Powerlink 2027-32 Revenue Proposal

Appendix 13.01

Setting STPIS values

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1 Setting STPIS Values - Introduction

1.1 Purpose

This appendix outlines the approach Powerlink has taken to determine performance targets, caps and floors for the Service Component (SC) of the Australian Energy Regulator's (AER's) Service Target Performance Incentive Scheme (STPIS). The information in this appendix supports Chapter 13 section 13.5 Service Target Performance Incentive Scheme of our Revenue Proposal.

1.2 Regulatory requirements

The AER's 2025 STPIS (version 6)[1] requires us to propose performance target, cap and floor for each of the SC parameters and sub-parameters in our Revenue Proposal.

For our 2027-32 Revenue Proposal, we have used the historical data range specified by the AER[2] to set our targets for the 2027-32 regulatory period. The AER's stipulated date ranges are:

- five calendar years 2020, 2021, 2022, 2023 and 2024 for the Revenue Proposal, and
- five calendar years 2021, 2022, 2023, 2024 and 2025 for the revised Revenue Proposal.

The AER's Reset Regulatory Information Notice (Reset RIN)[3] also requires us to provide the following in our Revenue Proposal:

- an explanation of how the proposed values to be attributed to the performance incentive scheme parameters comply with the requirements of the STPIS, and
- an explanation of the method used to calculate the proposed values to be attributed to those performance incentive scheme parameters and provide supporting calculations.

1.3 Appendix structure

The approach and methodology used to derive the proposed values is divided into two sections:

1. Section 2 outlines the approach used to establish and develop a sound methodology.
2. Section 3 contains STPIS values based on the historical data ranges specified by the AER, i.e. 2020 to 2024.

[1] Final STPIS Version 6, Australian Energy Regulator, April 2025.

[2] 2027-32 Reset RIN for Powerlink, Appendix A – Regulatory template instructions, Australian Energy Regulator, October 2025 (as varied November 2025), paragraph 5.6.2.

[3] 2027-32 Reset RIN for Powerlink, Australian Energy Regulator, October 2025, paragraph 4.7.1 (a) and (b).

2 Approach

We provide an overview of the approach used to establish our proposed STPIS targets for the 2027-32 regulatory period in Section 13.5 Service Target Performance Incentive Scheme of our Revenue Proposal.

This appendix complements the information in our Revenue Proposal and focuses on more detailed elements of the target setting arrangements. The approach we used to set our SC targets and values is detailed in the sections below.

Our approach is consistent with the National Electricity Rules[4], the AER's 2025 STPIS[5] and the AER's Framework and Approach for Powerlink[6]. We are required to propose values for the performance targets, caps and floors for the SC based on Section 3.2 of the AER's 2025 STPIS[7].

The proper operation of equipment parameter requires that we 'report only' and therefore no values are required.

In our 2023-27 Revenue Proposal[8], we adopted a principled, evidence-based method to calculate the performance targets, caps and floors. This method was consistent with the approach established by the AER in its determinations for other transmission network service providers (TNSPs)[9]. The AER accepted our proposed values, confirming their consistency with the methodology outlined in the 2015 STPIS[10], except for its decision to apply a zero target for the Large Loss of Supply sub-parameter[11].

We considered that a zero target for this sub-parameter did not align with the intent or design principles of the STPIS, as it created an asymmetric, penalty-only arrangement that removed incentives for improvement[12]. In its explanatory statement for the 2025 STPIS[13], the AER acknowledged this issue that rounded integer targets, which include zero, could unreasonably penalise TNSPs and addressed it by application of non-integer, real average outcomes as targets. This change provides TNSPs an incentive to improve performance and receive rewards when results exceed the target.

We have applied a consistent approach to our 2022-27 regulatory period for determining targets, caps and floors for the SC parameters for the 2027-32 regulatory period.

