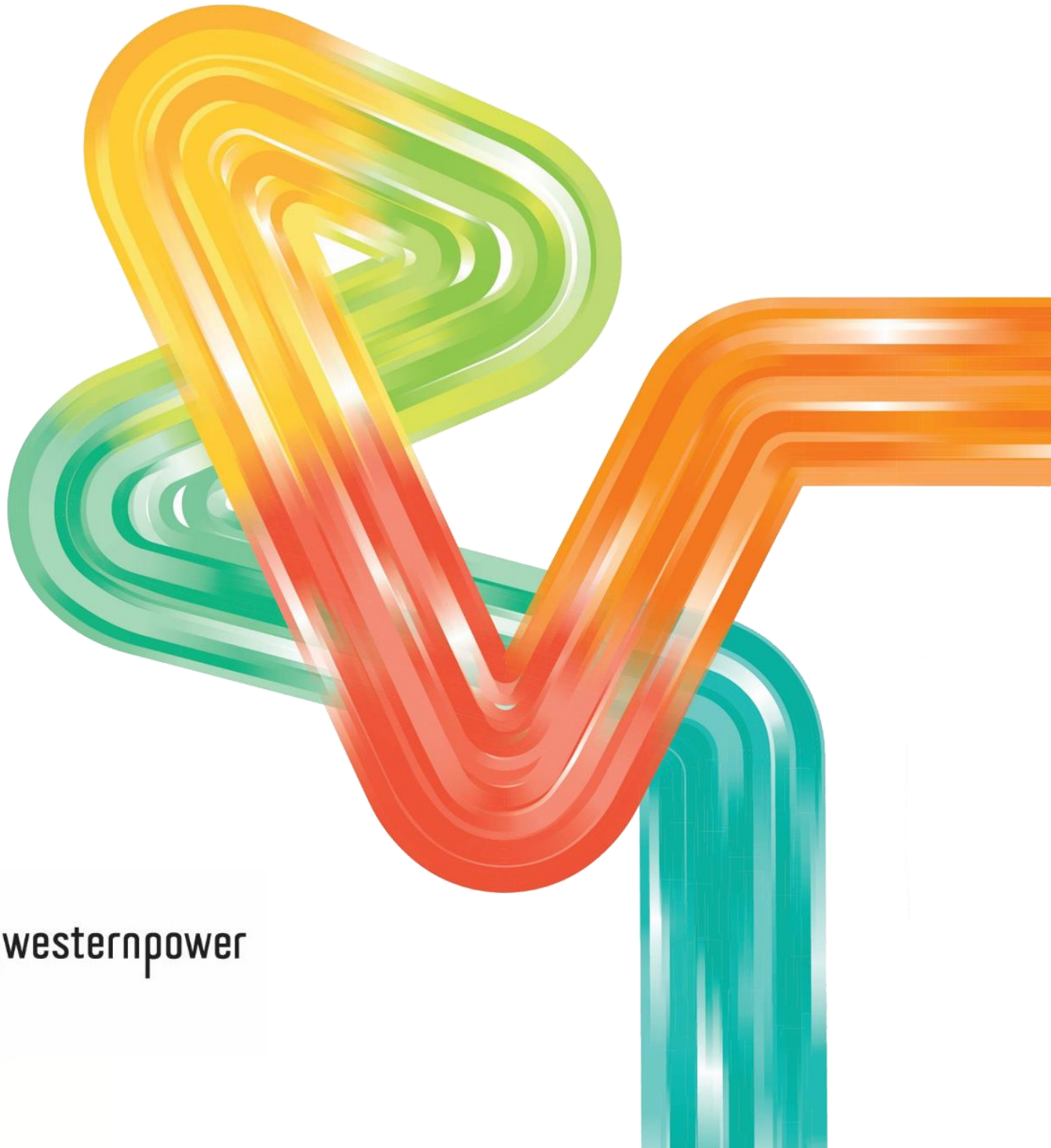
Electricity Networks Access Code 2004

Service Standard Performance Report for the year ended 30 June 2022

30 September 2022



westernpower

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1. Executive Summary

Western Power submits the Service Standard Performance Report (Report) as requested by the Economic Regulation Authority (ERA) under clause 11(3) of the Electricity Networks Access Code 2004 (Access Code). The report details Western Power's performance against the Service Standard Benchmarks (SSBs) defined in Western Power's approved Access Arrangement (AA4). This report covers the period 1 July 2021 to 30 June 2022 (2021/22 period).

The minimum levels of service required of Western Power for the 2021/22 period are defined by the 19 applicable SSBs, covering distribution and transmission networks reliability and security of supply, call centre performance, street lighting performance, LED replacements, supply abolishment and remote de-energisation and re-energisation.

Reliability of supply reflects the service Western Power provides to its customers and is a measure of the performance of its transmission and distribution networks. Western Power's performance against the SSBs applicable to the 2021/22 period is provided in section 6 of this report. In addition to the 19 SSBs specified in AA4, Western Power is required to report on three additional performance measures in this report for each financial year:

- Momentary Average Interruption Frequency Index events ($MAIFI_E$) by feeder category as detailed in section 8
- Loss of Supply Event Frequency (LoSEF) – radial as detailed in section 6.3
- LoSEF - meshed as detailed in section 6.3

Under its transmission and distribution licences, Western Power is required to comply with the Access Code that outlines provisions in relation to SSBs in Chapter 11. In accordance with clause 11.1 of the Access Code, Western Power is required to provide reference services at a service standard at least equivalent to the SSBs outlined in the Access Arrangement. Clause 11.3 requires Western Power to prepare a report annually on SSB performance as requested by the ERA.

During the 2021/22 period, Western Power's overall distribution and transmission network performance was above the required levels for all SSBs, except for Urban System Average Interruption Frequency Index (SAIFI) which was below the SSB level.

Apart from Perth CBD, reliability performance of the distribution network deteriorated in comparison to the 2020/21 period, mainly due to an increase in interruptions attributed to wind borne debris and vegetation, emergency outage for hazards, and equipment failure. Reliability performance in Perth CBD improved significantly from the 2020/21 period.

All transmission SSBs were achieved during the period. The performance of the transmission network improved in 2021/22 for all SSBs compared to the previous period except for LoSEF >1.0 System Minutes Interrupted.

The 2021/22 period presented a challenging operating environment due to environmental impacts from unusually high temperatures in the summer period[1] and bushfire activity, as well as the impacts of the COVID-19 pandemic on Western Power personnel and its third-party contractors.

[1] During 24-28 December 2021, daytime temperatures above 40 degrees and higher than average overnight temperatures were experienced. The Bureau of Meteorology characterised this heatwave as exceptional for its timing, intensity and duration. The heatwave combined with the high demand on the system due to inability of people to travel due to Covid, led to multiple outages and diminished customer experience over the Christmas period. The State Government commissioned an independent review of the Christmas outages. The final report was published in March 2022 on Energy Policy WA's website.

The combined effect of a series of three bushfire events in Denmark, Bridgetown and Jerramungup that impacted the distribution network from 4 to 13 February 2022 has been classified as Force Majeure, and excluded in measuring SSB performance. The bushfire events were as a result of extreme conditions following unusual heat waves during the summer of 2021/22.

The Bridgetown bushfire also impacted the transmission network and was classified as a transmission network force majeure event.

Reliability performance was also impacted during Total Fire Ban (TFB) days declared by the Department of Fire and Emergency Services (DFES) which have been at an elevated level since 2019/20[2]. TFB days are declared on days when fires are most likely to threaten lives and property. This requires Western Power to take appropriate measures to eliminate or manage potential risks to the safety of the public and our people, which can, consequently, exacerbate the length and area of power outages.

In parallel with these environmental challenges, the electricity landscape is undergoing unprecedented transformation from historical one-way power flows to two-way power flows, creating additional challenges to deliver a safe and reliable electricity service that the community expects. A growing challenge for the power system is low operational load and system stability, exacerbated by the changing generation mix away from grid-connected synchronous generators towards renewable generators and increased distributed energy resources such as rooftop photovoltaic (PV) systems on the network. System low load events on the South West Interconnected System (SWIS) are increasing in frequency and magnitude which creates a risk of widespread outages.[3]

The State Government's energy transformation program initiated a series of reforms to enable an orderly transition of the electricity sector. In June 2022, the State Government announced the retirement of the coal-fired Muja power plants in a move towards decarbonisation of the electricity sector[4]. This will require a concerted effort from several stakeholders to manage the impact on grid stability and system security while facilitating more renewables connecting to the grid.

Western Power continues to participate in these reforms with other key stakeholders to anticipate and respond to these emerging challenges and manage risks to power system security and reliability. This work includes:

- collaboration with the Australian Energy Market Operator (AEMO) and Energy Policy WA (EPWA) on immediate and longer-term actions to manage low load conditions
- engaging with the ERA to seek an appropriate level of service standards in the fifth Access Arrangement (AA5), to continue to deliver reliable customer service while keeping costs at the lowest sustainable level
- participating in the State Government's SWIS Demand Assessment modelling study to assess renewable energy needs to support local industry's decarbonisation goals to 2030 and beyond[5].

2 DFES Website - https://dfes.wa.gov.au/totalfirebans/Documents/TFB-Declarations-2015-2021.pdf

3 AEMO's July 2022 Quarterly Energy Dynamics outlines that the number of intervals with the lowest operational demand are steadily increasing year on year. https://aemo.com.au/-/media/files/major-publications/qed/2022/qed-q2-2022.pdf?la=en

4 https://www.mediastatements.wa.gov.au/Pages/McGowan/2022/06/State-owned-coal-power-stations-to-be-retired-by-2030.aspx

5 https://www.mediastatements.wa.gov.au/Pages/McGowan/2022/08/Assessment-of-electricity-demand-to-inform-WA%E2%80%99s-future-network.aspx

2. Background

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

The purpose of this Report is to provide information on the actual Service Standard performance against the SSBs contained in Western Power's AA4, applicable for the 2021/22 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 trading as Western Power. For the purposes of this Report, the terms distribution network and transmission network are used in reference to the Access Code, the Electricity Distribution Licence (EDL1), the Electricity Transmission Licence (ETL2) and AA4.

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 826,000 poles and over 104,000 circuit kilometres of power lines. The distribution network consists of over 820 feeders, connected to the transmission network at 154 terminal and zone substations, providing an electricity supply to over 1,180,000 customers and over 279,000 streetlights.

The network also includes 113 active Standalone Power Systems (SPS) as of 30 June 2022. These units are concentrated in the regional areas of the Mid-West, Goldfields, eastern Wheatbelt and the Great Southern. SPS Units will continue to be rolled out in these regional areas where it is shown to be an efficient and suitable option to provide reliable supply.

Western Power also has 13 community batteries in trial across the distribution network to understand their usefulness in providing grid stability by acting as a soak for excess solar PV output from households.

Figure 2.1: Map of the Western Power Network Coverage

3. The structure of this Report

This Report is structured 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 AA4 period
- Section 5 outlines and describes the SSBs relevant for the AA4 period
- Section 6 outlines and describes the actual performance against the applicable AA4 SSBs for the 2021/22 period
- Section 7 outlines and describes the recognised exclusions defined for the AA4 SSBs
- Section 8 outlines and describes the recognised events known as Momentary Interruptions, or $MAIFI_E$
- Section 9 outlines and describes the application of the Service Standard Adjustment Mechanism (SSAM)
- Appendix A provides charts for each of the SSBs, with the trend of historical performance over a 14-year period
- The figures and tables throughout the Report include data for the following access arrangements:

AA4	AA3	AA2
2021/22	2016/17	2011/12
2020/21	2015/16	2010/11
2019/20	2014/15	2009/10
2018/19	2013/14	2008/09
2017/18	2012/13	

4. Reference services

Under AA4 and in accordance with the Access Code sections 5.1 and 11.1, Western Power provides the following reference services:

- Three reference services at entry points for users (entry services)
- 17 reference services at exit points for users (exit services)
- 15 bi-directional reference services at bi-directional points (bi-directional services)
- 10 reference services at connection points (ancillary services)
- 16 standard metering services as reference services

4.1 Reference services for 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. Table 4.1 lists the network 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 reference service (metering) on the distribution system.
B2	Transmission Entry Service	An entry service combined with a connection service and a reference service (metering) at an entry point on the transmission system.
B3	Entry Service Facilitating a Distributed Generation or Other Non-Network Solution	An entry service provided on the same basis as entry service B1 in circumstances where this service provides for facilities and equipment connected behind a connection point (including distributed generating plant and other non-network solutions) that results in Western Power's capital-related costs or non-capital costs reducing as a result of the entry point for the distributed generating plant or other non-network solution being located in that particular part of the covered network. Note: a 'thin connection' that involves the export of electricity onto the Western Power Network or the provision of another network support service may be eligible for this reference service.

4.2 Reference services for 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. Table 4.2 lists the network 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 reference service (metering) 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 reference service (metering) at an exit point on the low voltage (415 volts or less) distribution system.
A3	Time of Use Energy (Residential) Exit Service	An exit service combined with a connection service and a reference service (metering) 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 reference service (metering) 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 reference service (metering) 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 reference service (metering) 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 reference service (metering) 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 reference service (metering) 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 and a reference service (metering) at an exit point on the low voltage (415 volts or less) distribution system for the purpose of public streetlighting, plus the service of the provision and maintenance of the streetlighting assets.
A10	Un-Metered Supplies Exit Service	An exit service combined with a connection service and a reference service (metering) 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 reference service (metering) at an exit point on the transmission system.
A12	3 Part Time of Use Energy (Residential) Exit Service	An exit service combined with a connection service and a reference service (metering) at an exit point on the low voltage (415 volts or less) distribution system.
A13	3 Part Time of Use Energy (Business) Exit Service	An exit service combined with a connection service and a reference service (metering) at an exit point on the low voltage (415 volts or less) distribution system.
A14	3 Part Time of Use Demand (Residential) Exit Service	An exit service combined with a connection service and a reference service (metering) at an exit point on the low voltage (415 volts or less) distribution system.

