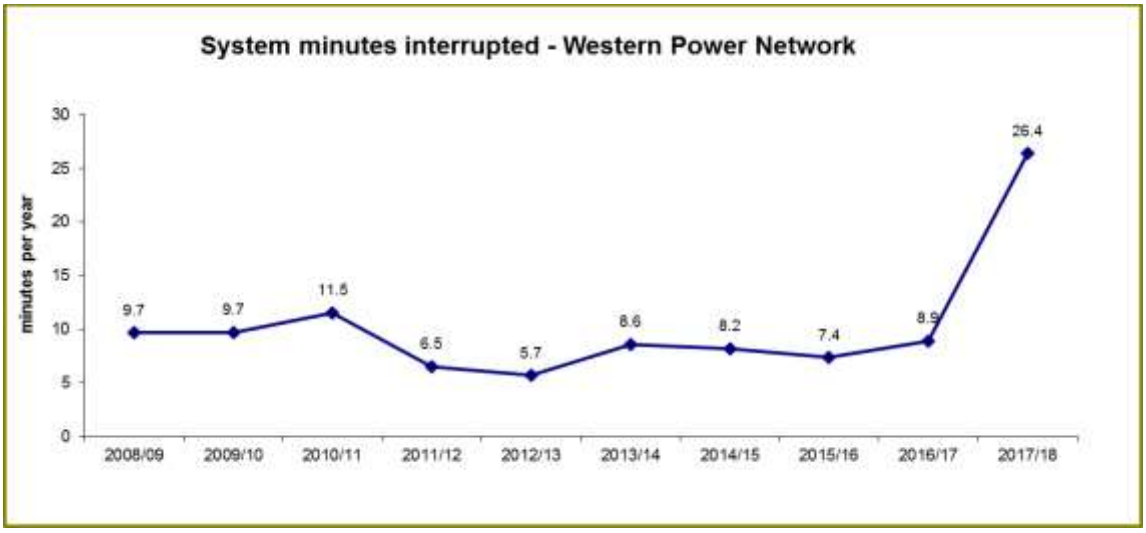


Figure 6.3: Transmission network System Minutes Interrupted



7. Exclusions from SSB performance

As outlined in section 5, the service standards and the SSAM financial incentive scheme, provide for certain events to be excluded from the distribution and transmission reference service performance.

7.1 Distribution performance – SAIDI, SAIFI

Based on the exclusions described in section 5.1.1, for the 2017/18 period, the distribution performance service standards in terms of SAIDI and SAIFI excluded the interruptions described below.

7.1.1 Major Event Days (MEDs)

The MEDs excluded are classified in accordance with IEEE 1366-2003 (*Guide for Electric Power Distribution Reliability Indices*). For the 2017/18 period, Western Power updated its AA4 definition of the MED and calculation methodology as it applies to SAIDI, SAIFI and Call Centre Performance, to align with Australian industry practice (Refer to section 1.2 for further explanation).

Under the AA4 MED definition there were seven days during the 2017/18 period that exceeded the daily MED threshold of 5.55 minutes. Applying the definition used for AA3, there was one additional MED (see January 15, 2018) and both methods are included in Table 7.1 below.

Table 7.1 illustrates:

- SAIDI (minutes per year) and SAIFI (interruptions per year), which have been excluded from the 2017/18 period due to these eight MEDs.
- Call centre performance (percentage calls per year), which is the percentage number of fault calls responded to in 30 seconds or less against the total number of fault calls during these eight MEDs.

Table 7.1: SAIDI, SAIFI and call centre performance exclusions due to MEDs

		2013/14	2014/15	2015/16	2016/17	Using AA3 MED Definition 2017/18	Using AA4 MED Definition 2017/18
SAIDI	CBD	0	0	6	0	0	0
	Urban	25	39	39	35	54	52
	Rural Short	74	44	175	30	161	157
	Rural Long	401	220	152	133	364	330
SAIFI	CBD	0.00	0.00	0.00	0.00	0.00	0.00
	Urban	0.13	0.22	0.17	0.13	0.10	0.08
	Rural Short	0.21	0.31	0.40	0.12	0.44	0.40
	Rural Long	0.61	0.78	0.61	0.23	0.73	0.61
Call centre performance		92.8%	92.9%	90.0%	91.8%	94.5%	96.1%

September 22, 2017 (as per AA4 definition)

(SAIDI = 8.96 minutes, SAIFI = 0.019 interruptions, call centre performance = 96.0%)

Over 22,000 customers were interrupted (approximately 16,000 customers without power at its peak) on the Western Power Network for an average of seven hours. Customers in the Perth Metropolitan area, the Wheatbelt and Great Southern regions were the most affected during this day.

The main cause of customer interruptions was faults on the distribution network arising from inclement weather.

November 18, 2017 (as per AA4 definition)

(SAIDI = 34.6 minutes, SAIFI = 0.018 interruptions, call centre performance = 91.5%)

There was localised storm activity around Kalgoorlie consisting of lightning and wind gusts recorded over 100km/h, resulting in extensive damage to network infrastructure.

Over 20,000 customers were interrupted (approximately 16,000 customers without power at its peak) on the Western Power Network for an average of seven hours. Most of these customers were in the Goldfields region, where customers in this area were affected on average for nearly four days.

January 15, 2018 (as per AA3 definition, not a MED under the AA4 definition)

(SAIDI = 5.60 minutes, SAIFI = 0.032 interruptions, call centre performance = 80.6%)

Over 26,000 customers were interrupted for an average of five and a half hours across the Western Power Network, with most of the affected customers being in the Perth Metropolitan area and the Mid-West region. There was heavy rain during that day which resulted in pole top fire activity. In addition, there were outages at the Joel Terrace and Chapman zone substations.

March 10, 2018 (as per AA4 definition)

(SAIDI = 7.66 minutes, SAIFI = 0.018 interruptions, call centre performance = 97.0%)

Over 20,000 customers were interrupted for an average of seven hours across the Western Power Network, with most of the affected customers being in the Perth Metropolitan area and the South-West region. The interruptions were due to inclement weather which included lightning and strong winds. In addition, there was network equipment damage due to bushfires in the South-West region.

March 30, 2018 (as per AA4 definition)

(SAIDI = 6.37 minutes, SAIFI = 0.012 interruptions, call centre performance = 93.0%)

Approximately 15,000 customers were interrupted for an average of 23 hours across the Western Power Network, with most of the affected customers being in the Wheatbelt, the Peel region and the South-West region. The Wheatbelt and the South-West regions were impacted by inclement weather which included lightning and strong winds. In addition, there was an underground cable failure affecting customers in the City of Mandurah for up to four hours.