[4] National Electricity Rules, clause S6A.1.3(2).
[5] Final STPIS Version 6, Australian Energy Regulator, April 2025.
[6] Framework and approach Powerlink transmission determination 2027-32, Australian Energy Regulator, July 2025, page 5.
[7] Final STPIS Version 6, Australian Energy Regulator, April 2025.
[8] 2023-27 Revenue Proposal, Powerlink, January 2021, Appendix 15.01 - Setting STPIS Values.
[9] Refer Draft Decision SP AusNet 2014-15 to 2016-17 STPIS, Australian Energy Regulator, August 2013, pages 184-185.
[10] Final STPIS Version 5 (corrected), Australian Energy Regulator, October 2015.
[11] Draft Decision Powerlink Queensland Transmission Determination 2022 to 2027 Attachment 10 Service target performance incentive scheme, Australian Energy Regulator, September 2021, pages 11-15.
[12] 2023-27 Revenue Proposal, Powerlink, January 2021, pages 151-155.
[13] Explanatory Statement STPIS Version 6, Australian Energy Regulator, April 2025, pages 25-26.

The performance target was calculated as the average of the previous five years of historical performance data, consistent with clause 3.2(f) of the AER's 2025 STPIS. When selecting appropriate statistical distributions to determine the caps and floors, we followed the principles previously outlined by the AER:

- the chosen distribution should reflect any inherent skewness of the performance data
- the distribution should not imply that impossible values are reasonably likely. For example, the distribution for an unplanned circuit outage event rate sub-parameter should not imply that values below zero per cent are possible
- discrete distributions should be used to represent discrete data. For example, a discrete distribution such as the Poisson distribution should be used when calculating caps and collars for loss of supply sub-parameters. Continuous distributions should not be used in these cases, and
- when asymmetric distributions are selected, the better measure to use are percentiles – the 5th and 95th percentiles of an asymmetric distribution are the equivalent of being two standard deviations from the mean in a normal distribution.

The caps and floors have been calculated by first fitting a statistical distribution to the previous five years of performance data and then deriving the 5th and 95th percentiles of the chosen statistical distribution.

We acknowledge the AER's principles outlined above and applied a set of criteria in our process of the best fit statistical distribution selection. They must:

- reflect the inherent skewness of the data
- be bound by the logical limits of the parameter type
- be discrete when fitting discrete data
- be continuous when fitting continuous data
- preference distributions with fewer parameters rather than more, and
- be a good fit for the performance data.

We used '@RISK' software to identify the most appropriate statistical distribution for each set of historic performance data. The software provides 'goodness of fit' results for each distribution, based on standard statistical tests. In determining the appropriate distribution, and therefore the caps and floors for each performance measure, we considered:

- the results from the @RISK software
- the AER's principles and methodology, and
- the AER's previous distribution selection preferences.

Our proposed targets, caps and floors are summarised in Table 4.1. Details of the selected statistical distribution for each SC parameter and sub-parameter are provided in Section 3.

3 Setting STPIS Values

This section contains our proposed STPIS values based on the historical data range specified by the AER, being for this Revenue proposal the five calendar years 2020 to 2024, inclusive.

3.1 Service Component – unplanned outage circuit event rate

The Unplanned Outage Circuit Event Rate parameter measures network reliability by using the aggregate number of fault or forced outages per annum for each of the element transmission types – lines, transformers and reactive plant. The best statistically possible performance rate for this parameter is zero. Therefore, a higher performance rate indicates lower network reliability.

For each sub-parameter we have provided the following information to demonstrate how the best fit statistical distribution is selected:

- relevant historic performance data
- fit distribution chart, and
- fit result table.

Details of the approach used for each of the element transmission types is in the following sections.

3.1.1 Lines event rate – fault

Our Lines Fault Event Rate performance history is shown in Table 3.1.