Reference Service		Reference Service Description
A15	3 Part Time of Use Demand (Business) Exit Service	An exit service combined with a connection service and a reference service (metering) at an exit point on the low voltage (415 volts or less) distribution system.
A16	Multi Part Time of Use Energy (Residential) Exit Service	An exit service combined with a connection service and a reference service (metering) at an exit point on the low voltage (415 volts or less) distribution system.
A17	Multi Part Time of Use Energy (Business) Exit Service	An exit service combined with a connection service and a reference service (metering) at an exit point on the low voltage (415 volts or less) distribution system.

4.3 Reference services for bi-directional 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. Table 4.3 lists the network bi-directional 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 reference service (metering) 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 reference service (metering) at a bi-directional point on the low voltage (415 volts or less) distribution system.
C3	Time of Use Energy (Residential) Bi-directional Service	A bi-directional service combined with a connection service and a reference service (metering) at a bi-directional point on the low voltage (415 volts or less) distribution system.
C4	Time of Use Energy (Business) Bi-directional Service	A bi-directional service combined with a connection service and a reference service (metering) at a bi-directional point on the low voltage (415 volts or less) distribution system.
C5	High Voltage Metered Demand Bi-directional Service	A bi-directional service combined with a connection service and a reference service (metering) at a bi-directional point on the high voltage (6.6 kV or higher) distribution system.
C6	Low Voltage Metered Demand Bi-directional Service	A bi-directional service combined with a connection service and a reference service (metering) at a bi-directional point on the low voltage (415 volts or less) distribution system.
C7	High Voltage Contract Maximum Demand Bi-directional Service	A bi-directional service combined with a connection service and a reference service (metering) at a bi-directional point on the high voltage (6.6 kV or higher) distribution system.

Reference Service		Reference Service Description
C8	Low Voltage Contract Maximum Demand Bi-directional Service	A bi-directional service combined with a connection service and a reference service (metering) at a bi-directional point on the low voltage (415 volts or less) distribution system.
C9	3 Part Time of Use Energy (Residential) Bi-directional Service	A bi-directional service combined with a connection service and a reference service (metering) at a bi-directional point on the low voltage (415 volts or less) distribution system.
C10	3 Part Time of Use Energy (Business) Bi-directional Service	A bi-directional service combined with a connection service and a reference service (metering) at a bi-directional point on the low voltage (415 volts or less) distribution system.
C11	3 Part Time of Use Demand (Residential) Bi-directional Service	A bi-directional service combined with a connection service and a reference service (metering) at a bi-directional point on the low voltage (415 volts or less) distribution system.
C12	3 Part Time of Use Demand (Business) Bi-directional Service	A bi-directional service combined with a connection service and a reference service (metering) at a bi-directional point on the low voltage (415 volts or less) distribution system.
C13	Multi Part Time of Use Demand (Residential) Bi-directional Service	A bi-directional service combined with a connection service and a reference service (metering) at a bi-directional point on the low voltage (415 volts or less) distribution system.
C14	Multi Part Time of Use Demand (Business) Bi-directional Service	A bi-directional service combined with a connection service and a reference service (metering) at a bi-directional point on the low voltage (415 volts or less) distribution system.
C15	Bi-directional Service Facilitating a Distributed Generation or Other Non-Network Solution	A bi-directional service provided on the same basis as bi-directional services C1 to C14 (selected by the user) in circumstances where this service provides for facilities and equipment connected behind a connection point (including distributed generating plant and other non-network solutions) that results in Western Power's capital-related costs or non-capital costs reducing as a result of the entry point for the distributed generating plant or other non-network solution being located in that particular part of the covered network. {Note: a 'thin connection' that involves the export of electricity onto the Western Power Network or the provision of another network support service may be eligible for this reference service.}

4.4 Reference services at connection points (ancillary)

Western Power offers 10 services at a connection point as a reference service (ancillary). Table 4.4 lists the reference services at connection points (ancillary).

Table 4.4: Reference services at connection points (ancillary)

Reference Service		Reference Service Description
D1	Supply Abolishment Service	A service ancillary to an exit service, entry service or bi-directional service to permanently disconnect electricity supply, remove the meter and abolish the connection point.

Reference Service		Reference Service Description
D2	Capacity Allocation Swap (Nominator) (Business) Service	A service ancillary to: • exit services A7, A8 and A11; • entry services B1 and B2; and • bi-directional services C7 and C8 under which a user's contracted capacity is decreased at one or more connection points under its access contract and there is a corresponding increase in contracted capacity at one or more connection points under its own access contracts or connection points under another user's access contract for one or more intraday periods for a clearly specified period of time nominated by the user following which the contracted capacity under the user's access contract is reinstated.
D3	Capacity Allocation Swap (Nominee) (Business) Service	A service ancillary to: • exit services A7, A8 and A11; • entry services B1 and B2; and • bi-directional services C7 and C8 under which a user's contracted capacity is increased at one or more connection points under its access contract and there is a corresponding decrease in contracted capacity at one or more connection points under its own access contracts or connection points under another user's access contract for one or more intraday period for a clearly specified period of time nominated by the user following which the contracted capacity under the user's access contract is reinstated.
D4	Capacity Allocation Same Connection Point (Nominator) (Business) Service	A service ancillary to: • exit services A7, A8 and A11; • entry services B1 and B2; and • bi-directional services C7 and C8 under which a user's contracted capacity at a connection point is decreased under its access contract (expressed as a percentage of that contracted capacity (DSOC or CMD)) for a clearly specified period of time and there is a corresponding increase in contracted capacity to another user at the same connection point under its access contract. The allocated capacity is not further transferable or otherwise delegable. At the end of the specified period the contracted capacity under the user's access contract is reinstated.

Reference Service		Reference Service Description
D5	Capacity Allocation Same Connection Point (Nominee) (Business) Service	A service ancillary to: • exit services A7, A8 and A11; • entry services B1 and B2; and • bi-directional services C7 and C8 under which a user's contracted capacity is increased at a connection point under its access contract (expressed as the percentage of contracted capacity (DSOC or CMD) nominated pursuant to reference service D4) for a clearly specified period of time and there is a corresponding decrease in contracted capacity to the nominator user at the same connection point under its access contract. The allocated contracted capacity is not further transferable or otherwise delegable. At the end of the specified period the contracted capacity under the user's access contract is reinstated.
D6	Remote Direct Load Control Service	A service ancillary to: • exit services A1 to A8 and A12 to A17; and • bi-directional services C1 to C15 to send a command to an activated device for the control of a load at a connection point from a remote locality. The service does not include any site visits by Western Power.
D7	Remote Load Limitation Service	A service ancillary to: • exit services A1 to A8 and A12 to A17; and • bi-directional services C1 to C15 to remotely limit the load at a connection point through a Western Power meter. The service does not include any site visits by Western Power.
D8	Remote De-energise Service *(Commenced in March 2022)*	A service ancillary to: • exit services A1 to A8 and A12 to A17; • entry service B1; and • bi-directional services C1 to C15 to de-energise a meter by removing supply voltage from all outgoing circuits on a non-permanent basis by a command sent to a meter from a remote locality. The service does not include any site visits by Western Power.
D9	Remote Re-energise Service *(Commenced in March 2022)*	A service ancillary to: • exit services A1 to A8 and A12 to A17; • entry service B1; and • bi-directional services C1 to C15 to re-arm a previously de-energised meter by a command sent to a meter from a remote locality. The service does not include any site visits by Western Power.

Reference Service		Reference Service Description
D10	Streetlight LED Replacement Service	A service ancillary to: • Reference Service A9 – Streetlighting Exit Service to replace an existing streetlight luminaire with one of the LED luminaires specified in the price list.

4.5 Reference services for Metering services

Western Power offers 16 metering services as reference services. Table 4.5 provides a list of these metering services.

Table 4.5: Reference services at connection points (ancillary)

Reference Service		Reference Service Description
M1	Unidirectional, accumulation, bi-monthly, manual	Provision of accumulated energy data from an accumulation meter (uni-directional) or interval meter derived by way of a manual read on a bi-monthly basis.
M2	Unidirectional, accumulation (TOU), bi-monthly, manual	Provision of accumulated energy data for the time bands of the reference tariff for the underlying exit service from an accumulation meter (uni-directional) or interval meter derived by way of a manual read on a bi-monthly basis.
M3	Unidirectional, interval, bi-monthly, manual	Provision of interval energy data from an interval meter (uni-directional) derived by way of a manual read on a bi-monthly basis.
M4	Unidirectional, interval, monthly, manual	Provision of interval energy data from an interval meter (uni-directional) derived by way of a manual read on a monthly basis.
M5	Unidirectional, interval, bi-monthly, remote	Provision of interval energy data from an interval meter (uni-directional) derived via a communications network on a bi-monthly basis.
M6	Unidirectional, interval, monthly, remote	Provision of interval energy data from an interval meter (uni-directional) derived following the collection of the interval energy data via a communications network on a monthly basis.
M7	Unidirectional, interval, daily, remote	Provision of interval energy data from an interval meter (uni-directional) derived following the collection of the interval energy data via a communications network on a daily basis.
M8	Bidirectional, accumulation, bi-monthly, manual	Provision of accumulated energy data from an accumulation meter (bi-directional) or interval meter (bi-directional) derived by way of a manual read on a bi-monthly basis.
M9	Bidirectional, accumulation (TOU), bi-monthly, manual	Provision of accumulated energy data for the time bands of the reference tariff for the underlying bi-directional service from an accumulation meter (bi-directional) or interval meter (bi-directional) derived by way of a manual read on a bi-monthly basis.
M10	Bidirectional, interval, bi-monthly, manual	Provision of interval energy data from an interval meter (bi-directional) derived by way of a manual read on a bi-monthly basis.
M11	Bidirectional, interval, monthly, manual	Provision of interval energy data from an interval meter (bi-directional) derived by way of a manual read on a monthly basis.

Reference Service		Reference Service Description
M12	Bidirectional interval, bi-monthly, remote	Provision of interval energy data from an interval meter (bi-directional) derived following the collection of the interval energy data via a communications network on a bi-monthly basis.
M13	Bidirectional, interval, monthly, remote	Provision of interval energy data from an interval meter (bi-directional) derived following the collection of the interval energy data via a communications network on a monthly basis.
M14	Bidirectional, interval, daily, remote	Provision of interval energy data from an interval meter (bi-directional) derived following the collection of the interval energy data via a communications network on a daily basis.
M15	Unmetered supply, accumulation, bi-monthly, manual	Provision of the metering services set out in the Metering Code for a type 7 connection point.
M16	One off manual interval read	Provision upon request of interval energy data collected as a manual read from an accumulation meter.

5. Current Service Standard Benchmarks

In Western Power's approved Access Arrangement and in accordance with the Access Code section 11.2, Western Power has SSBs which it is required to monitor and meet each financial year. All 19 SSBs specified in AA4 are reported on in this Report. This information is published in accordance with the Electricity Networks Access Code 2004 (Access Code).

Similar to the 2020/21 report, Western Power has included performance against the following three measures for the 2021/22 period:

- $MAIFI_E$ by feeder category.
- LoSEF disaggregated by radial.
- LoSEF disaggregated by meshed.

5.1 Distribution network Service Standards

For the reference services A1 to A10, A12 to A17, B1 and B3, C1 to C15 and any applicable ancillary reference service D2 to D7, 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[6] (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 SAIDI

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 number of distribution customers served, which is determined by averaging the start of month values for the 12 months included in the 12 month 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 Major Event Day (MED) in accordance with the AA4 description.
- 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).

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

- Planned interruptions.
- Force majeure events affecting the distribution system.

The SSBs expressed in terms of SAIDI for each year of the AA4 period are shown in Table 5.1.

Table 5.1: SAIDI SSBs for each year ending 30 June

SAIDI	Minutes per year
	SSB
CBD	33.7
Urban	130.6
Rural Short	215.4
Rural Long	848.3

5.1.2 SAIFI

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 distribution customers served, which is determined by averaging the start of month values for the 12 months included in the 12 month 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 in section 5.1.1, also apply to SAIFI. The SSBs expressed in terms of SAIFI for each year of the AA4 period are shown in Table 5.2.

Table 5.2: SAIFI SSBs for each year ending 30 June

SAIFI	Interruptions per year
	SSB
CBD	0.21
Urban	1.27
Rural Short	2.34
Rural Long	5.70

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 AA4, 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
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.
- Calls abandoned by a caller in 30 seconds or less of the call being placed in the queue to be responded to by a human operator.
- 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 AA4 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
	86.8%

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 affecting the transmission system shown to be caused by a fault or other event on a third-party system (for instance, without limitation interruptions caused by an inter-trip signal, generator unavailability or a customer installation).
- Force majeure events affecting the transmission system.
- 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 AA4 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
	97.8%

5.2.2 LoSEF

LoSEF is the frequency of unplanned customer interruption events where the loss of supply:

- exceeds 0.1 but less than or equal to 1.0 System Minutes Interrupted
- exceeds 1.0 System Minutes Interrupted.

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

When calculating LoSEF for the financial year ending 30 June 2020 and each financial year thereafter, “System Peak MW” is the maximum peak demand recorded for the South West Interconnected System for the previous year, excluding the coincident demand for those customers receiving a non-reference service, where the impact of an Unplanned Customer outage event is excluded for the purpose of this measure.

The following exclusions apply to System Minutes Interrupted:

- Planned interruptions.
- Momentary interruptions (less than one minute).
- Unregulated transmission assets.
- Interruptions affecting the transmission system shown to be caused by a fault or other event on a third-party system (for instance, without limitation interruptions caused by an inter-trip signal, generator unavailability or a consumer installation).
- Force majeure events affecting the transmission system.

The SSBs expressed in terms of LoSEF for each year of the AA4 period are shown in Table 5.6.

Table 5.6: LoSEF SSBs for each year ending 30 June

LoSEF	Number of events per year
	SSB
>0.1 & ≤1.0 System Minutes Interrupted	26
> 1.0 System Minutes Interrupted	7

5.2.3 Average Outage Duration

Average Outage Duration is the 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 LoSEF also apply to Average Outage Duration. In addition, the exclusion applies for reactive compensation plant, and any event contributing to Average Outage Duration is capped at 14 days.

The SSB expressed in terms of Average Outage Duration for each year of the AA4 period is shown in Table 5.7.