May 24, 2018 (as per AA4 definition)

(SAIDI = 5.75 minutes, SAIFI = 0.026 interruptions, call centre performance = 91.6%)

Due to inclement weather which included lightning and strong winds, over 31,000 customers were interrupted for an average of nine hours across the Western Power Network. Most of the affected customers were in the Perth Metropolitan area and the South-West region.

May 25, 2018 (as per AA4 definition)

(SAIDI = 9.57 minutes, SAIFI = 0.047 interruptions, call centre performance = 95.2%)

Over 33,000 customers were interrupted for an average of eight and a half hours across the Western Power Network. Most of the affected customers were in the Perth Metropolitan area, the Wheatbelt and South West regions. The interruptions were due to inclement weather which included lightning and strong winds.

June 5, 2018 (as per AA4 definition)

(SAIDI = 13.96 minutes, SAIFI = 0.042 interruptions, call centre performance = 98.7%)

Over 63,000 customers were interrupted for an average of eight hours across the Western Power Network. Most of the affected customers were in the Great Southern and South-West regions. The interruptions were due to inclement weather which included lightning and strong winds.

7.1.2 Transmission network interruptions

The SAIDI (minutes per year) and SAIFI (interruptions per year) that were excluded due to supply interruptions caused by the transmission network are outlined in Table 7.2.

Table 7.2: SAIDI and SAIFI exclusions due to transmission network interruptions

		2013/14	2014/15	2015/16	2016/17	2017/18
SAIDI	CBD	0	0	0	0	0
	Urban	10	17	8	18	8
	Rural Short	12	17	24	17	50
	Rural Long	14	31	40	70	74
SAIFI	CBD	0.00	0.00	0.00	0.00	0.00
	Urban	0.20	0.25	0.13	0.27	0.18
	Rural Short	0.25	0.22	0.29	0.32	0.33
	Rural Long	0.32	0.34	0.75	0.57	0.29

7.1.3 Other third-party network interruptions

The SAIDI (minutes per year) and SAIFI (interruptions per year) that were excluded due to supply interruptions caused by generator unavailability or customer equipment are outlined in Table 7.3.

Table 7.3: SAIDI and SAIFI exclusions due to other third-party network interruptions

		2013/14	2014/15	2015/16	2016/17	2017/18
SAIDI	CBD	3	3	2	1	0
	Urban	2	4	3	5	4
	Rural Short	4	7	2	5	2
	Rural Long	9	5	4	5	7
SAIFI	CBD	0.02	0.01	0.02	0.00	0.00

		2013/14	2014/15	2015/16	2016/17	2017/18
	Urban	0.03	0.04	0.02	0.13	0.02
	Rural Short	0.08	0.04	0.02	0.13	0.01
	Rural Long	0.13	0.09	0.06	0.09	0.03

These third-party network supply interruptions include:

- Ravensthorpe generator failure on 16 August 2017 lasted 43 minutes and resulted in 314 customers being interrupted in the Shire of Ravensthorpe.
- There were 2,702 faults attributed to customer installations or other third-party equipment.

7.1.4 Planned interruptions

The SAIDI (minutes per year) and SAIFI (interruptions per year) that were excluded due to planned supply interruptions required to undertake safe work activities on the distribution network and mitigate the risk of unplanned interruptions, are outlined in Table 7.4.

Table 7.4: SAIDI and SAIFI exclusions due to planned interruptions

		2013/14	2014/15	2015/16	2016/17	2017/18
SAIDI	CBD	19	4	21	9	10
	Urban	70	55	44	79	97
	Rural Short	259	151	148	186	126
	Rural Long	328	413	448	253	376
SAIFI	CBD	0.03	0.02	0.06	0.02	0.03
	Urban	0.23	0.17	0.14	0.24	0.30
	Rural Short	0.77	0.45	0.41	0.50	0.38
	Rural Long	0.93	1.20	1.26	0.94	1.08

7.1.5 Force Majeure

There were no events on the distribution network that were classified as force majeure.

7.2 Distribution performance – Call centre performance

Based on the exclusions described in section 5.1, for the 2017/18 period, the distribution performance service standards in terms of call centre performance exclude the fault call non-compliances as indicated below:

7.2.1 Abandoned calls – four seconds or less

These calls are currently not captured or recorded within Western Power's systems.

7.2.2 Major Event Days

See 7.1.1 for the details of the MEDs for the 2017/18 period.

7.2.3 Extraordinary events

There were no extraordinary events on the distribution network affecting the call centre performance.

7.3 Transmission performance

Based on the exclusions described in Section 5.2, the transmission performance for the AA3 period excludes the interruptions described below.

7.3.1 Force Majeure

There were no events on the transmission network that were classified as force majeure.

7.3.2 Planned interruptions - major construction work exceeding 14 days

In calculating circuit availability, planned interruptions for major construction work is capped at 14 days; Table 7.5 shows the number of planned supply interruptions for major construction works that exceeded the 14 day cap in each of the last four financial years of the AA3 period and the 2017/18 period.

Table 7.5: Planned interruptions for major construction work exceeding 14 days

	2013/14	2014/15	2015/16	2016/17	2017/18
Number of planned interruptions	22	10	19	24	14

8. $MAIFI_E$

During the 2017/18 period, there were approximately 3,315 momentary interruptions recorded on the network. Most of these interruptions occurred on the Rural Long network.

Table 8.1 shows the $MAIFI_E$ for the 2017/18 period for each of the distribution feeder classifications. This data is inclusive of all momentary interruptions on the distribution network.

Table 8.1: MAIFIE for the 2017/18 period

	$MAIFI_E$
CBD	0.37
Urban	0.74
Rural Short	2.23
Rural Long	6.03
Western Power Network	1.59

Appendix A

Service standard performance graphs - 2008/09 to 2017/18

A.1 Service standard performance graphs – 2008/09 to 2017/18

The following graphs illustrate the actual performance of the service standards for the ten financial years up to the 2017/18 period, and the SSBs and SSTs (if applicable) during the AA3 period. Where relevant, the AA2 SSBs have been included to demonstrate trends. Details and further information regarding AA2 performance has been provided in previous Service Standard Performance Reports throughout the AA2 period.