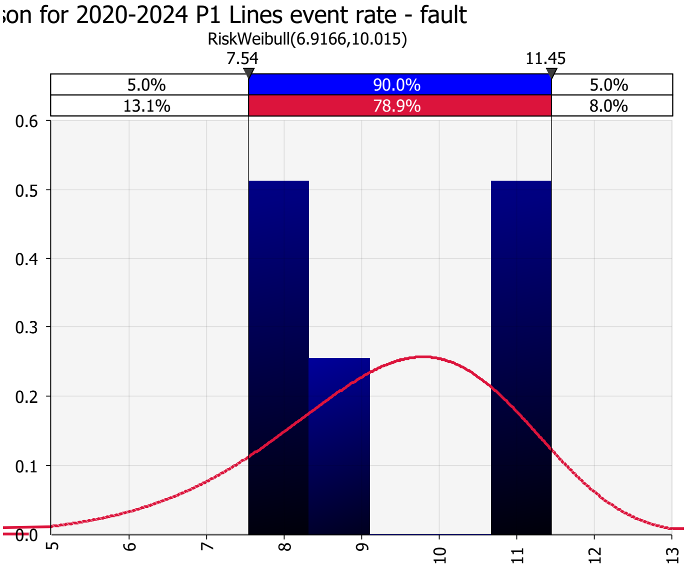
Table 3.1 - Lines event rate – fault – historic performance 2020-2024

	2020	2021	2022	2023	2024
Lines event rate – fault	9.06	11.45	7.97	7.54	10.75

The average of the five-year performance is 9.35.

We have selected the Weibull distribution as the best fit distribution for this parameter, as it ranked the highest under the Kolmogorov-Smirnov test and tied for first under the Chi-Square test, indicating the best overall statistical fit to the historical performance data. Results of the analysis are presented in Figure 3.1 and Table 3.2.

Figure 3.1 - Lines event rate – fault – fit distribution



Source @RISK

Table 3.2 - Lines event rate – fault – distribution percentiles

Percentiles	Weibull
5%	6.52
95%	11.74

Our proposed values for lines fault event rate is shown in Table 3.3.

Table 3.3 - Lines event rate – fault – proposed values for the 2020-2024 year range

	Floor	Target	Cap	Distribution
Lines event rate – fault	11.74	9.35	6.52	Weibull

3.1.2 Transformer event rate – fault

Our transformer fault event rate performance history is shown in Table 3.4.

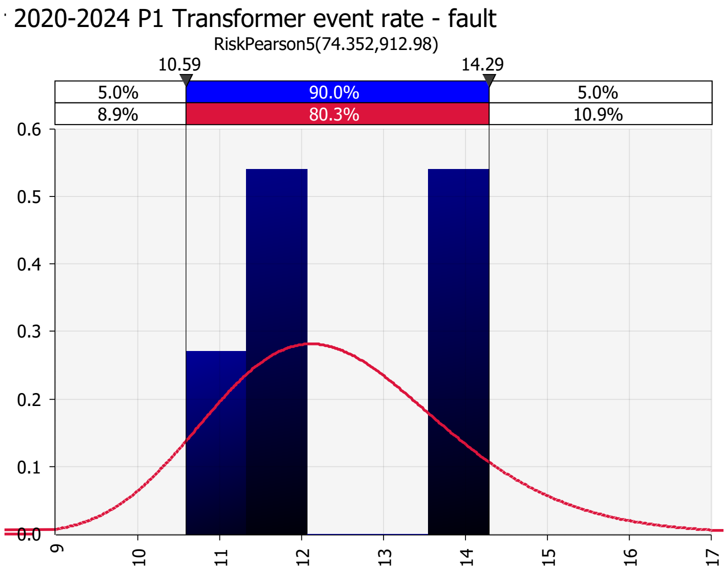
Table 3.4 - Transformer event rate – fault – historic performance 2020-2024

	2020	2021	2022	2023	2024
Transformer event rate – fault	11.63	11.70	14.04	10.59	14.29

The average of the five-year performance is 12.45.

We have selected the Pearson5 distribution as it has the best score from both Kolmogorov-Smirnov and Anderson-Darling tests. Results of the analysis are presented in Figure 3.2 and Table 3.5.

Figure 3.2 - Transformer event rate – fault - distribution



Source @RISK

Table 3.5 - Transformer event rate – fault – distribution percentiles

Percentiles	Pearson5
5%	10.25
95%	15.03

Our proposed values for transformer fault event rate is shown in Table 3.6.