Table 5.7: Average Outage Duration SSB for each year ending 30 June

Average Outage Duration	Minutes per year
	SSB
	1,234

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 the average number of business days. 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.
- Streetlights for which Western Power is not responsible for maintenance.

The SSBs expressed in terms of street lighting repair time for each year of the AA4 period are shown in Table 5.8.

Table 5.8: 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 defined

The areas 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 2018*.

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

5.4 Supply abolishment

For the reference service D1, the SSB is expressed in terms of response time.

Supply abolishment response time is the average number of business days to abolish supply. 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 supply abolishment response time:

- Supply abolishment requests that:
  - are cancelled or deferred;
  - relate to non-whole current meters or non-standard technical configurations, site access issues or safety issues;
  - require external approvals or actions beyond the control of Western Power as a reasonable and prudent person; or
- A fact or circumstance beyond the control of Western Power as a reasonable and prudent person affecting the ability to abolish supply.
- Force majeure events affecting the ability to abolish supply.

The SSB expressed in terms of supply abolishment response time for each year of the AA4 period is shown in Table 5.9.

Table 5.9: Supply abolishment response time SSB for each year ending 30 June

Supply abolishment response time	SSB – average number of business days
Supply abolishment response time	15

5.5 Streetlight LED replacement service

For the reference service D10 the SSB is that the LED replacement, requested by the user, will be completed as soon as reasonably practicable in accordance with good electricity industry practice.

Similar to 2020/21, Western Power was not requested to perform this reference service during the 2021/22 period. However, Western Power has held discussions with several Local Government Authorities (LGAs) seeking streetlight LED replacement services and due to the level of interest shown by the LGAs, this service will continue to be offered in 2022/23.

5.6 Remote De-energise Service

For the reference service D8, the SSB is to de-energise a meter by removing supply voltage from all outgoing circuits on a non-permanent basis by a command sent to a meter from a remote locality. The service does not include any site visits by Western Power.

The service standard benchmark is expressed in terms of response time to remotely de-energise. 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 remote de-energise response time:

- Remote de-energise requests that are cancelled or deferred.
- Remote de-energisation requests received on a business day in relation to this measure, where the total number of de-energisation requests exceeds the maximum operational capacity of the infrastructure supporting the remote de-energisation requests.
- A fact or circumstance beyond the control of Western Power as a reasonable and prudent person affecting the ability to remote de-energise.
- Force majeure events affecting the remote de-energise service.

The SSB expressed in terms of remote de-energise response time for each year of the AA4 period is shown in Table 5.10.

Table 5.10: Remote de-energise response time SSB for each year ending 30 June

Remote de-energise response time	SSB – average number of business days
Remote de-energise response time	1

5.7 Remote Re-energise Service

For the reference service D9, the SSB is to re-arm a previously de-energised meter by a command sent to a meter from a remote locality. The service does not include any site visits by Western Power.

The service standard benchmark is expressed in terms of response time to remotely re-energise. 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 remote re-energise response time:

- Remote re-energise requests that are cancelled or are requested to be deferred.
- Remote re-energisation requests received on a business day in relation to this measure, where the total number of re-energisation requests exceeds the maximum operational capacity of the infrastructure supporting the remote re-energisation requests.
- A fact or circumstance beyond the control of Western Power as a reasonable and prudent person affecting the ability to remote re-energise.
- Force majeure events affecting the remote re-energise service.

The SSB expressed in terms of remote re-energise response time for each year of the AA4 period is shown in Table 5.11.

Table 5.11: Remote re-energise response time SSB for each year ending 30 June

Remote re-energise response time	SSB – average number of business days
Remote re-energise response time	1

6. Actual Service Standard performance

6.1 Summary of Service Standard performance

The Service Standard performance is detailed in Table 6.1.

Table 6.1: Service Standard performance summary for the 2021/22 period[7]

			SSB 2018/19 onwards	2017/18 actual AA4	2018/19 actual AA4	2019/20 actual AA4	2020/21 actual AA4	2021/22 AA4	
								Actual	SSB met
Distribution	SAIDI	CBD	≤ 33.7	1.3	14.7	22.8	14.1	5.8	✓
		Urban	≤ 130.6	104.5	104.2 (106.1)	134.3	118.0	130.3	✓
		Rural Short	≤ 215.4	151.9	178.3 (179.3)	218.3	210.2	205.8	✓
		Rural Long	≤ 848.3	718.1	663.5 (712.3)	737.7	713.5	806.8	✓
	SAIFI	CBD	≤ 0.21	0.04	0.11	0.20	0.26	0.08	✓
		Urban	≤ 1.27	1.03	0.95 (0.97)	1.14	1.13	1.29	×
		Rural Short	≤ 2.34	1.59	1.78 (1.79)	2.11	1.94	2.11	✓
		Rural Long	≤ 5.70	3.96	3.83 (4.02)	3.77	4.25	4.61	✓
	Call Centre Performance - %		≥ 86.8	91.7	91.7	92.6	91.9	90.7	✓
Transmission	Circuit Availability - %		≥ 97.8	99.1	98.7	98.8	98.5	98.9	✓
	Loss of Supply Events	>0.1 & ≤1.0 SMI	≤ 26	11	13	15	14 (13)	5	✓
		>1.0 SMI	≤ 7	6	2	3	2	7	✓
	Average Outage Duration		≤ 1,234	560	523	751	976 (1,027)	590	✓
Streetlights	Metropolitan area - business days		≤ 5	3.23 (3.06)	4.82	4.53	4.83	4.95	✓
	Regional area - business days		≤ 9	8.09 (7.00)	8.15	6.77	7.33	8.58	✓

[7] Some comparative numbers for previous years have been amended in this report and the incorrect numbers are shown in red text. In the 2017/18 period streetlight performance numbers have been amended due to data cleansing. In the 2018/19 period SAIDI and SAIFI numbers have been adjusted to account for an additional Major Event Day on 1 August 2018, calculated following discussions with the ERA regarding the methodology, held over November 2021 – February 2022. Some comparative numbers in the 2020/21 period have been adjusted to account for a data correction post the submission of the 2020/21 service standard performance report.

		SSB 2018/19 onwards	2017/18 actual AA4	2018/19 actual AA4	2019/20 actual AA4	2020/21 actual AA4	2021/22 AA4	
							Actual	SSB met
	LED Replacements	Note[8]		N/A	N/A	N/A	N/A	
	Supply Abolishment - business days	≤ 15		N/A	3.36	2.54	2.48	✓
	Remote de-energise - business day	≤ 1		N/A	N/A	N/A	0.29	✓
	Remote re-energise - business day	≤ 1		N/A	N/A	N/A	0.20	✓

6.2 Distribution network

During the 2021/22 period, Western Power's overall distribution performance was above the required levels for eight of the nine distribution SSBs. The measure below the required SSB level was SAIFI Urban. CBD performance improved for both SAIDI and SAIFI.

A number of factors influenced the overall performance in 2021/22 including interruptions attributed to:

- emergency outages to remove hazards
- wind borne debris, birds and vegetation
- equipment faults

6.2.1 Distribution network – key strategies and activities

Western Power notes that while only one SSB (Urban SAIFI) was not achieved to the required level during 2021/22, the customer experience of reliability during the Christmas 2021 period was not adequate, chiefly due to the unusual heatwave experienced over that period coupled with the high demand on the system as a result of Covid restricting the ability of the community to travel during the same.

Western Power continued to implement routine activities during the 2021/22 period to maintain network reliability of supply. In addition, Western Power initiated a number of targeted activities in response to the recommendations outlined in the Shepherd report to improve customer experience over the forthcoming summer period.

Routine maintenance

This activity involves Western Power's routine and targeted asset inspection, maintenance programs, 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, conductors and switching equipment. The objective of routine and targeted maintenance is to manage risks to public safety within acceptable levels and to maintain reliability performance.

Grid augmentation

This activity involves additional capital work such as network modification or installation of new assets. Specific areas may be targeted based on their long-term reliability performance and underlying reliability

[8] For the reference service D10 the Service Standard Benchmark is the LED replacement, requested by the user, will be completed as soon as reasonably practicable in accordance with good electricity industry practice. During the 2021/22 period, Western Power was not requested to perform this reference service.

risk factors. The nature of augmentation will depend on systemic factors that negatively affect reliability and the suitability of options at that location on the network.

Activities undertaken include:

- installing new interconnections between parts of the network to facilitate the transfer of customer connections to different points on the network (reducing supply interruption duration), and extensive automation of existing interconnections to allow nearly instantaneous transfer
- replacing overhead power lines with covered conductor or underground cables (to reduce the risk of a live electrical conductor contacting a foreign body and causing a supply interruption)
- augmenting or upgrading the distribution feeders and transformers, to ensure there is sufficient load carrying capacity to meet customer needs
- investigating and utilizing new technology that is expected to improve the customer experience, such as microgrids, automation, Stand-alone power systems, portable generation connecting transformers (injection units), battery energy storage systems, fast communication links and protection devices.

Targeted activities

Several targeted reliability activities were undertaken during the 2021/22 period:

- Targeted equipment repairs were brought forward to increase the speed and operability of automated fault restoration systems.
- Additional network reconfiguration was undertaken in reliability hotspots, and performance improvements were realised at the end of the 2021/22 period. Targeted network rebuild and maintenance works were undertaken on the Northampton and Kalbarri feeders, including line washing, siliconing and insulator replacement.
- Deployment of fuse saver technology to reduce sustained outages on radial spurs.
- Temporary deployment of generators for selected reliability hot spots. In the 2021/22 period, temporary islanded networks were created for some periods of time in the towns of Kalbarri and Mullewa.
- Portable generators were deployed to Perenjori to support the network supply, and also in urban areas during the Christmas 2021 outages.
- Strategies for the management of distribution underground cables were reviewed in the 2021/22 period and are on-going. The revised strategy deployment activities include data acquisition and building up capability to carry out targeted testing.

A significant number of network reconfiguration and optimisation projects have been investigated and scoped in the 2021/22 period and are scheduled for implementation during the 2022/23 period. However, due to the time lag in impacting performance, network performance benefits are expected to be realised in 2023/24. The projects include recloser, fuse saver, remote monitoring unit installation, and pole top switch installations and/or automation and improving feeder interconnectivity.

Western Power has also undertaken a targeted response to reduce the impact of another Christmas outages like event. This includes an accelerated program of capacity and reliability works for summer readiness with a focus on reducing outage risk and duration. Planned works include network reinforcement for five substations with 14 feeders, network switching for 36 substations with 90 feeders

and early restoration of out-of-service assets. Western Power is also planning to supplement its existing fleet of emergency response generators for summer readiness.

Additionally, Western Power has approved a SPS project for 18 customer sites experiencing the highest number of 12-hour outages on the network. This targeted project is designed to improve customer reliability by replacing edge of grid single-phase network connections with SPS. The project is expected to be completed in late 2023/24.

Table 6.2: Distribution performance and commentary for the AA4 2021/22 period [9]

Service Standard	SSB	2020/21	2021/22	Comments
		Actual	Actual	
CBD SAIDI	33.7	14.1	5.8	Performance was within the AA4 benchmark and was an improvement on the 2020/21 period. The primary contributors to improved performance were fewer interruptions attributed to equipment failure. Note: The CBD SAIDI performance is volatile over a short period of time due to the combined effects of fewer interconnections and the relatively long repair time for fault in an underground CBD network.
Urban SAIDI	130.6	118.0	130.3	Performance was within the AA4 benchmark but declined compared to the 2020/21 period. Over the 2021/22 period, there was an increase in interruptions attributed to wind borne debris and vegetation, and emergency outages caused by hazards.
Rural Short SAIDI	215.4	210.2	205.8	Performance was within the AA4 benchmark and was an improvement on the 2020/21 period. The primary contributors to the improvement in performance were fewer interruptions attributed to equipment failure. Network reconfigurations were actioned in the second half of the 2020/21 period to minimise the impact of outages on customers. Further network reconfiguration and augmentation projects have been initiated in the 2021/22 period, and their benefits will be realised in the 2022/23 period.
Rural Long SAIDI	848.3	713.5	806.6	Performance was within the AA4 benchmark but declined compared to the 2020/21 period. Over the 2021/22 period, there was an increase in interruptions attributed to emergency outage for hazards and equipment failure.
CBD SAIFI	0.21	0.26	0.08	Performance was within the AA4 benchmark and was an improvement on the 2020/21 period. The primary contributor to improved performance was fewer interruptions attributed to equipment failure. Note: The CBD SAIFI performance is generally volatile over a short period of time due to the combined effects of fewer interconnections and the relatively long repair time for fault in an underground CBD

[9] Where the SSB has not been met, the number is shown in red.

Service Standard	SSB	2020/21	2021/22	Comments
		Actual	Actual	
				network. Strategies for the management of distribution underground cables were reviewed in the 2020/21 period, and the revised deployment activities, along with asset failure monitoring, was a focus for the 2021/22 period which led to an improvement.
Urban SAIFI	1.27	1.13	1.29	Performance did not meet the AA4 benchmark and also declined against the 2020/21 result. There was an increase in emergency outages to remove hazards, and interruptions due to wind borne debris and other vegetation.
Rural Short SAIFI	2.34	1.94	2.11	Performance was within the AA4 benchmark but declined as compared to the 2020/21 period. Over the 2021/22 period, there was an increase in interruptions attributed to emergency outage for hazards as well as fauna in overhead equipment.
Rural Long SAIFI	5.70	4.25	4.61	Performance was within the AA4 benchmark but declined compared to the 2020/21 period. The primary contributors to the reduced performance were increases in the customer impact of interruptions attributed to emergency outage for hazards and equipment failure.
Call centre performance	86.8%	91.9%	90.7%	The 2021/22 performance exceeded the AA4 benchmark but declined compared to the 2020/21 period. The key contributors to the decline in performance were the impact of multiple Major Event Days (MEDs) during summer heatwaves, and a change in focus towards digital communication that impacted the number of available call takers. Increased leave (linked to Covid) during the quieter months of March-June also impacted the call centre's ability to recover service levels.

6.3 Transmission network

All transmission SSBs were achieved in the 2021/22 period. Factors primarily contributing to performance are detailed in Table 6.3.