A.1.1 Distribution performance

- Figure A.1 to Figure A.8 show the SAIDI and SAIFI of the CBD, Urban, Rural Short and Rural Long networks.
- Figure A.9 illustrates call centre performance

Figure A.1: CBD SAIDI

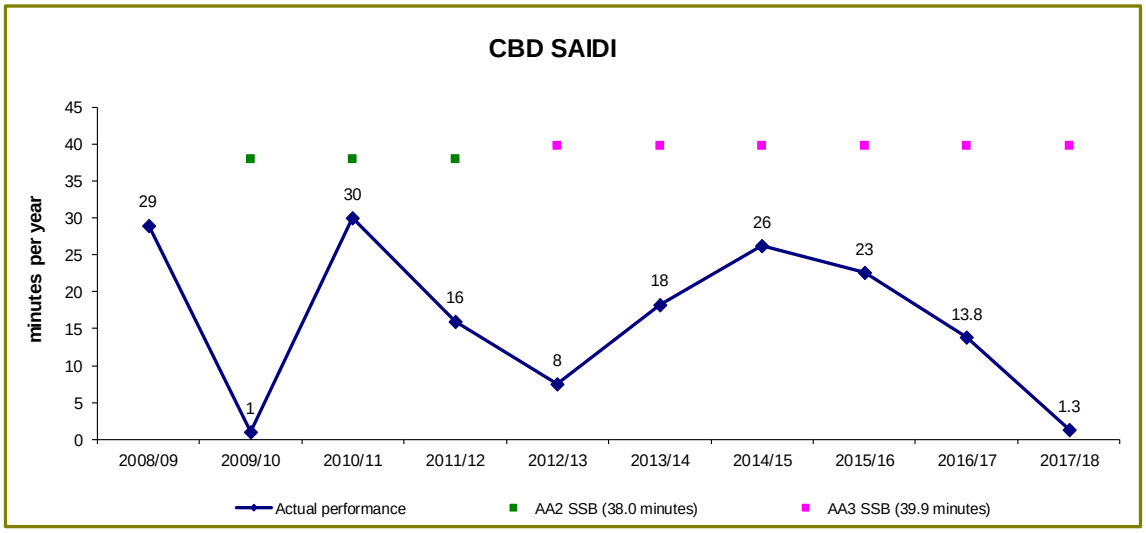


Figure A.2: CBD SAIFI

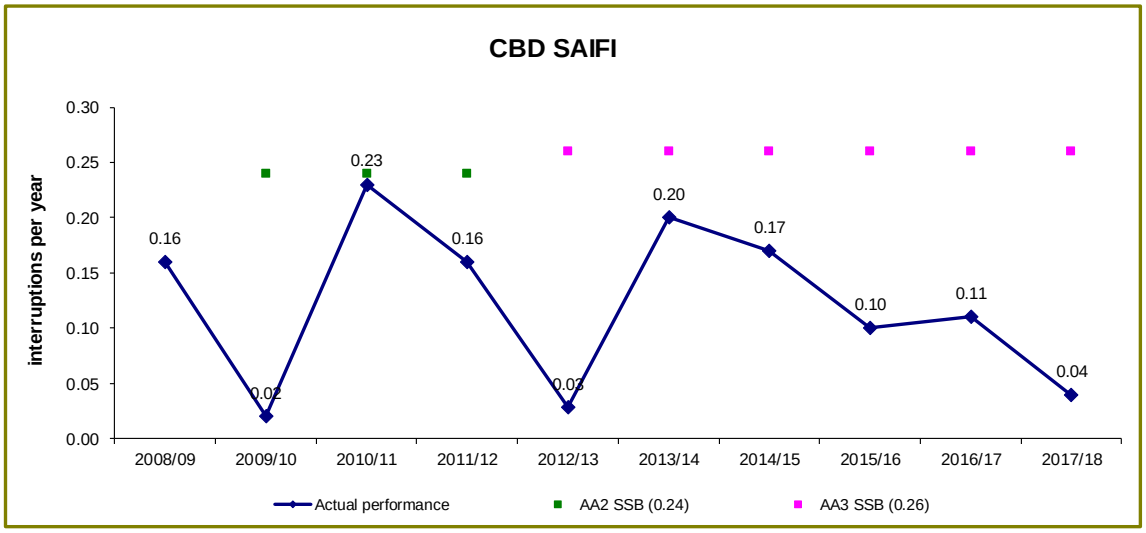


Figure A.3: Urban SAIDI

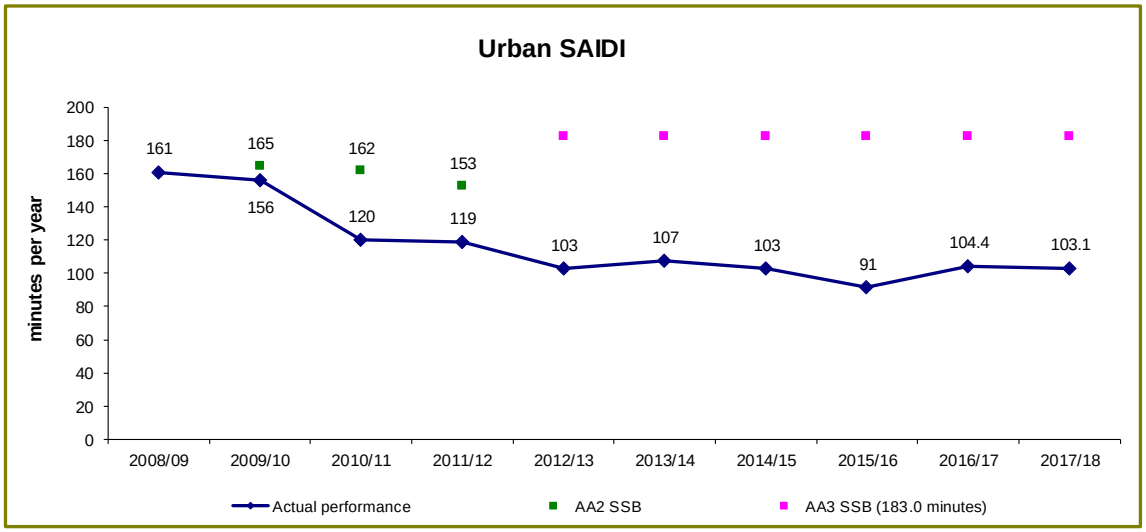