Table 3.6 - Transformer event rate – fault – proposed values for 2020-2024 year range

	Floor	Target	Cap	Distribution
Transformer event rate – fault	15.03	12.45	10.25	Pearson5

3.1.3 Reactive plant event rate – fault

Our reactive plant fault event rate performance history is shown in Table 3.7.

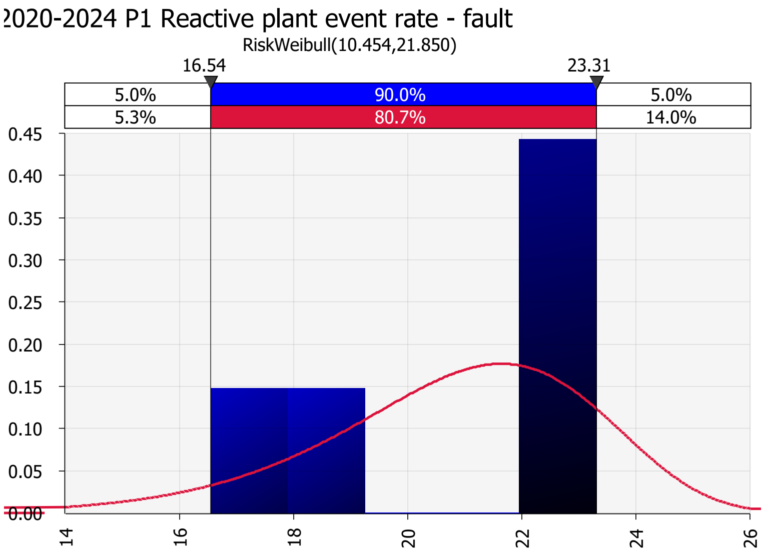
Table 3.7 - Reactive plant event rate – fault – historic performance 2020-2024

	2020	2021	2022	2023	2024
Reactive plant event rate – fault	22.56	23.31	16.54	22.56	18.66

The average of the five-year performance is 20.72.

We have selected the Weibull distribution as it achieved the best overall fit, ranking first under the Kolmogorov–Smirnov test. While the Gamma distribution performed well under the Anderson–Darling test, the Weibull distribution provided a more balanced and representative fit to the data. Results of the analysis are presented in Figure 3.3 and Table 3.8.

Figure 3.3 - Reactive plant event rate – fault – fit distribution



Source @RISK

Table 3.8 - Reactive plant event rate – fault – distribution percentiles

Percentiles	Weibull
5%	16.45
95%	24.27

Our proposed values for reactive plant fault event rate is shown in Table 3.9.

Table 3.9 - Reactive plant event rate – fault – proposed values from the 2020-2024 year range

	Floor	Target	Cap	Distribution
Reactive plant event rate – fault	24.27	20.72	16.45	Weibull

3.1.4 Lines event rate – forced

Our lines forced event rate performance history is shown in Table 3.10.

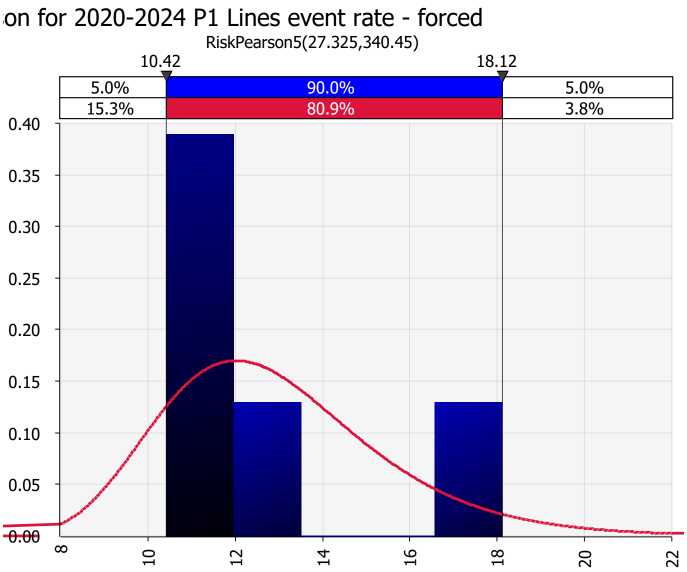
Table 3.10 - Lines event rate – forced – historic performance 2020-2024

	2020	2021	2022	2023	2024
Lines event rate – forced	18.12	13.47	10.96	11.80	10.42

The average of the five-year performance is 12.96.