6.3.1 Transmission network – key strategies and activities

Key strategies and routine activities continued to be undertaken during the 2021/22 period to maintain or deliver targeted improvements in the performance of the transmission network.

Routine and targeted maintenance

This activity involves Western Power's routine and targeted asset inspection, maintenance programs, 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 objective of routine and targeted maintenance is to positively influence reliability performance and reduce public safety risk.

Western Power has continued to improve maintenance planning and coordination across planned outages to reduce adverse impacts on transmission circuit availability.

Operational response

Western Power expedites the restoration of faulted regulated circuits by employing proactive measures such as on-call network switching resources and/or additional resources.

The restoration of customers via the distribution system, where available, helps to maintain performance within the relevant benchmarks.

Table 6.3: Transmission performance and commentary for the 2021/22 period[10]

Service Standard	SSB	2020/21	2021/22	Comments
		Actual	Actual	
Circuit Availability	97.8%	98.5%	98.9%	Performance exceeded the AA4 benchmark and was an improvement on the 2020/21 period.
LoSEF >0.1 and ≤1.0 System Minutes Interrupted	<26	14 (13)	5	Performance exceeded the AA4 benchmark and was an improvement on the 2020/21 period. The restoration of customers via the distribution system helped to maintain performance within the benchmark.
LoSEF >1.0 System Minutes Interrupted	≤7	2	7	Performance was within the AA4 benchmark but declined compared to the 2020/21 period. A number of reasons contributed to the decline in performance, including: • storm activity affecting a number of transmission lines • bushfire and pole top fires events on the Network
Average Outage Duration	1,234	976 (1,027)	590	Performance exceeded the AA4 benchmark and was an improvement to the 2020/21 period.

The significant events under the LoSEF for the 2021/22 period are detailed in Tables 6.4 and 6.5.

[10] Some comparative numbers in the 2020/21 period have been adjusted to account for a data correction post the submission of the 2020/21 service standard performance report. The previous numbers are shown in red text.

Table 6.4: LoSEF >1.0 SMI for the 2021/22 period

Events	Date	Load Area	Network Configuration	System Minutes	Connected Load MW	Contributing Factor
1	2/02/2022	ST	Mesh	2.904	5.28	Tx failure
2	6/02/2022	EGF	Mesh	6.332	77.6	Bushfire
3	6/02/2022	EGF	Mesh	1.357	28.44	Pole top fire
4	6/02/2022	EGF	Mesh	1.341	17.03	Transmission network
5	1/04/2022	NC	Mesh	1.098	39	Protection error
6	22/05/2022	EC	Radial	4.007	49.47	Protection error
7	25/05/2022	EC	Radial	2.379	75.91	Protection error
EC=East Country, EGF=Eastern Goldfields, GSR=Great Southern Region, NC=North Country, PIC=Picton, CT=Cannington, SF=South Fremantle, NT=Northern Terminal, WT=Western Terminal, ST=Southern Terminal						

Table 6.5: LoSEF >0.1 & ≤1.0 SMI for the 2021/22 period

Events	Date	Load Area	Network Configuration	System Minutes	Connected Load MW	Contributing Factor
1	26/09/2021	PIC	Mesh	0.17	8.56	Distribution equipment
2	25/10/2021	MU	Mesh	0.306	12.76	Unknown
3	31/12/2021	PIC	Radial	0.833	7.0	Crossarm failure
4	27/04/2022	PIC	Mesh	0.63	46.42	Line failure
5	20/06/2022	CT	Mesh	0.561	41.13	Non-operational staff
EC=East Country, EGF=Eastern Goldfields, GSR=Great Southern Region, NC=North Country, PIC=Picton, CT=Cannington, SF=South Fremantle, NT=Northern Terminal, WT=Western Terminal, MH = Mandurah, MU=Muja						

6.3.2 LoSEF for radial and meshed circuits

There is no separately defined SSB measure for LoSEF for radial and meshed circuits.

As shown in Table 6.4, five events for LoSEF >1.0 SMI were in the meshed transmission networks, and two in the radial transmission network. Also, as illustrated in Table 6.5, for LoSEF >0.1 SMI and ≤1.0 SMI in the 2021/22 period, four events were in the meshed transmission network and one in the radial transmission network.

In the classification of radial and meshed transmission networks for the purposes of this Report, the 220kV circuit between Muja Terminal and Merredin Terminal is classified as a radial transmission network circuit due to the protection scheme installed which results in a trip to the whole 220kV line in the event of any fault on the Muja to Merredin lines.

6.4 Street lighting repair time

Table 6.6: Street lighting repair time performance and commentary for the 2021/22 period

Service Standard	2021/22		Comments
	SSB	Actual	
Metropolitan area	≤ 5 business days	4.95	Performance was within the AA4 Benchmark of 5 busines days but declined compared to the 2020/21 period (4.83 average business days). While the grouping of faulty streetlights for repair in the metropolitan areas has resulted in a decrease of streetlights not repaired within 5 days, the average number of days to effect repairs has increased.
Regional area	≤ 9 business days	8.58	Performance was within the AA4 Benchmark of 9 business days but declined compared to the 2020/21 period (7.33 average business days). While the grouping of faulty streetlights for repair in the regional areas has resulted in a decrease of streetlights not repaired within 9 days, the average number of days to effect repairs has increased.

6.5 Supply abolishment

Table 6.7: Supply abolishment response time performance and commentary for the 2021/22 period

Service Standard	2021/22		Comments
	SSB	Actual	
All areas	≤ 15 business days	2.48	The average performance exceeded the AA4 Benchmark of 15 business days and was an improvement from the 2020/21 actual of 2.54 days

6.6 Remote de-energise

Table 6.8: Remote de-energise response time performance and commentary for the 2021/22 period

Service Standard	2021/22		Comments
	SSB	Actual	
All areas	≤ 1 business days	0.29	The average performance exceeded the AA4 Benchmark of one business day.

6.7 Remote re-energise

Table 6.9: Remote re-energise response time performance and commentary for the 2021/22 period

Service Standard	2021/22		Comments
	SSB	Actual	
All areas	≤ 1 business days	0.20	The average performance exceeded the AA4 Benchmark of one business day.

6.8 Western Power Network Performance

There is no defined SSB measure for the total Western Power network. As shown in Table 6.1 and Figures 6.1 and 6.2, the reliability performance of the distribution network for the 2021/22 period declined compared to the previous year, with both the duration of outages and the frequency of interruptions having increased.

The worsened performance was a result of an overall increase in the interruptions across the network due to emergency outages due to hazards and a few where the cause could not be determined.

Table 6.10: Overall reliability performance of the network

		2020/21	2021/22
Distribution	SAIDI	193.80	206.90
	SAIFI	1.62	1.79

Figure 6.1: Distribution network SAIDI (14-year history)

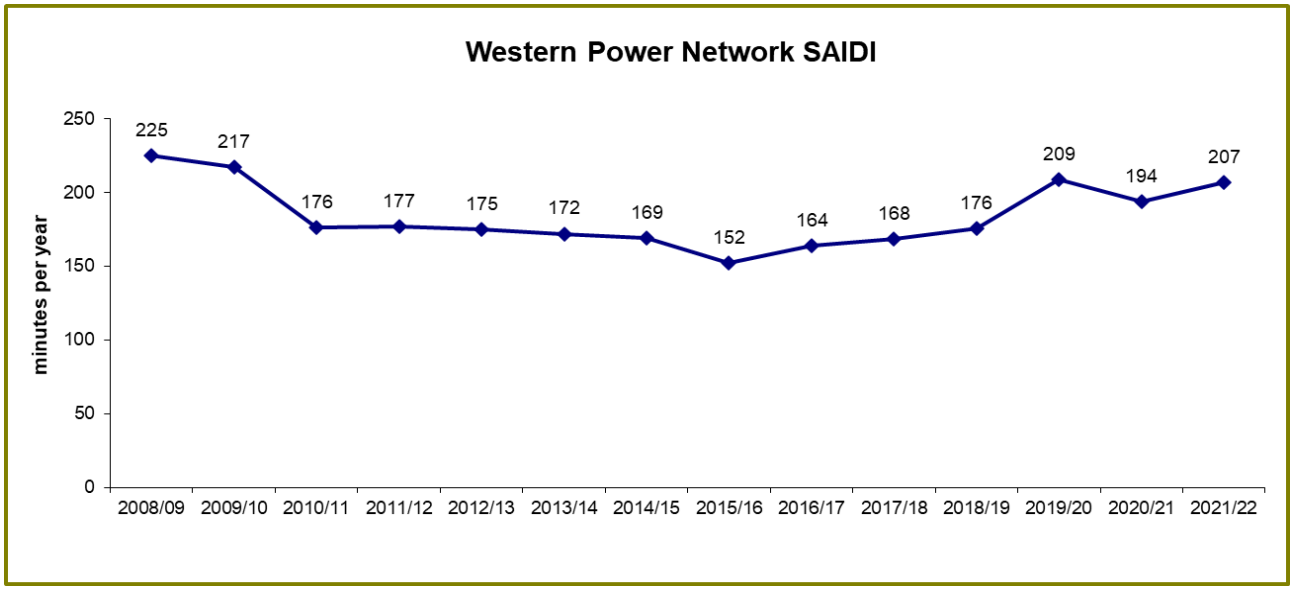
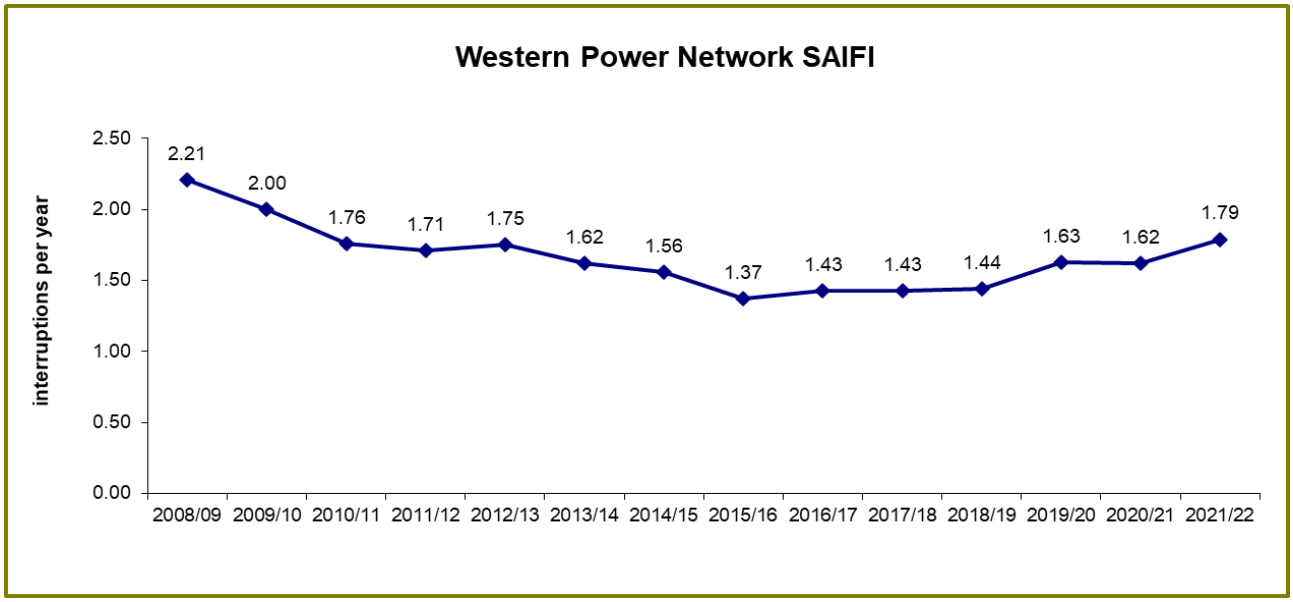


Figure 6.2: Distribution network SAIFI (14-year history)



6.9 Emerging Challenges

Since 2019, the impact of severe weather events and risk due to bushfire activity has increased. The trend continued over 2020 and 2021 with a series of concurrent bushfire events occurring between January – March 2021, Tropical Cyclone Seroja in April 2021 and storm activity in June 2021 affecting the Great Southern region. During the Christmas period 2021, the Perth metropolitan region experienced four consecutive days of temperatures above 40 degrees, and high overnight temperatures. This heatwave was described by the Bureau of Meteorology as being exceptional for its timing, intensity and duration.

Total Fire Ban (TFB) days declared by the Department of Fire and Emergency Services (DFES) also continue to remain at an elevated level since 2019/20. TFB days are declared on days when fires are most likely to threaten lives and property. This means Western Power takes appropriate additional precautions to eliminate or manage potential risks to the safety of the public and our people, which can, consequently, exacerbate the length and area of power outages.

In addition to more frequent and extreme weather events, the need for two-way power flows, compared to historical one-way flows, creates additional challenges to deliver the safe and reliability electricity service that our community expects. A growing challenge for Western Power is low load and system stability, primarily due to the changing generation mix towards renewable generation and increased penetration of distributed energy resources such as rooftop photovoltaic (PV) systems on the network. System low load events on the South West Interconnected System (SWIS) are increasing in frequency and magnitude which creates a risk of widespread outages.

Western Power is working with Energy Policy WA and AEMO on immediate and longer-term actions. This includes determining the implications of increasingly lower SWIS demand events and understanding when significant system risks may be expected to occur, to inform the development and implementation of efficient responses. Some key actions have already been implemented to mitigate the pressing issues (such as new reactors, AEMO control room tools, new load on the power system), and a number of shorter-term mitigations have been explored and will continue to be enhanced (such as further investment in reactors, emergency response generators, revised inverter standards, and other reforms such as generator performance standards, and the DER Register). Western Power is also collaborating with key stakeholders

to facilitate the State Government's decarbonisation targets, including by participating in the SWIS demand assessment modelling work, and planning for a smooth transition following the planned coal-plant retirements.

7. Exclusions from SSB performance

As outlined in section 5, the Service Standards provide for certain events to be excluded from the distribution, transmission, street lighting, supply abolishment and remote de-energise and remote re-energise reference service performance.

7.1 Distribution performance – SAIDI, SAIFI

Based on the exclusions described in section 5.1.1, for the 2021/22 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 the description provided in the Approved Access Arrangement (AA4).