Figure A.4: Urban SAIFI

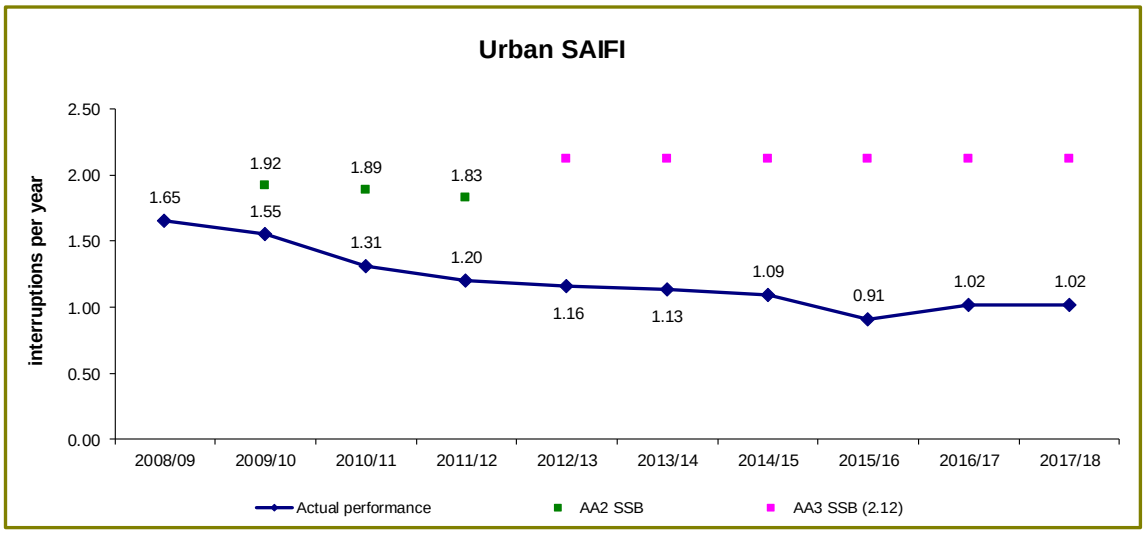


Figure A.5: Rural Short SAIDI

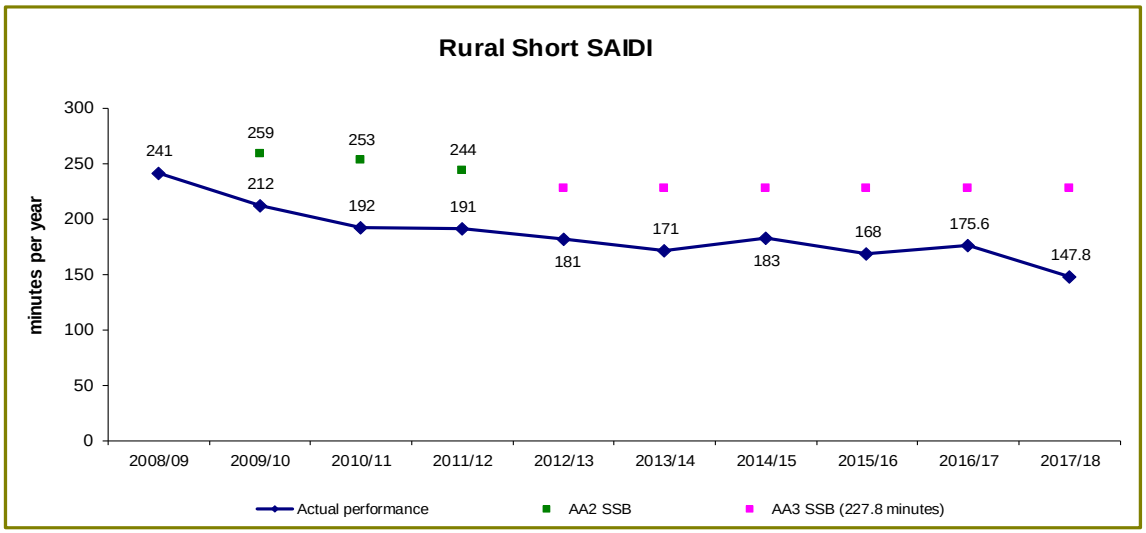


Figure A.6: Rural Short SAIFI

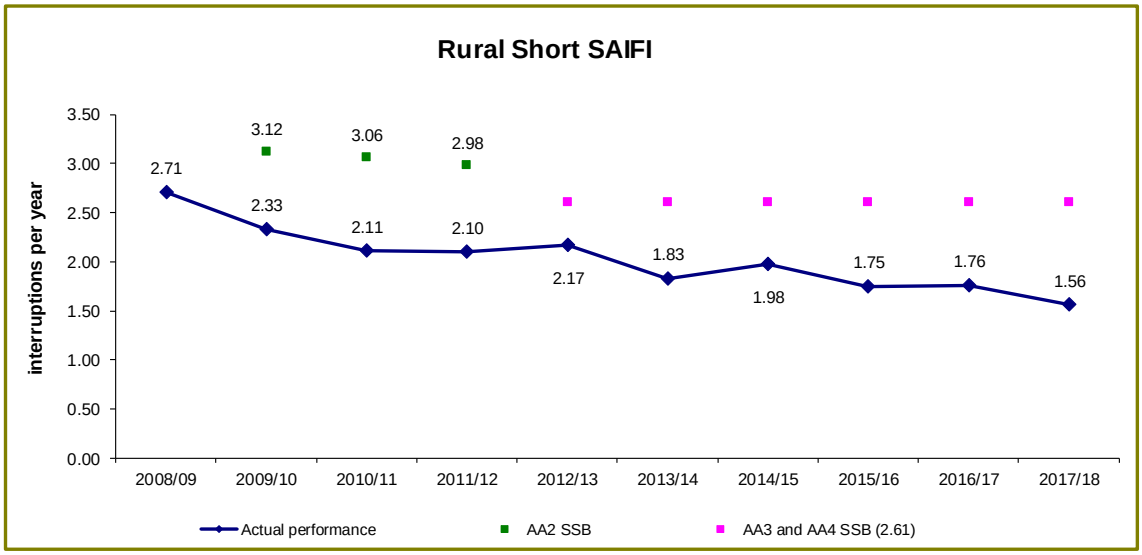


Figure A.7: Rural Long SAIDI

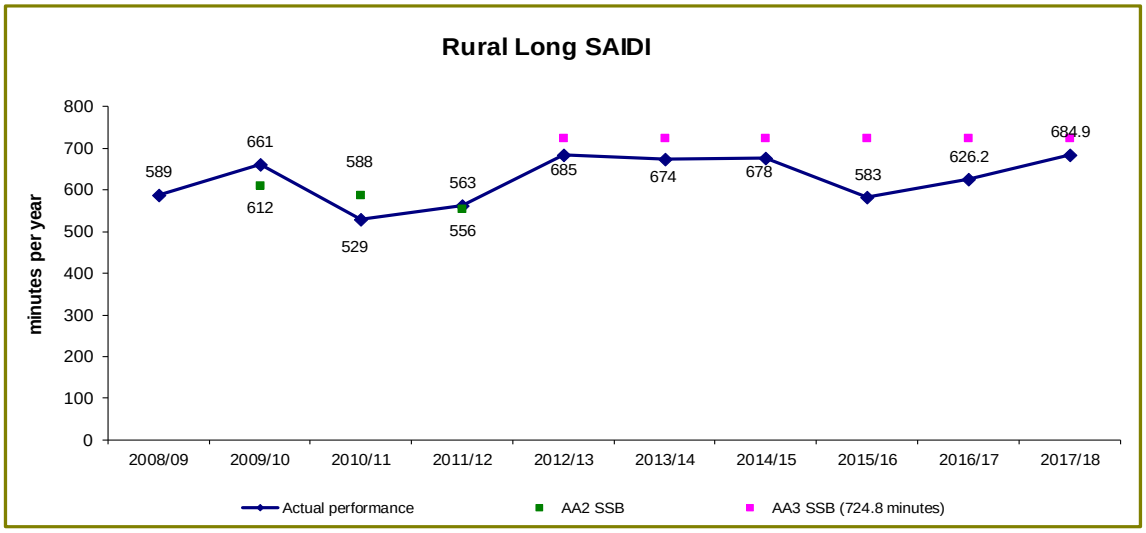


Figure A.8: Rural Long SAIFI

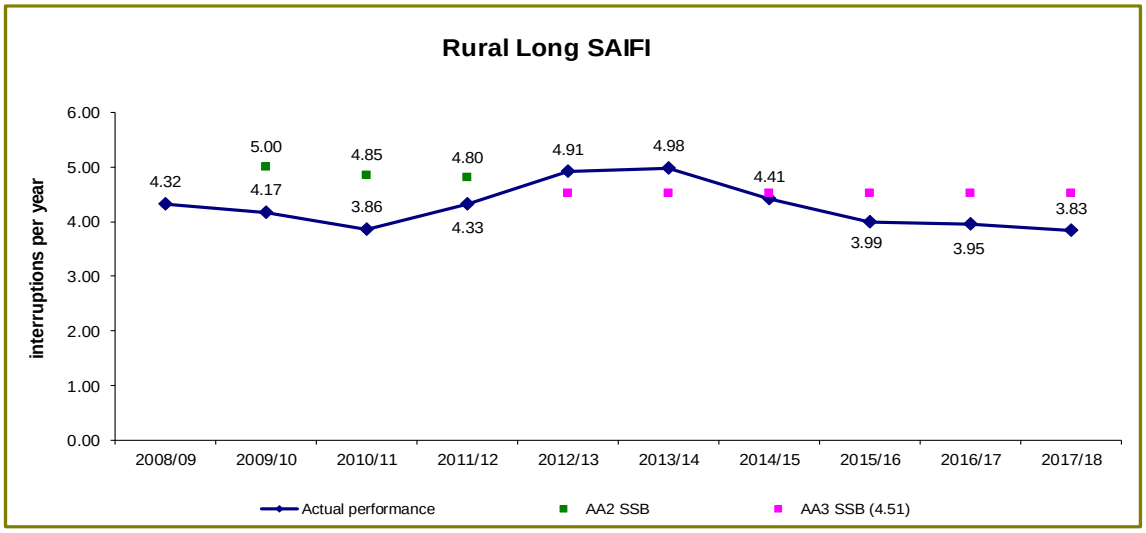
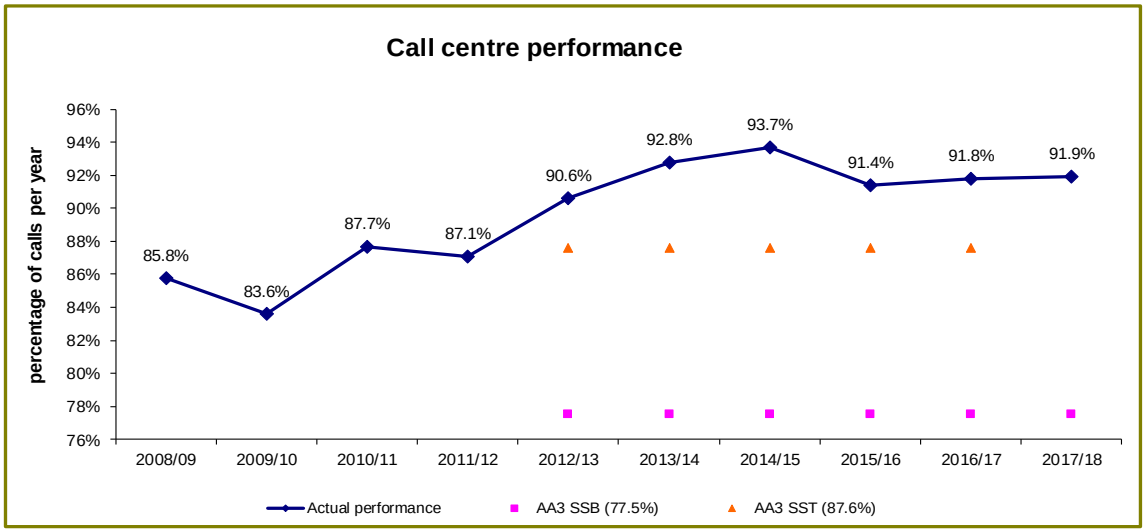


Figure A.9: Call Centre Performance



A.1.2 Transmission performance

- Figure A.10 shows the circuit availability.
- Figure A.11 and Figure A.12 shows the system minutes interrupted for the meshed and radial networks.
- Figure A.13 and Figure A.14 shows the loss of supply event frequency for > 0.1 and > 1 system minutes.
- Figure A.15 shows the average interruption duration.