We have selected the Pearson5 distribution as the best fit distribution for this parameter, as it has the best fit scores from the Kolmogorov-Smirnov and Anderson-Darling tests. Results of the analysis are presented in Figure 3.4 and Table 3.11.

Figure 3.4 - Lines event rate – forced – fit distribution



Source @RISK

Table 3.11 - Lines event rate – forced – distribution percentiles

Percentiles	Pearson5
5%	9.34
95%	17.61

Our proposed values for lines forced event rate is shown in Table 3.12.

Table 3.12 - Lines event rate – forced – proposed values for the 2020-2024 year range

	Floor	Target	Cap	Distribution
Lines event rate – forced	17.61	12.96	9.34	Pearson5

3.1.5 Transformer event rate – forced

Our Transformer forced event rate performance history is shown in Table 3.13.

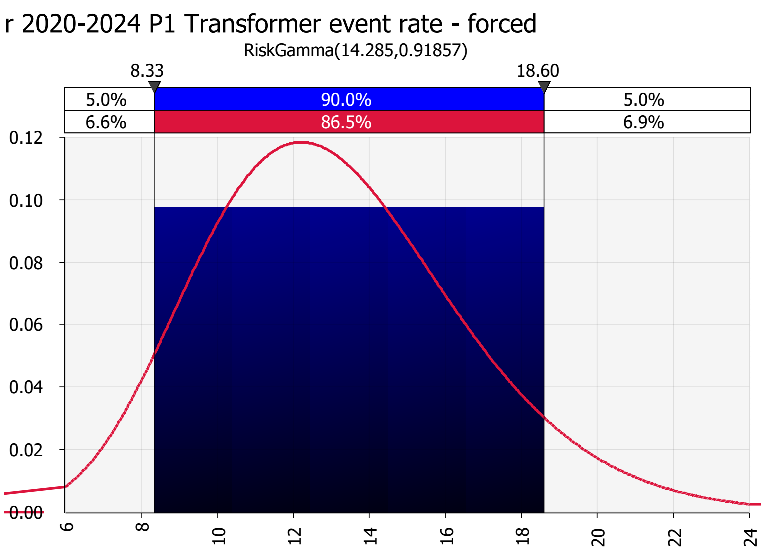
Table 3.13 - Transformer event rate - forced - historic performance 2020-2024

	2020	2021	2022	2023	2024
Transformer event rate – forced	18.60	14.62	11.11	12.94	8.33

The average of the five-year performance is 13.12.

We have selected the Gamma distribution as the best fit distribution for this parameter, as it achieved the highest score under the Kolmogorov–Smirnov test and performed strongly across other fit criteria. While the Log-logistic distribution ranked highest under the Anderson–Darling test, its overall fit was slightly weaker, making the Gamma distribution the most balanced and representative selection. Results of the analysis are presented in Figure 3.5 and Table 3.14.

Figure 3.5 - Transformer event rate - forced - fit distribution



Source @RISK

Table 3.14 - Transformer event rate - forced – distribution percentiles

Percentiles	Gamma
5%	7.98
95%	19.31

Our proposed values for transformer forced event rate is shown in Table 3.15.

Table 3.15 - Transformer event rate - forced - proposed values for the 2020-2024 year range

	Floor	Target	Cap	Distribution
Transformer event rate – forced	19.31	13.12	7.98	Gamma

3.1.6 Reactive plant event rate – forced

Our reactive plant forced event rate performance history is shown in Table 3.16.