The Box-Cox transformation method has been applied to the daily unplanned SAIDI data set to determine the major event day threshold for each financial year of AA4. The Box- Cox transformation lambda value for 2021/22 using the previous 5 financial years of daily unplanned distribution SAIDIs was determined to be -0.04.

There were six days (four events) during the 2021/22 period that exceeded the daily MED threshold of 6.57 minutes.

Table 7.1 illustrates:

- SAIDI (minutes per year) and SAIFI (interruptions per year), which have been excluded from the 2021/22 period due to these six MEDs.
- Call centre performance (percentage of 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 four MEDs.

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

		2017/18	2018/19	2019/20	2020/21	2021/22
SAIDI	CBD	0	0	2.25[11]	0	12
	Urban	52	11	117	29	67
	Rural Short	157	28	192	224	115
	Rural Long	330	130	629	1,655	247
SAIFI	CBD	0	0	0	0	0.02
	Urban	0.08	0.07	0.44	0.03	0.20
	Rural Short	0.40	0.12	0.49	0.08	0.55
	Rural Long	0.61	0.36	1.53	0.23	0.60
Call centre performance		96.1%	92.1%	89.9%	94.3%	88.3%

[11] The comparative number for 2019/20 has been adjusted to account for a small number of feeders not included in the reporting for the period. The previous number was incorrectly shown as 0 but should have been 2.25.

August 1, 2021

(SAIDI = 10.5 minutes, SAIFI = 0.048 interruptions, call centre performance = 86.1%)

Almost 50,000 customers were interrupted predominantly in the Perth Metropolitan and Peel regions for an average of three hours and 40 minutes during inclement weather.

December 8, 2021

(SAIDI = 8.4 minutes, SAIFI = 0.035 interruptions, call centre performance = 89.9%)

Over 43,000 customers were interrupted, mostly in the mid to northern half of the Perth Metropolitan region for an average of nearly four hours, during hot weather.

December 25 to 27, 2021

(SAIDI = 7.6 minutes, SAIFI = 0.016 interruptions, call centre performance = 88.5%)

(SAIDI = 16.0 minutes, SAIFI = 0.068 interruptions, call centre performance = 87.0%)

(SAIDI = 6.8 minutes, SAIFI = 0.026 interruptions, call centre performance = 83.2%)

Over 76,000 customers were interrupted (predominantly in the Perth Metropolitan and Peel regions for an average of four and a half hours, peaking at over 31,000 customers at around 7:00 pm on 26 December 2021 during unusually hot weather.

February 6, 2022

(SAIDI 34.8 minutes, SAIFI = 0.075 interruptions, call centre performance = 92.6%)

Around 116,000 customers were interrupted across the SWIS for an average of nearly six hours, peaking at over 44,000 customers at around 9:45 pm. Nearly 45,000 customers were interrupted due to faults on the Transmission network arising from bushfire activity in the Mid-West and Goldfields region, while most of the remaining customers were without power, attributed to pole top fire activity across all regions.

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

		2017/18	2018/19	2019/20	2020/21	2021/22
SAIDI	CBD	0	0	2	0	8
	Urban	8	3	20	18	11
	Rural Short	50	9	44	143	51
	Rural Long	74	32	236	213	89
SAIFI	CBD	0	0	0.10	0	0.32
	Urban	0.18	0.11	0.24	0.13	0.10
	Rural Short	0.33	0.13	0.18	0.29	0.38

		2017/18	2018/19	2019/20	2020/21	2021/22
	Rural Long	0.29	0.43	0.63	0.31	0.71

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 unavailability of generators or customer equipment are outlined in Table 7.3.

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

		2017/18	2018/19	2019/20	2020/21	2021/22
SAIDI	CBD	0	2	1	3	2
	Urban	4	1	10	2	4
	Rural Short	2	1	6	21	9
	Rural Long	7	5	8	30	6
SAIFI	CBD	0	0.01	0	0.03	0
	Urban	0.02	0.01	0.12	0.01	0.02
	Rural Short	0.01	0.01	0.07	0.05	0.07
	Rural Long	0.03	0.01	0.04	0.01	0.02

There were 4,038 faults attributed to customer installations or other third-party equipment. There were two faults attributed to generator failure.

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

		2017/18	2018/19	2019/20	2020/21	2021/22
SAIDI	CBD	10	3	27	61	20
	Urban	97	49	71	60	105
	Rural Short	126	64	87	81	126
	Rural Long	376	156	277	202	304
SAIFI	CBD	0.03	0.01	0.05	0.13	0.05
	Urban	0.30	0.16	0.25	0.18	0.31
	Rural Short	0.38	0.21	0.28	0.25	0.40
	Rural Long	1.08	0.48	0.90	0.61	1.08

7.1.5 Force Majeure

A force majeure event is a common exclusion across the Service Standard Benchmarks and is defined in the Access Code, under Appendix 3 – Model standard access contract. Force majeure events are events or circumstances which Western Power is not able to reasonably and prudently prevent or overcome.

There were three force majeure events which impacted the distribution network during the 2021/22 period.

February Bushfires – The combined effect of a series of three bushfire events that impacted the distribution network from 4 to 13 February 2022 has been classified as Force Majeure.

The bushfire events were as a result of extreme conditions following heat waves during the summer of 2021/22. The bushfires occurred during periods of high temperatures and high winds as tabled below:

Event	Max temperate (^{o}C)	Max Wind gust (km/hr)
Bridgetown 5 February	40.9	41
Denmark 4 February	39.2	37
Jerramungup 11 February	44	137

External site access restrictions by the Department of Fire and Emergency Services (DFES) impacted Western Power's ability to respond, prohibiting Western Power access to its network assets. Repairs could not occur until it was safe to do so under the direction and within the constraints imposed by DFES.

The restriction of access caused significant delays of up to 48 hours in fixing the damaged assets and reinstatement of supply. The damaged assets in most cases were predominantly fully or partially burnt poles.

Table 7.5: Distribution network force majeure events (figures exclude reliability impact on Major Event Days)

Force Majeure Event	Incident Date	Customers Interrupted	SAIDI Impact (Minutes)	SAIFI Impact (Interrupt)	Distribution Area
Bridgetown Bushfire	5 – 7 February 2022	895	11.1	0.01	Rural Long
Denmark Gully Bushfire	4 - 9 February 2022	1,761	32.1	0.02	Rural Long
Jerramungup Bushfire	11 - 13 February 2022	589	8.5	0.01	Rural Long

Table 7.6: SAIDI and SAIFI exclusions due to force majeure

		2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
SAIDI	CBD	0	0	0	0	0	0
	Urban	0	0	0	0	1	0
	Rural Short	0	0	0	9	13	0
	Rural Long	0	0	0	57	62	51

SAIFI	CBD	0.00	0.00	0.00	0.00	0.00	0.00
	Urban	0.00	0.00	0.00	0.00	0.001	0.00
	Rural Short	0.00	0.00	0.00	0.03	0.04	0.00
	Rural Long	0.00	0.00	0.00	0.25	0.08	0.03

7.2 Distribution performance – Call centre performance

Based on the exclusions described in section 5.1.4, for the 2021/22 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 not captured or recorded within Western Power's systems.

7.2.2 Major Event Days

See section 7.1.1 for the details of the MEDs for the 2021/22 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 AA4 period excludes the interruptions described below.

7.3.1 Force Majeure

There was one event on the transmission network that was classified as force majeure:

Bridgetown Bushfire – The impact on the Transmission network was caused by the Bridgetown bushfire from 5 to 7 February 2022. The loss of the Bridgetown, Manjimup and Beenup substations was due to the outage of both the 132kV teed transmission lines MU-BTN/MJP81 and 82 lines that Teed into Bridgetown substation.

Table 7.7: Transmission network force majeure events

Force Majeure Event	Incident Date	Circuit Availability	LoSEF >0.1 and ≤1.0 SMI	LoSEF >1.0 SMI	Average Outage Duration
Bridgetown Bushfire	5 – 7 February 2022	0.027%	0	-1	24

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 7.8 shows the number of planned interruptions for major construction works that exceeded the 14-day cap in each of the last five financial years.

Table 7.8: Planned interruptions for major construction work exceeding 14 days

	2017/18	2018/19	2019/20	2020/21	2021/22
Number of planned interruptions	14	17	21	11	14

8. $MAIFI_E$

During the 2021/22 period, there were approximately 3,300 Momentary Average Interruption Frequency Index events (MAIFIe) recorded on the network. Most of these interruptions occurred on the Rural Long network.

Momentary interruptions are usually transient faults which are cleared through auto-reclose operations. They can occur due to several reasons, a more common one being vegetation that may have blown onto a line that has subsequently blown off.

Table 8.1 shows the $MAIFI_E$ for the AA4 period for each of the distribution feeder classifications. This data is inclusive of all momentary interruptions on the distribution network.

Table 8.1: $MAIFI_E$ during the AA4 period

	2018/19	2019/20	2020/21	2021/22
CBD	0.12	0.12	0.18	0.16
Urban	0.64	0.73	0.72	0.70
Rural Short	2.15	2.19	2.18	2.41
Rural Long	6.45[12]	5.48	6.16	6.54

[12] This number has changed due to the addition of another MED on 1 August 2018. The number was previously reported as 6.61.

9. Service Standard Adjustment Mechanism

9.1 Overview

Western Power's Access Arrangement includes a Service Standard Adjustment Mechanism (SSAM). This is a scheme that ensures that Western Power has an incentive (through financial rewards and penalties) to maintain service standards and improve service standards only where the improvement is of value to customers.

The SSAM applies to 13 SSBs for SAIDI, SAIFI, circuit availability, call centre performance, loss of supply event frequency and average outage duration. A reward or penalty is calculated based on the difference between the actual performance and the Service Standard Target (SST) which is capped, as outlined in AA4.

9.2 Actual performance

Western Power has met or exceeded the expected level of performance for the SSAM target for five out of the 13 SSB measures which are subject to this financial incentive scheme. Table 9.1 shows the results of the SSAM performance for the 2021/22 period. All values are expressed in real dollars as at 30 June 2017.

Table 9.1: Service Standard Adjustment Mechanism results for the 2021/22 period

Service Standard				Incentive Rate		SST	SSB	SSA	SSD	SSAM Reward | Penalty ($)
			$ Unit Rate	Reward	Penalty					
Distribution	SAIDI	CBD	per SAIDI minute	$30,215	$30,215	17.7	33.7	5.8	11.90	359,559
		Urban		$446,660	$446,660	106.8	130.6	130.3	-23.50	-10,496,510
		Rural Sho		$143,118	$143,118	188.6	215.4	205.8	-17.20	-2,461,630
		Rural Long		$52,503	$52,503	677.7	848.3	806.6	-128.90	-6,767,637
	SAIFI	CBD	per 0.01 SAIFI event	$29,224	$29,224	0.12	0.21	0.08	0.04	116,896
		Urban		$290,697	$290,697	1.09	1.27	1.29	-0.18	-5,232,546
		Rural Sho		$91,819	$91,819	1.96	2.34	2.11	-0.15	-1,377,285
		Rural Long		$55,341	$55,341	4.29	5.70	4.61	-0.32	-1,770,912
	all Centre Performan		% calls per year	$38,059	$12,442	92.00	86.8	90.71	-1.3	-161,746
Total Distribution Penalty										-27,791,811
Total Distribution Penalty / Reward (capped at 2.5% for Penalties, and 1% for Rewards)										-21,900,000
Transmission	Circuit Availability		% hours per year	$449,344	$256,768	98.5	97.8	98.9	0.4	1,797,376.00
	Loss of Supply Event Frequenc y	0.1 < System Minute <=1	number of events per year	$89,869	$59,912	17.0	26.0	5	12	1,078,428
		System Minute > 1		$179,737	$134,803	3.0	7.0	7	-4	-539,212
	erage Outage Durati		minutes per year	$5,661	$1,598	784	1,234	590	194	1,098,234
Total Transmission Penalty										3,434,826
Total Transmission Penalty / Reward (capped at 1% for Penalties, and 1% for Rewards)										3,434,826
Total SSAM Penalty / Reward										-18,465,174

Note: **SSA** means Service Standard Actual and **SSD** means Service Standard Difference.

Appendix A

Service Standard performance graphs – 2008/09 to 2021/22

A.1 Service Standard performance graphs – 2008/09 to 2021/22

The following graphs illustrate the actual performance of the Service Standards for the 14 financial years up to the 2021/22 period. The Service Standard Target (SST) applied for AA3 from 2012/13 to 2016/17. As the AA4 commencement was delayed to 1 July 2019, the SSTs did not apply for 2017/18 and 2018/19, but will apply for 2019/20 to 2021/22.

- 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.