Figure A.10: Circuit availability

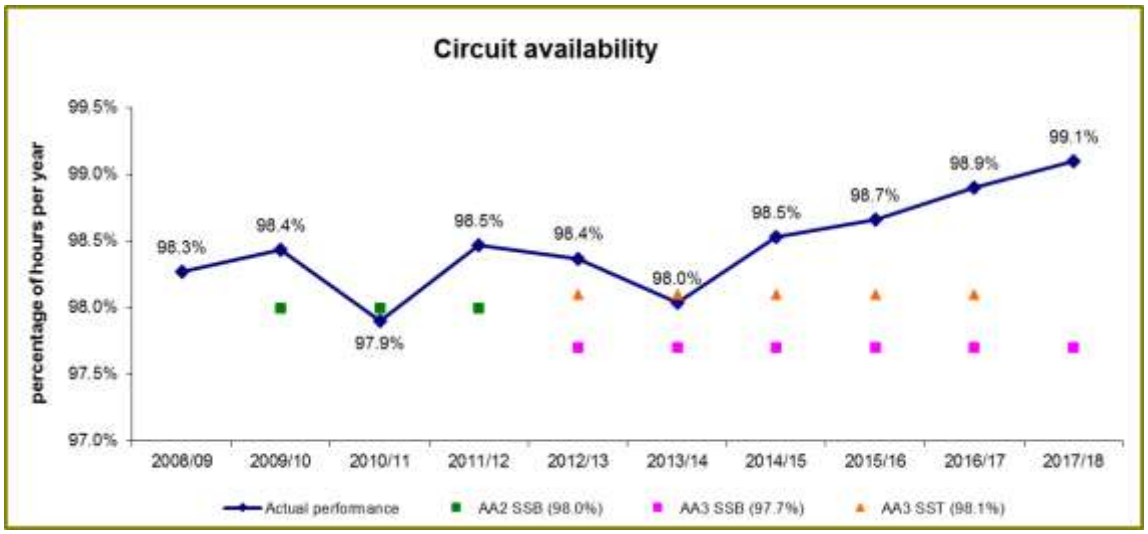


Figure A.11: System minutes interrupted – meshed network

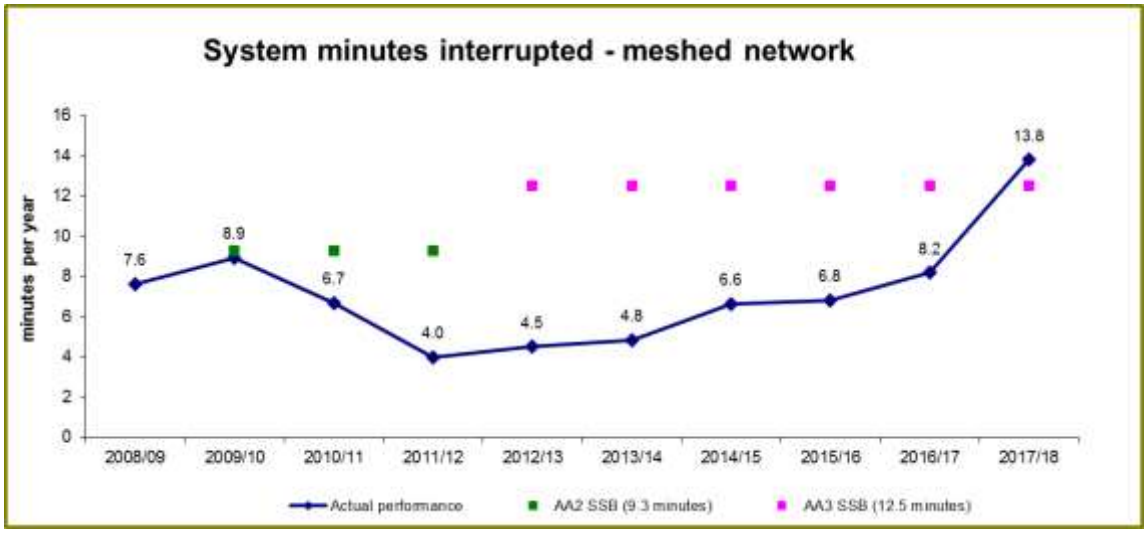


Figure A.12: System minutes interrupted – radial network

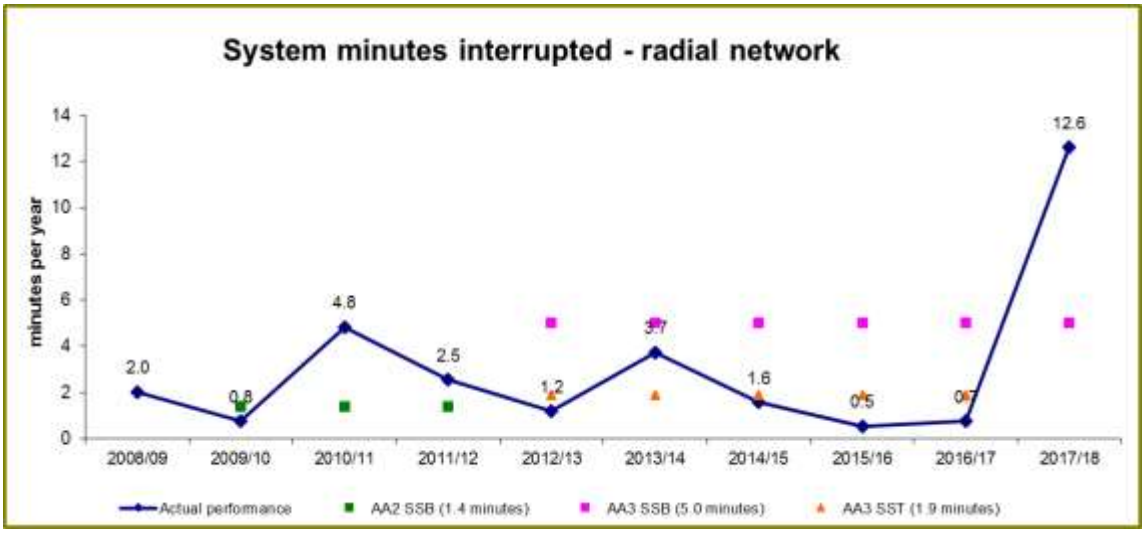


Figure A.13: Loss of supply event frequency > 0. 1 system minutes interrupted