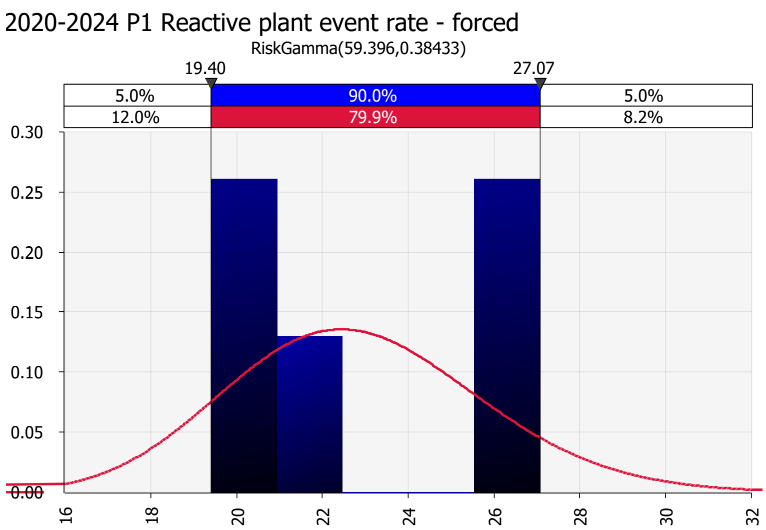
Table 3.16 - Reactive plant event rate - forced - historic performance 2020-2024

	2020	2021	2022	2023	2024
Reactive plant event rate – forced	20.30	25.56	21.80	27.07	19.40

The average of the five-year performance is 22.83.

We have selected the Gamma distribution as the best fit distribution for this parameter, as it achieved the top Kolmogorov–Smirnov test score. The Pearson5 distribution performed best under the Anderson–Darling test, however, it ranked fourth in the Kolmogorov-Smirnov test and did not provide as balanced an overall fit across all statistical criteria. The Gamma distribution offers the most consistent and representative fit to the historical performance data. Results of the analysis are presented in Figure 3.6 and Table 3.17.

Figure 3.6 - Reactive plant event rate - forced - fit distribution



Source @RISK

Table 3.17 - Reactive plant event rate - forced - fit comparison

Percentiles	Gamma
5%	18.18
95%	27.91

Our proposed values for reactive plant forced event rate is shown in Table 3.18.

Table 3.18 - Reactive plant event rate - forced - proposed values for the 2020-2024 year range

	Floor	Target	Cap	Distribution
Reactive plant event rate – forced	27.91	22.83	18.18	Gamma

3.2 Service Component – loss of supply event frequency

The loss of supply event frequency parameter measures network reliability by counting the number of loss of supply events on our network that impact our customers. Performance is measured in system minutes which are calculated using the energy not supplied for each supply interruption, divided by our peak demand value. The number of events where system minutes exceed each threshold is summed per annum. The best statistically possible performance for this parameter is zero. Therefore, a higher number of event counts represents a less reliable network.

While the Loss of Supply event frequency parameter represents discrete data, rounding of the calculated target has been removed consistent with the AER's 2025 STPIS and the explanatory statement[14].

3.2.1 Frequency of moderate loss of supply events greater than 0.05 system minutes (X Threshold)

Our loss of supply event frequency greater than 0.05 system minutes performance history is shown in Table 3.19.

Table 3.19 - Loss of supply event frequency > 0.05 system minutes - historic performance 2020-2024