A.1.1 Distribution performance

Figure A.1: CBD SAIDI

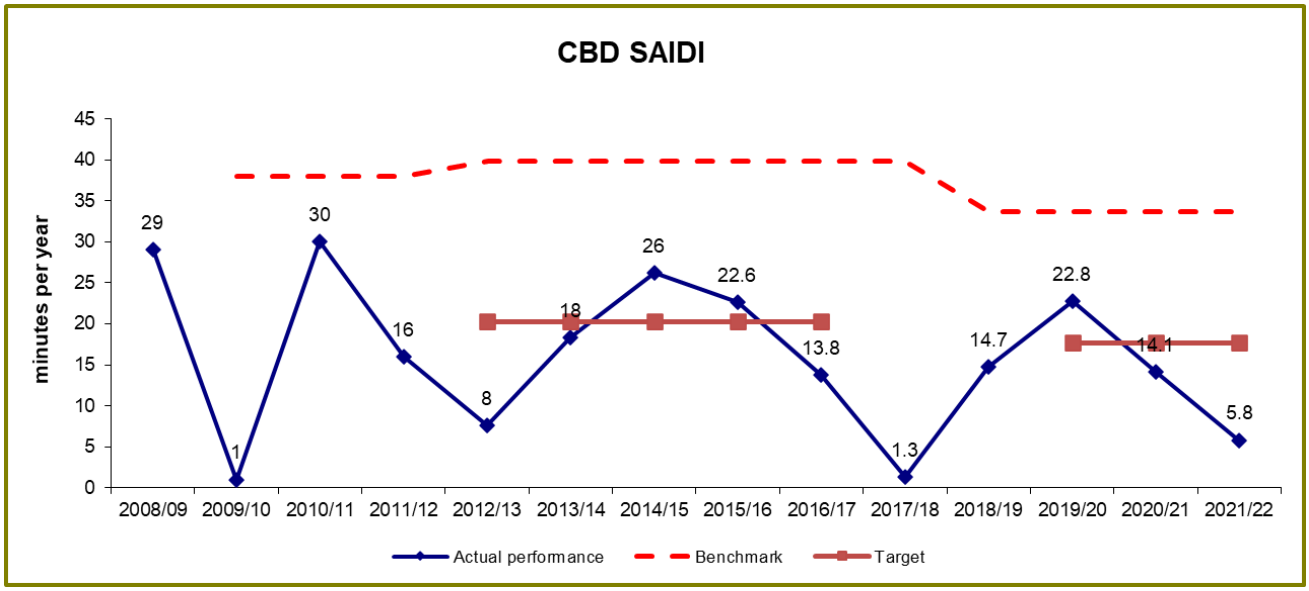


Figure A.2: CBD SAIFI

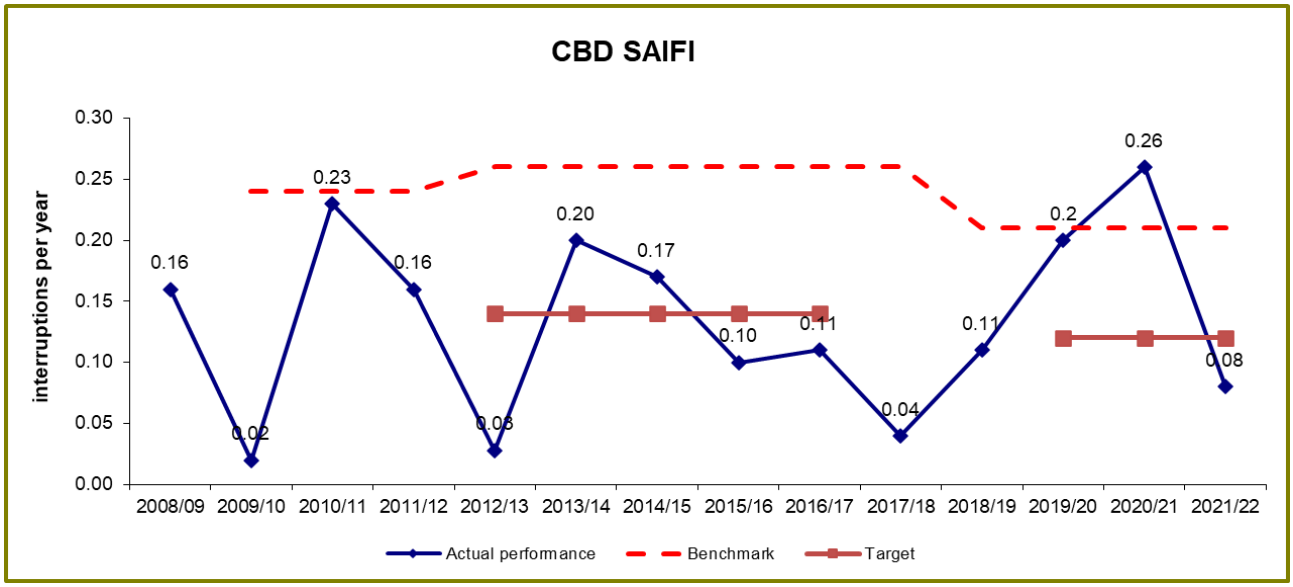


Figure A.3: Urban SAIDI

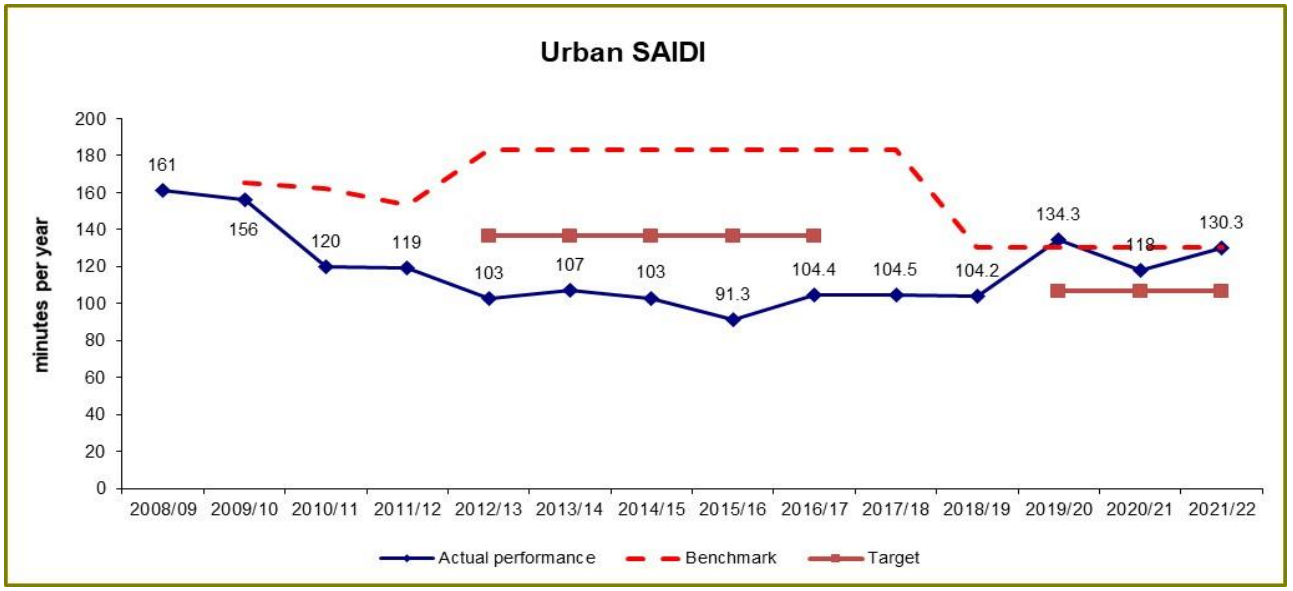


Figure A.4: Urban SAIFI

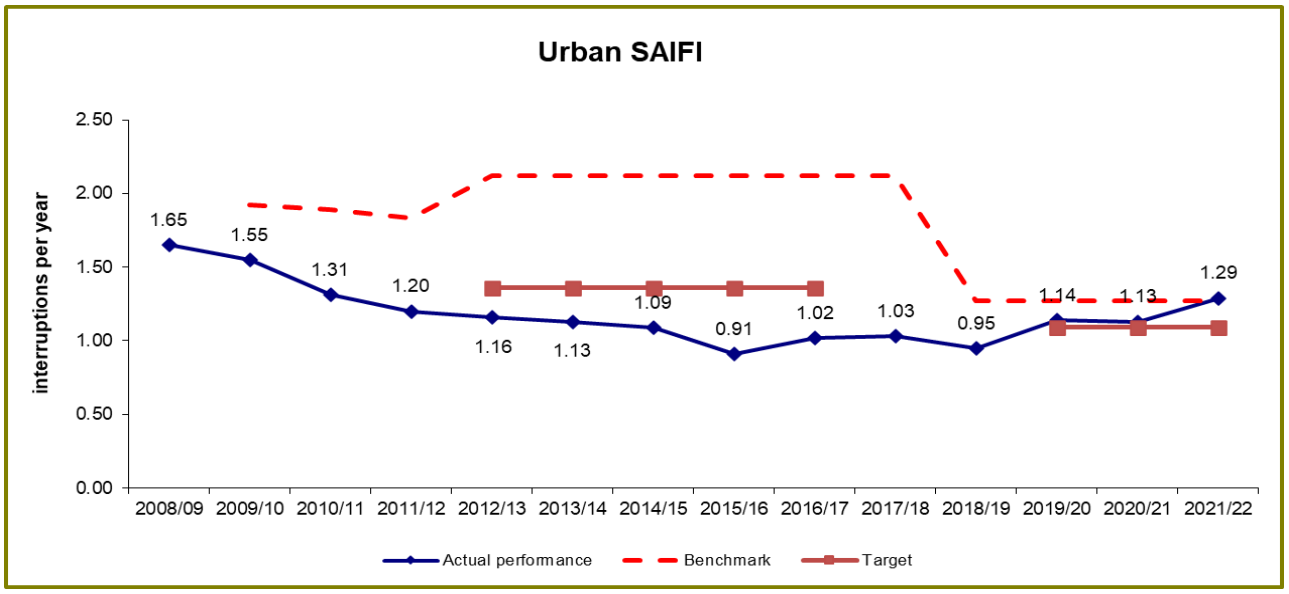


Figure A.5: Rural Short SAIDI

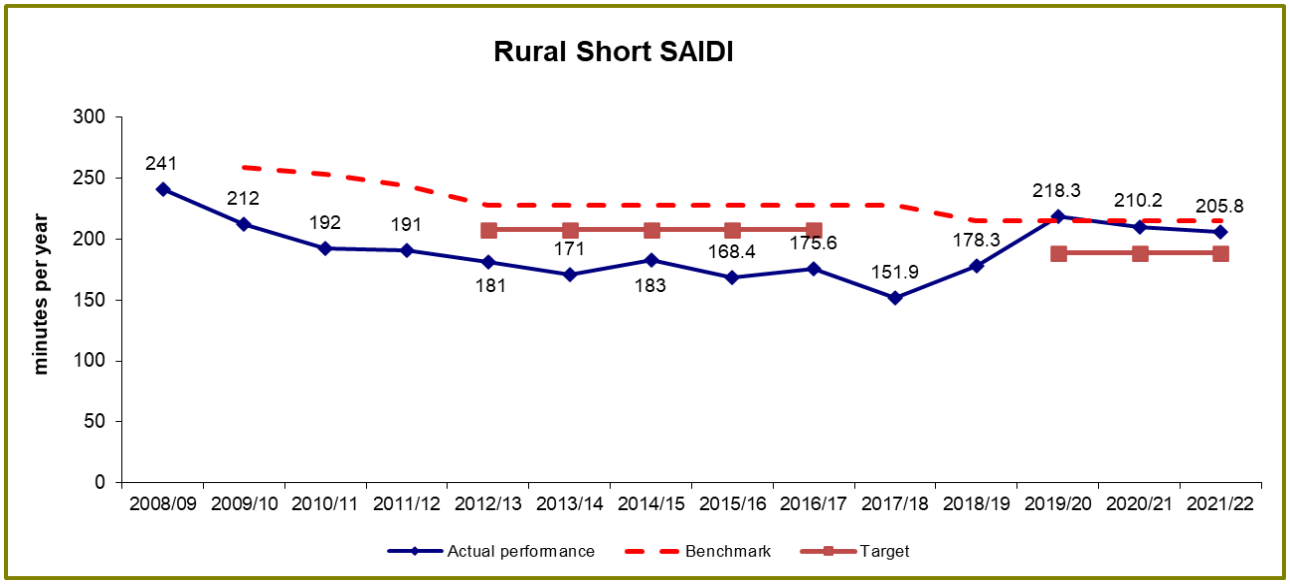


Figure A.6: Rural Short SAIFI

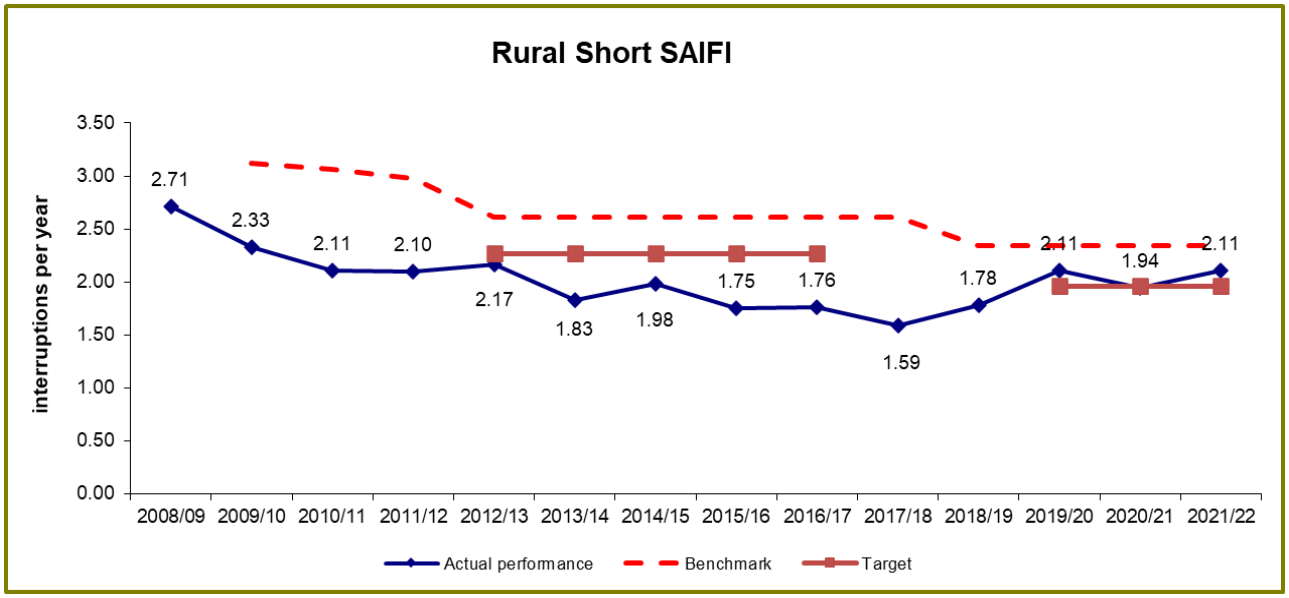


Figure A.7: Rural Long SAIDI

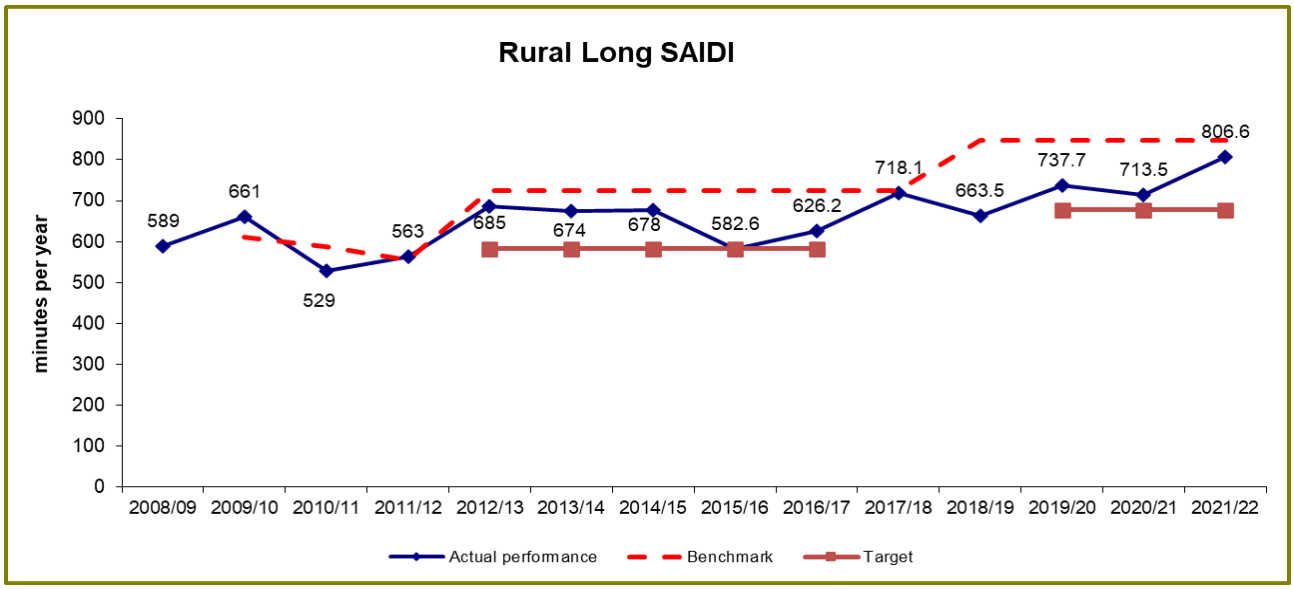