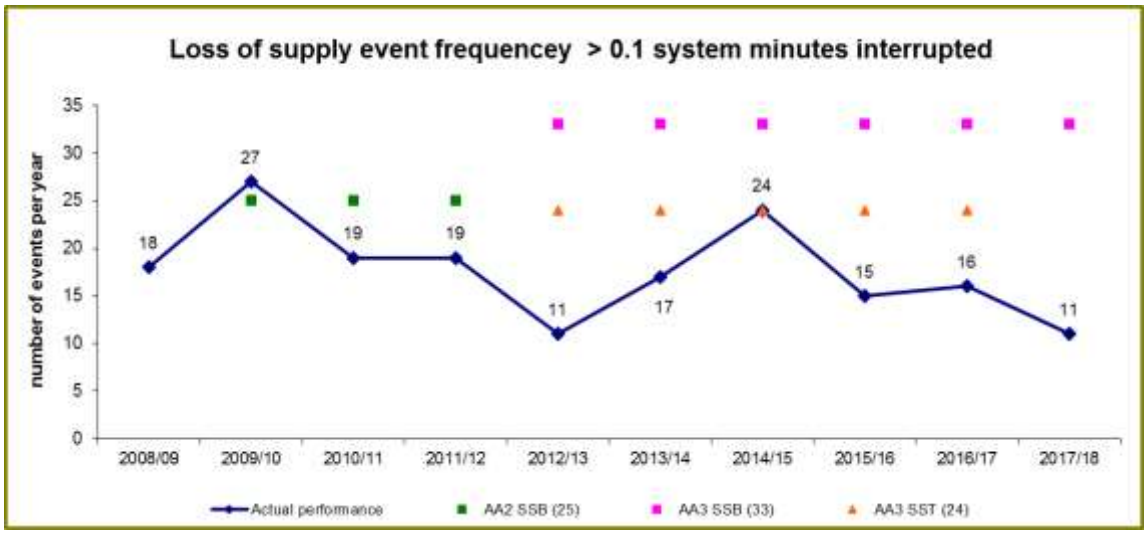


Figure A.14: Loss of supply event frequency > 1 system minutes interrupted

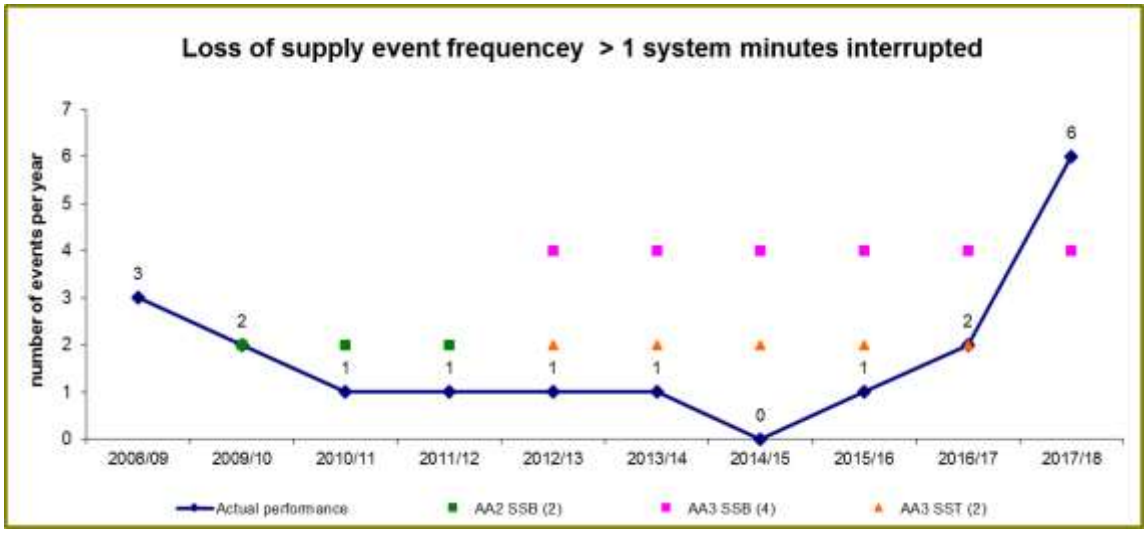
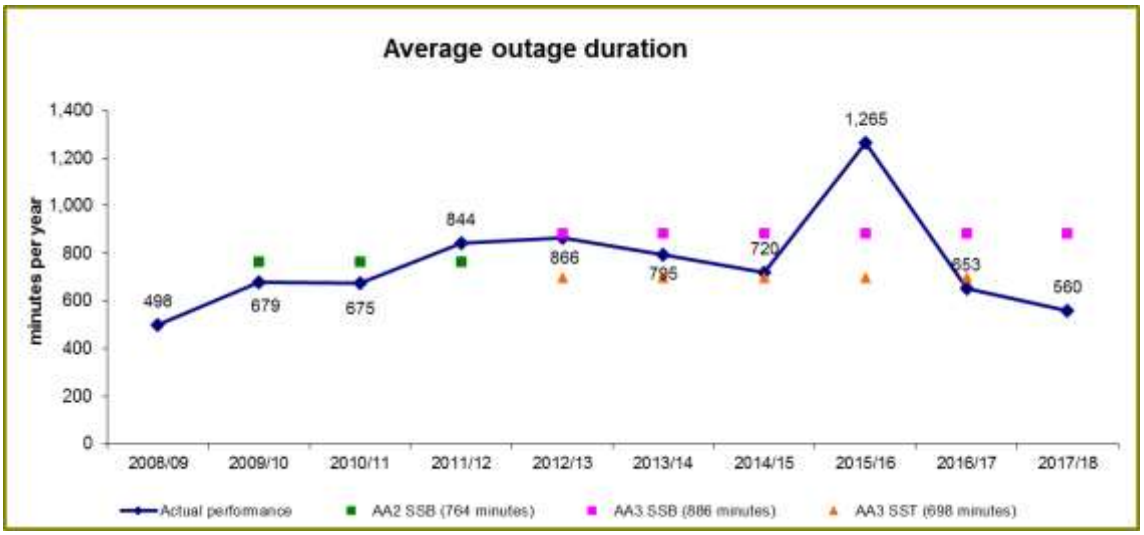


Figure A.15: Average outage duration



A.1.3 Street lighting repair time

- Figure A.16 and Figure A.17 shows the street lighting repair time for the metropolitan and regional areas