	2020	2021	2022	2023	2024
Loss of Supply event > 0.05 system minutes	0	3	2	2	0

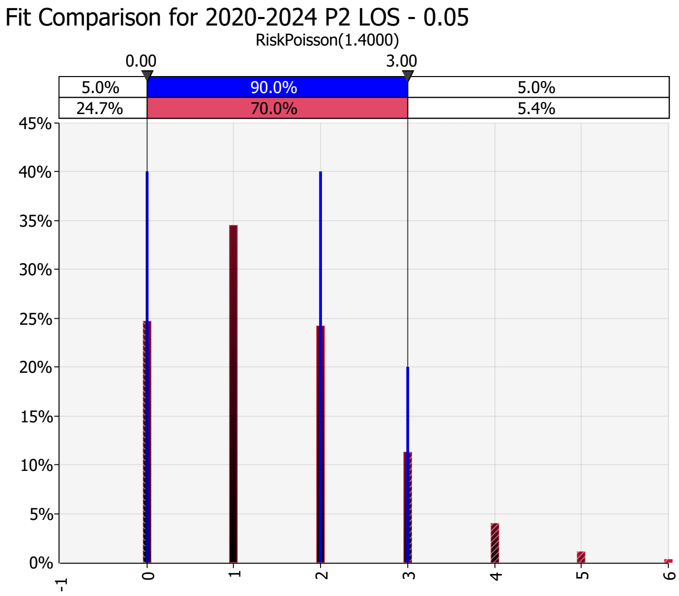
The average of the five-year performance is 1.40.

We have selected the Poisson distribution as the best fit distribution for this parameter, as it achieved the highest ranking under the Akaike Information Criterion test, indicating the most efficient balance between model fit and simplicity. The Poisson distribution also aligns with the discrete nature of the historical performance data, supporting its suitability for this parameter.

Results of the analysis are presented in Figure 3.7 and Table 3.20.

[14] Explanatory Statement STPIS Version 6, Australian Energy Regulator, April 2025, pages 25-26.

Figure 3.7 - Loss of supply X threshold - fit distribution



Source @RISK

Table 3.20 - Loss of supply X threshold – distribution percentiles

Percentiles	Poisson
5%	0
95%	4

Our proposed values for loss of supply event frequency greater than 0.05 system minutes is shown in Table 3.21.

Table 3.21 - Loss of supply X threshold – proposed values for the 2020-2024 year range

	Floor	Target	Cap	Distribution
Loss of supply X threshold greater than 0.05 system minutes	4	1.40	0	Poisson

3.2.2 Frequency of large loss of supply events greater than 0.40 system minutes (Y threshold)

Our loss of supply event frequency greater than 0.40 system minutes performance history is shown in Table 3.22.

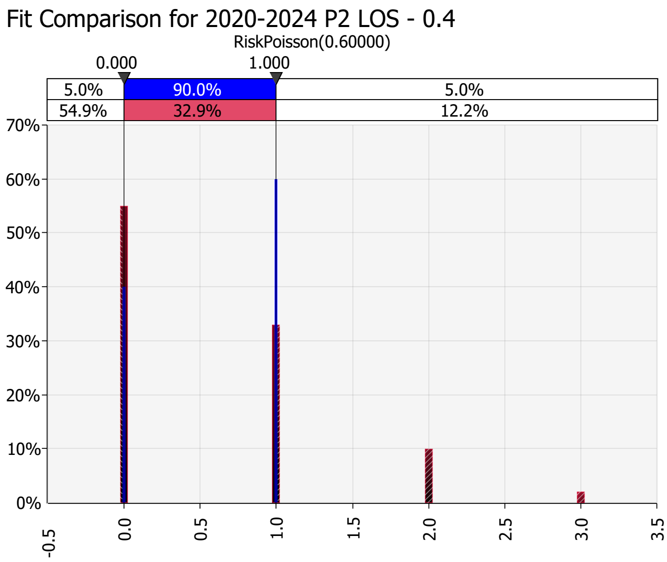
Table 3.22 - Loss of supply event frequency > 0.40 system minutes - historic performance 2020-2024

	2020	2021	2022	2023	2024
Loss of Supply event > 0.4 system minutes	0	1	1	1	0

The average of the five-year performance is 0.60.

We have selected the Poisson distribution as the best fit distribution for this parameter, as it has the best fit scores from the Akaike Information Criterion test. Results of the analysis are presented in Figure 3.8 and Table 3.23.

Figure 3.8 - Loss of supply X threshold - fit distribution



Source @RISK

Table 3.23 - Loss of supply Y threshold – distribution percentiles

Percentiles	Poisson
5%	0
95%	2

Our proposed values for loss of supply event frequency greater than 0.4 system minutes is shown in Table 3.24.