Figure A.8: Rural Long SAIFI

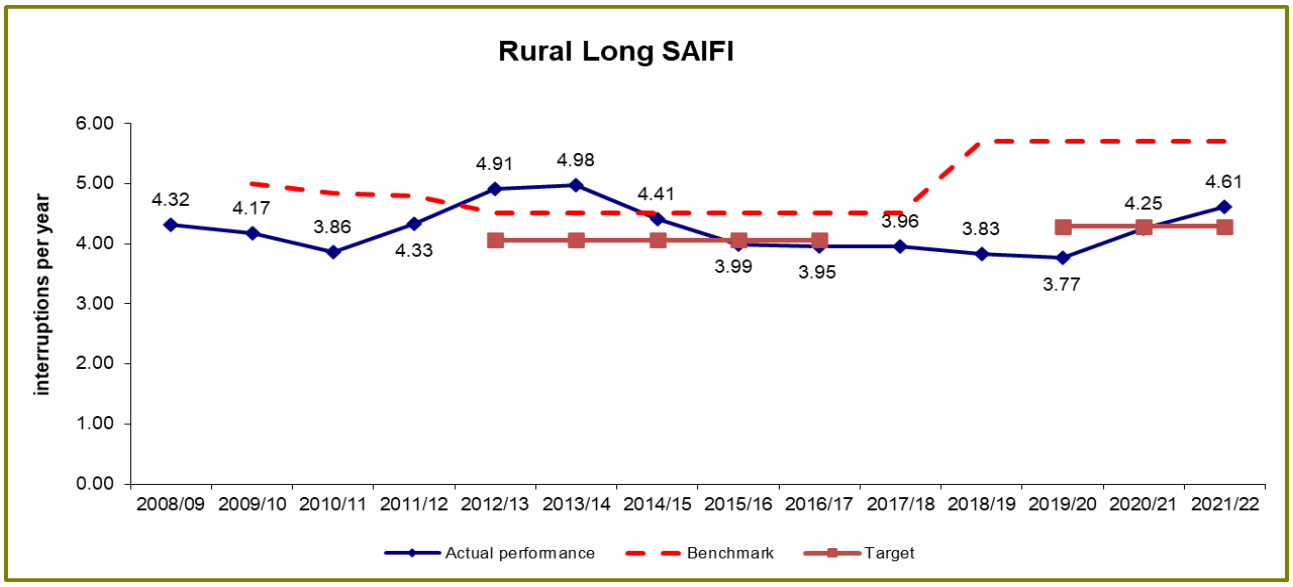
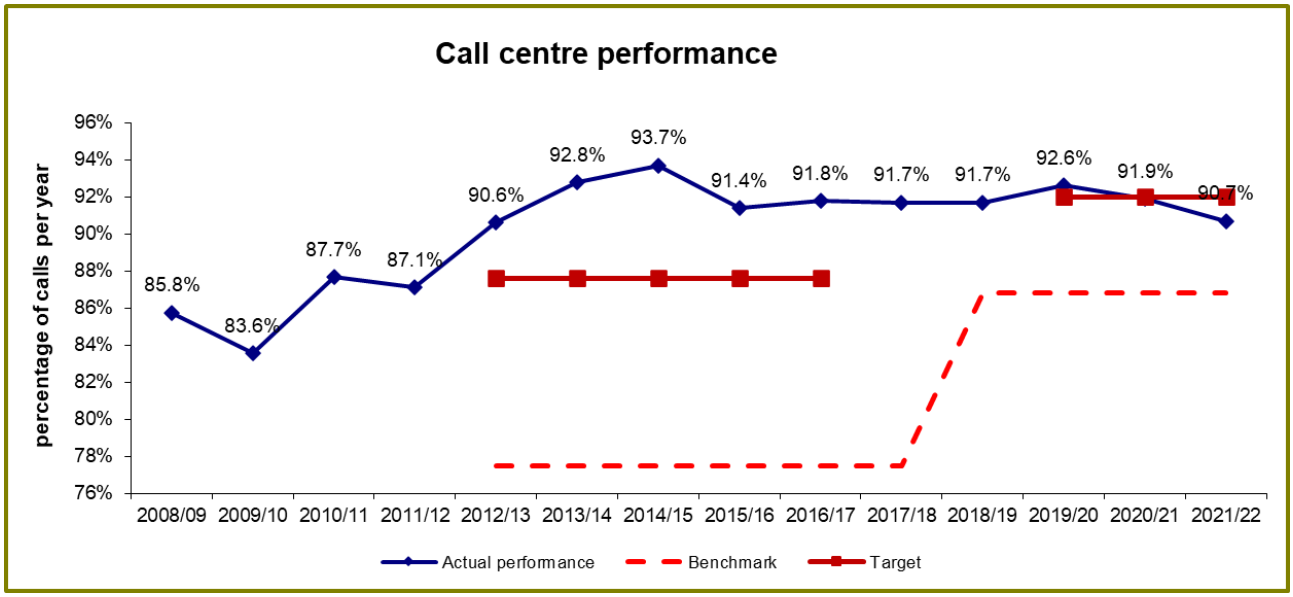


Figure A.9: Call Centre performance



A.1.2 Transmission performance

- Figure A.10 shows the circuit availability.
-
- Figure A.11 and Figure A.12 show the LoSEF for > 0.1 & ≤1.0 and > 1.0 System Minutes.
- Figure A.13 shows the average outage duration.

Figure A.10: Circuit availability

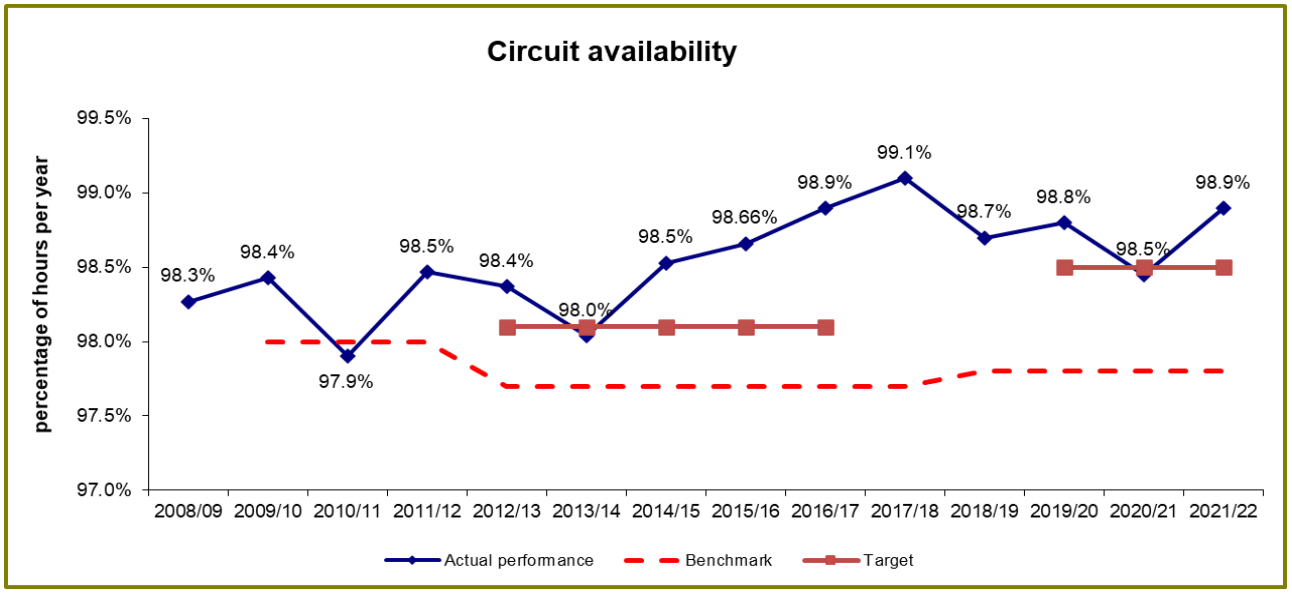


Figure A.11: Loss of supply event frequency > 0. 1 & ≤ 1.0 System Minutes Interrupted