Figure A.16: street lighting repair time – Metropolitan area

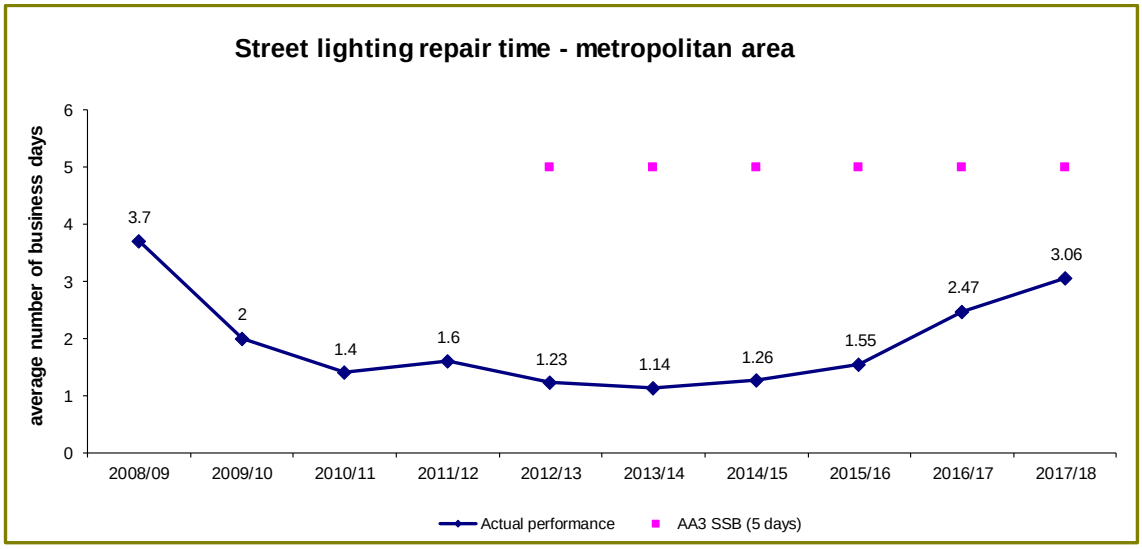
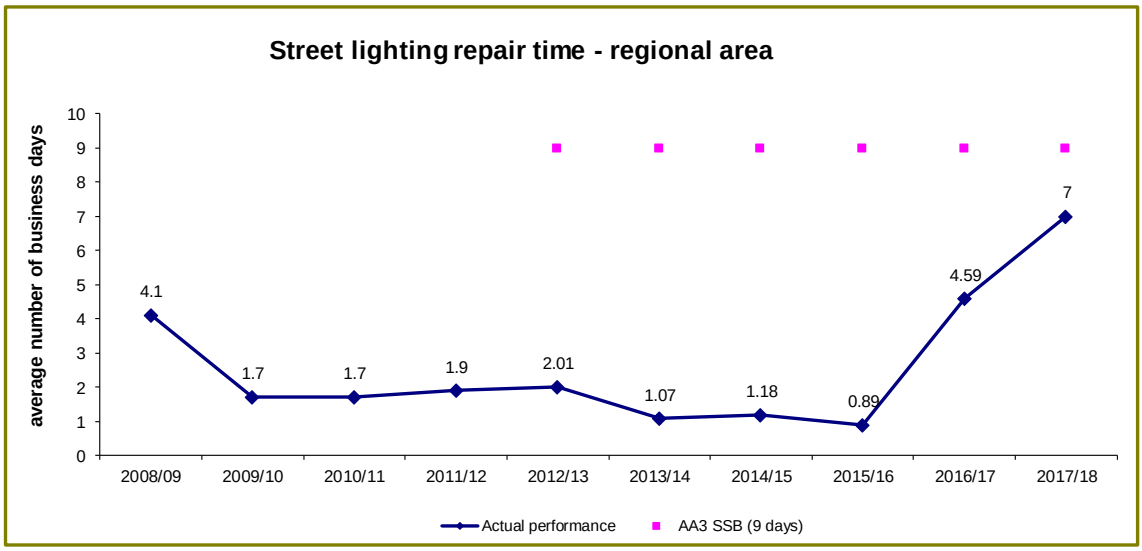


Figure A.17: street lighting repair time – Regional area



Appendix B

Trends of fault causes for Western Power Network SAIFI

B.1 Trends of fault causes for Western Power Network SAIFI

The following graphs illustrate the fault cause trends, over the past 5 years, by key causes of interruptions (overhead equipment failure, unknown fault causes and lightning) which contribute to the Western Power Network SAIFI.

Figure B.1: Western Power Network SAIFI – overhead equipment failure cause trend

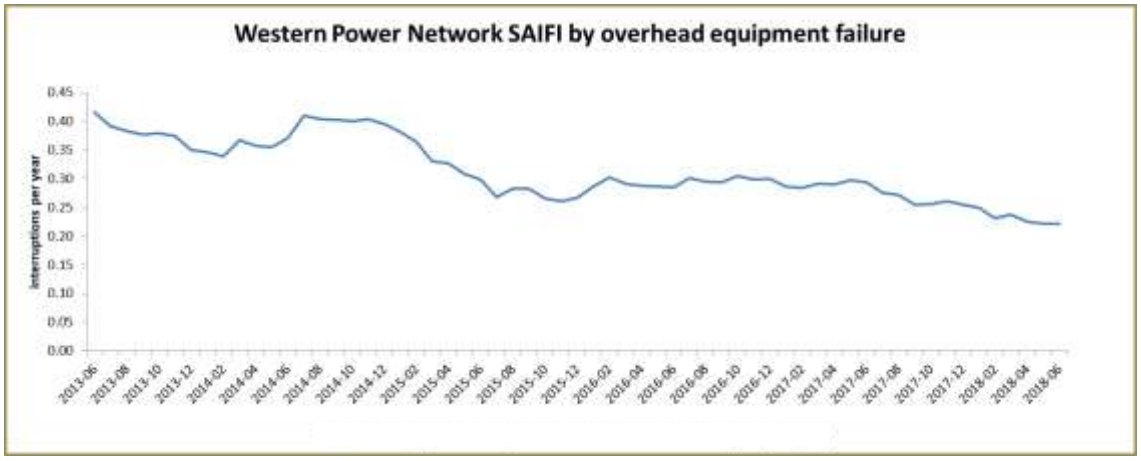


Figure B.2: Western Power Network SAIFI – unknown cause trend

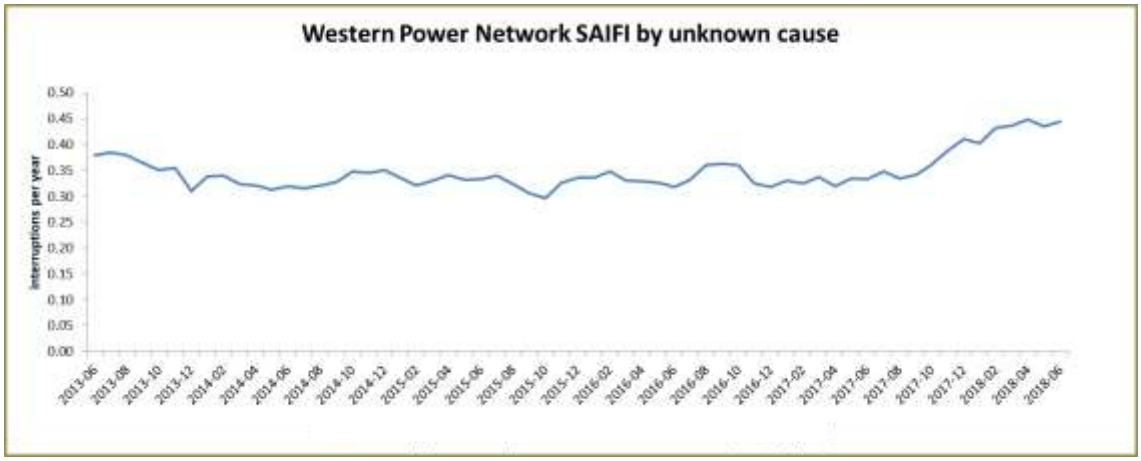


Figure B.3: Network SAIFI –lightning cause trend