Table 3.24 - Loss of supply Y threshold – proposed values for the 2020-2024 year range

	Floor	Target	Cap	Distribution
Loss of supply Y threshold greater than 0.4 system minutes	2	0.60	0	Poisson

3.3 Service Component – average outage duration

The average outage duration parameter measures network reliability by measuring the average time it takes for a TNSP to restore loss of supply events. The average outage duration (in minutes) is calculated by dividing the annual cumulative summation of the loss of supply event duration time by the number of loss of supply events. The best statistically possible performance for this parameter is zero minutes. Therefore, longer average outage duration minutes represents a less reliable network.

Our average outage duration performance history is shown in Table 3.25.

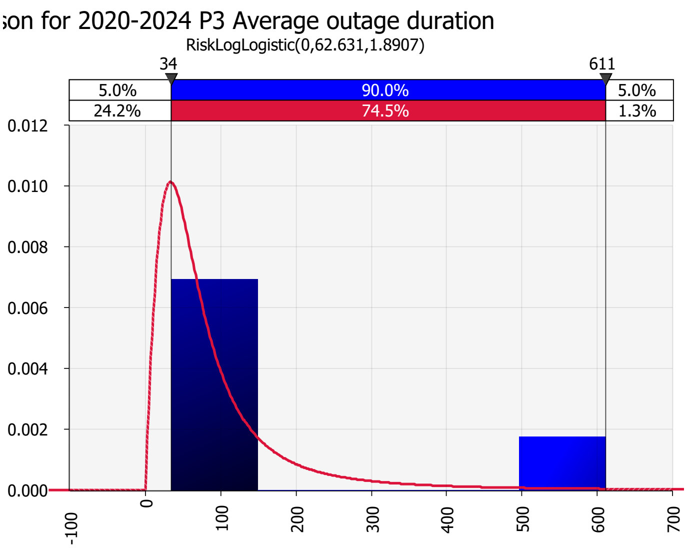
Table 3.25 - Average outage duration – historic performance 2020-2024

	2020	2021	2022	2023	2024
Average outage duration (minutes)	57	45	611	34	58

The average of the five-year performance is 161.16 minutes.

We have selected Log-logistic distribution as the best fit distribution for this parameter, as it achieved the highest score under the Kolmogorov–Smirnov test. Although the Pearson5 distribution ranked first under the Anderson–Darling test, it placed second in the Kolmogorov–Smirnov test. Overall, the Log-logistic distribution provides the most consistent and representative fit across the statistical measures. Results of the analysis are presented in Figure 3.9 and Table 3.26.

Figure 3.9 - Average outage duration - fit distribution



Source @RISK

Table 3.26 - Average outage duration – fit comparison

Percentiles	Log-logistic
5%	13.20
95%	297.24

Our proposed values for average outage duration is shown in Table 3.27.

Table 3.27 - Average outage duration – proposed values for the 2020-2024 year range

	Floor	Target	Cap	Distribution
Average outage duration	297.24	161.16	13.20	Log-logistic

4 STPIS Values – Proposed

Table 4.1 provides a summary of our proposed STPIS values for the SC of the STPIS.

Table 4.1 - STPIS values

SC Parameter (±1.25% MAR)	Floor	Target	Cap	Distribution
Unplanned Outage Circuit Event Rate (±0.75% MAR)				
Lines Event Rate – Fault	11.74	9.35	6.52	Weibull
Transformer Event Rate – Fault	15.03	12.45	10.25	Pearson5
Reactive Plant Event Rate – Fault	24.27	20.72	16.45	Weibull
Lines Event Rate – Forced	17.61	12.96	9.34	Pearson5
Transformer Event Rate – Forced	19.31	13.12	7.98	Gamma
Reactive Plant Event Rate – Forced	27.91	22.83	18.18	Gamma
Loss of Supply Event Frequency (±0.30% MAR)				
Greater than 0.05 System Minutes (x)	4	1.40	0	Poisson
Greater than 0.40 System Minutes (y)	2	0.60	0	Poisson
Average Outage Duration (±0.20% MAR)				
Average Outage Duration	297.24	161.16	13.20	Log-logistic