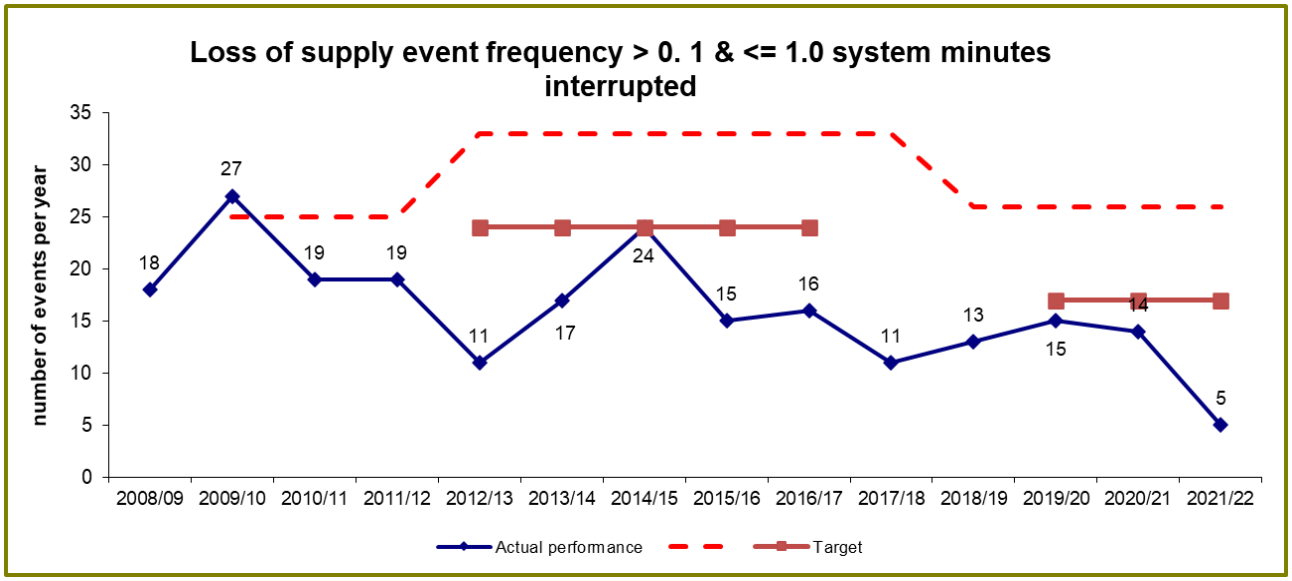


Figure A.12: Loss of supply event frequency > 1 System Minutes Interrupted

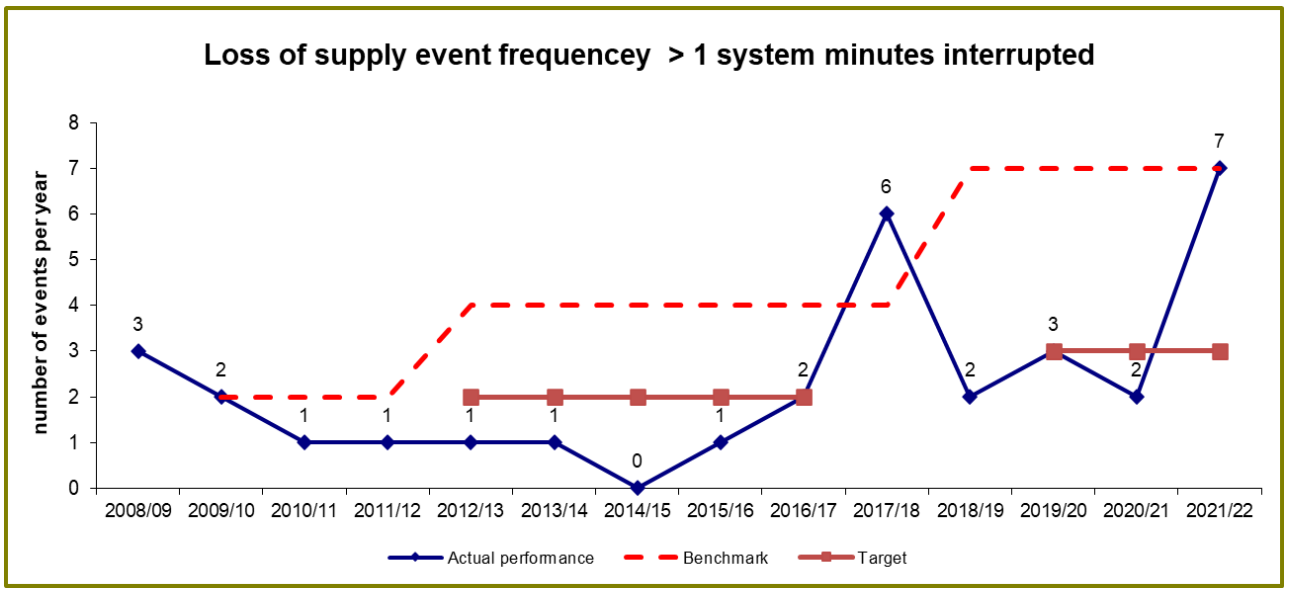
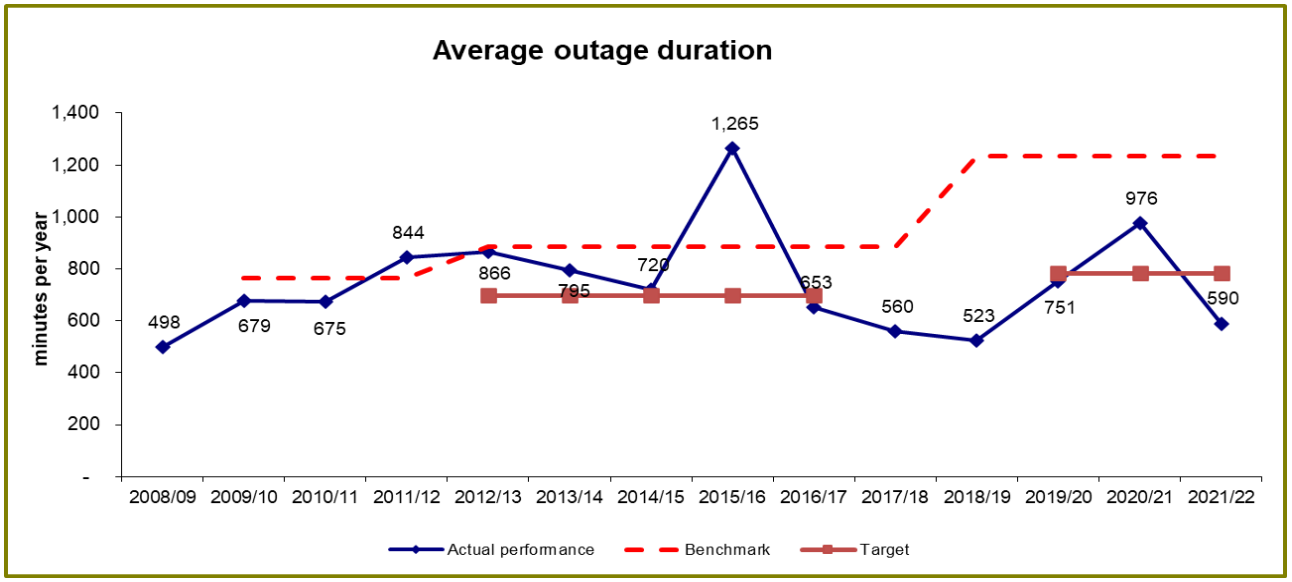


Figure A.13: Average outage duration



A.1.3 Street lighting repair time

Figure A.14 and Figure A.15 show the street lighting repair time for the metropolitan and regional areas.

Figure A.14: Street lighting repair time – Metropolitan area

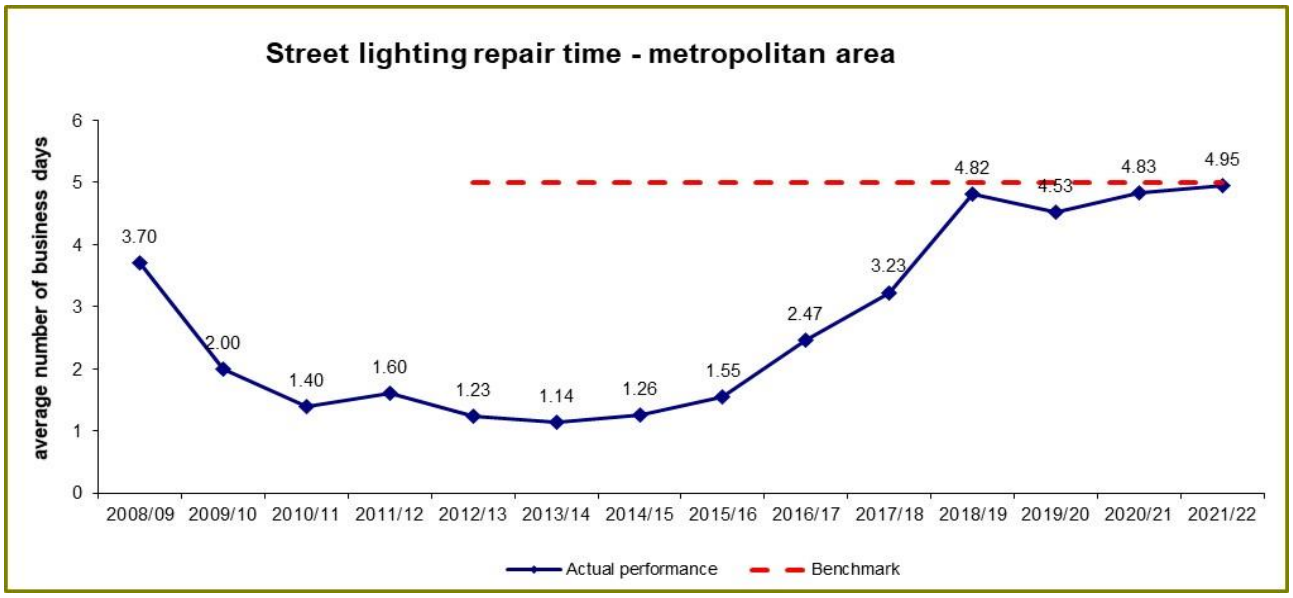
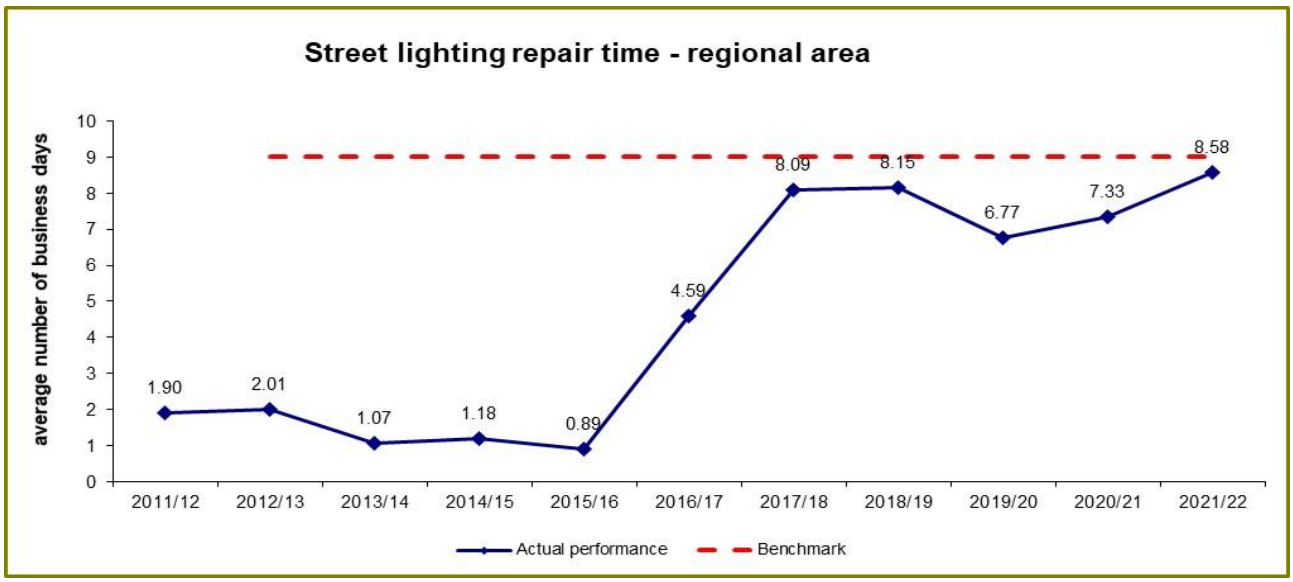
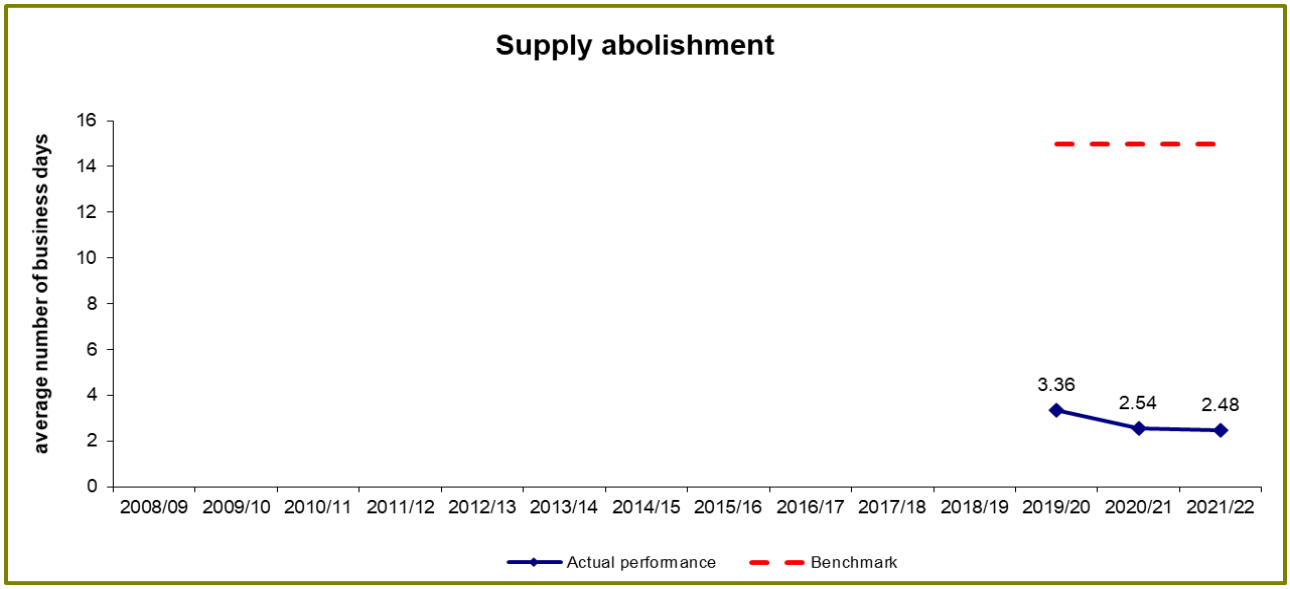


Figure A.15: Street lighting repair time – Regional area



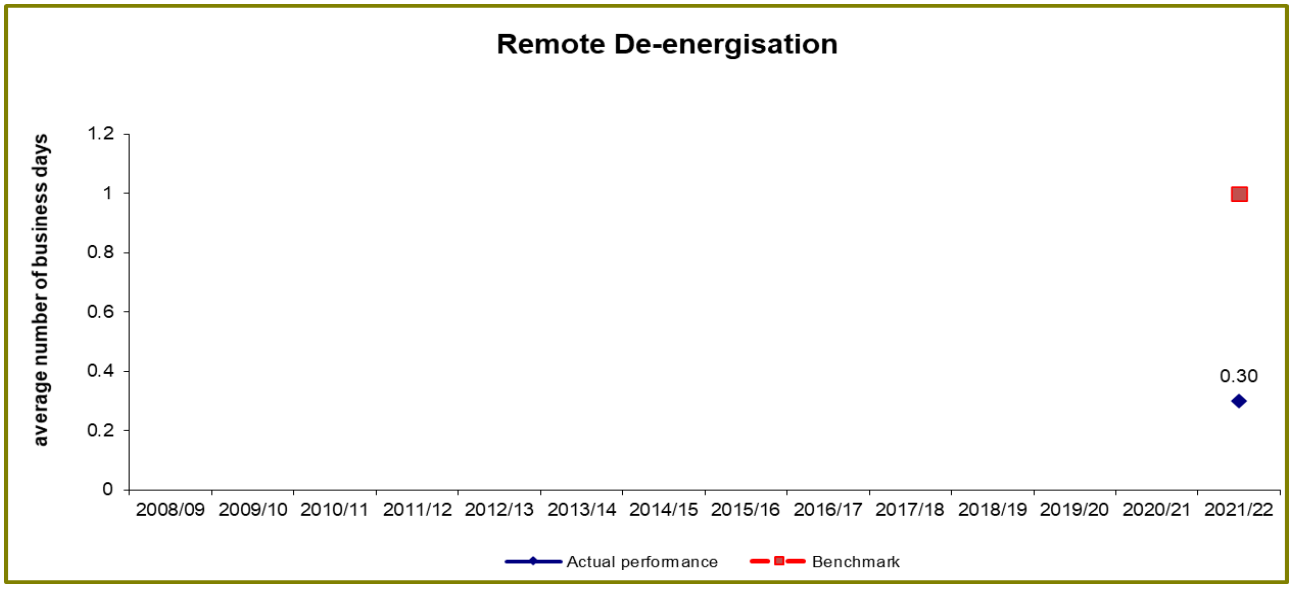
A.1.4 Supply abolishment

Figure A.16: Supply abolishment



A.1.5 Remote De-energisation

Figure A.17: Remote De-energisation



A.1.6 Remote Re-energisation

Figure A.18: Remote Re-energisation