

**STPIS Proposal and  
Reliability Licence Conditions  
Compliance Capex Requirement**

**2019-2024 Regulatory Control  
Period**

---

## CONTENTS

---

<b>1.0</b>	<b>Executive Summary</b> .....	<b>2</b>
<b>2.0</b>	<b>Overview</b> .....	<b>3</b>
<b>2.1</b>	<b>Introduction and Context</b> .....	<b>3</b>
<b>3.0</b>	<b>STPIS Parameters and Targets</b> .....	<b>4</b>
<b>3.1</b>	<b>Endeavour Energy’s Long Term Performance Context</b> .....	<b>4</b>
<b>3.2</b>	<b>Application of the STPIS to the 2019-24 Regulatory Control Period</b> .....	<b>4</b>
	3.2.1 Revenue at Risk .....	5
<b>3.3</b>	<b>STPIS Reliability Component</b> .....	<b>5</b>
	3.3.1 Feeder Categorisation .....	5
	3.3.2 Reliability of Supply Parameters .....	6
	3.3.3 Value of Customer Reliability .....	6
	3.3.4 Proposed Reliability Targets.....	6
	3.3.5 Adjustments to Targets.....	7
	3.3.6 Exclusions - Major Event Day Threshold .....	8
<b>3.4</b>	<b>STPIS Customer Service Component</b> .....	<b>8</b>
	3.4.1 Proposed Customer Service Targets .....	8
	3.4.2 Revenue at Risk .....	8
	3.4.3 Incentive rates.....	8
	3.4.4 Exclusions.....	8
<b>4.0</b>	<b>Required Expenditure for NSW Licence Conditions Compliance</b> .....	<b>9</b>
<b>4.1</b>	<b>Endeavour Energy Licence Conditions Requirements</b> .....	<b>9</b>
<b>4.2</b>	<b>Endeavour Energy’s NSW Licence Conditions Obligations</b> .....	<b>9</b>
<b>4.3</b>	<b>Current Licence Compliance Performance</b> .....	<b>10</b>
<b>4.4</b>	<b>Licence Conditions Expenditure History and Requirements</b> .....	<b>10</b>
	<b>Appendix - Major Event Days Proposal</b> .....	<b>12</b>
	Current Process.....	12
	Statistical Performance of the Box-Cox Transform.....	12
	MED Threshold Trends.....	15
	MED Days Removed .....	16

## 1.0 Executive Summary

This document details Endeavour Energy's proposed STPIS targets and Capex requirements to meet its NSW reliability Licence Conditions obligations, as well as our proposal for the application of the STPIS for the 2019-2024 Regulatory Control Period.

The key aspects of this document are summarised as follows:

### Application of the STPIS to Endeavour Energy

Our proposal for STPIS includes:

- S-factor revenue at risk of  $\pm 5\%$  (with a maximum  $\pm 0.5\%$  for customer service).
- Reliability targets (to be updated for final proposal):
  - Urban SAIDI 63.1 minutes
  - Rural Short SAIDI 188.5 minutes
  - Urban SAIFI 0.813
  - Rural Short SAIFI 1.808
- Telephone answering target of 81.5% (to be updated for final proposal).
- Continued use of the Box-Cox transform for daily SAIDI normalisation to determine major event day thresholds.

### Capex Requirements for NSW Reliability Licence Conditions

- Our proposed Reliability Capex is \$4M per year between 2019/20 and 2023/24, for a total of \$20M (nominal), targeted at compliance to the NSW Licence Conditions Schedule 3 Individual Feeder Standards. This represents a 17% reduction on the 2014-19 regulatory determination allowed Reliability Capex.

## 2.0 Overview

### 2.1 Introduction and Context

Endeavour Energy operates a distribution network that meets the reliability performance needs and expectations of its customers. In the context of current regulatory and licence requirements, customer expectations, and capital investment constraint, Endeavour Energy has adopted a reliability strategy of maintaining existing average levels of reliability, and rectifying poor-performance outliers.

Endeavour Energy operates within the context of state and national regulation:

- The Australian Energy Regulator's (AER) distribution Service Target Performance Incentive Scheme (STPIS) provides a financial incentive for Endeavour Energy to self fund the maintenance or improvement of its reliability and customer service performance over time.
- The NSW state government imposes Licence Conditions to all electricity distribution businesses in NSW. Endeavour Energy has an obligation to ensure compliance with these conditions which are enforceable by the Independent Pricing and Regulatory Tribunal (IPART) and the Minister. The latest Licence Conditions provided to Endeavour Energy are dated 7th June 2017.

The purpose of this document is to:

- Detail Endeavour Energy's proposal on how the STPIS should apply for the 2019-24 regulatory period.
- Propose reliability and telephone answering targets for the 2019-24 regulatory period.
- Detail the expenditure required for Endeavour Energy to maintain compliance with its Licence Conditions obligations.

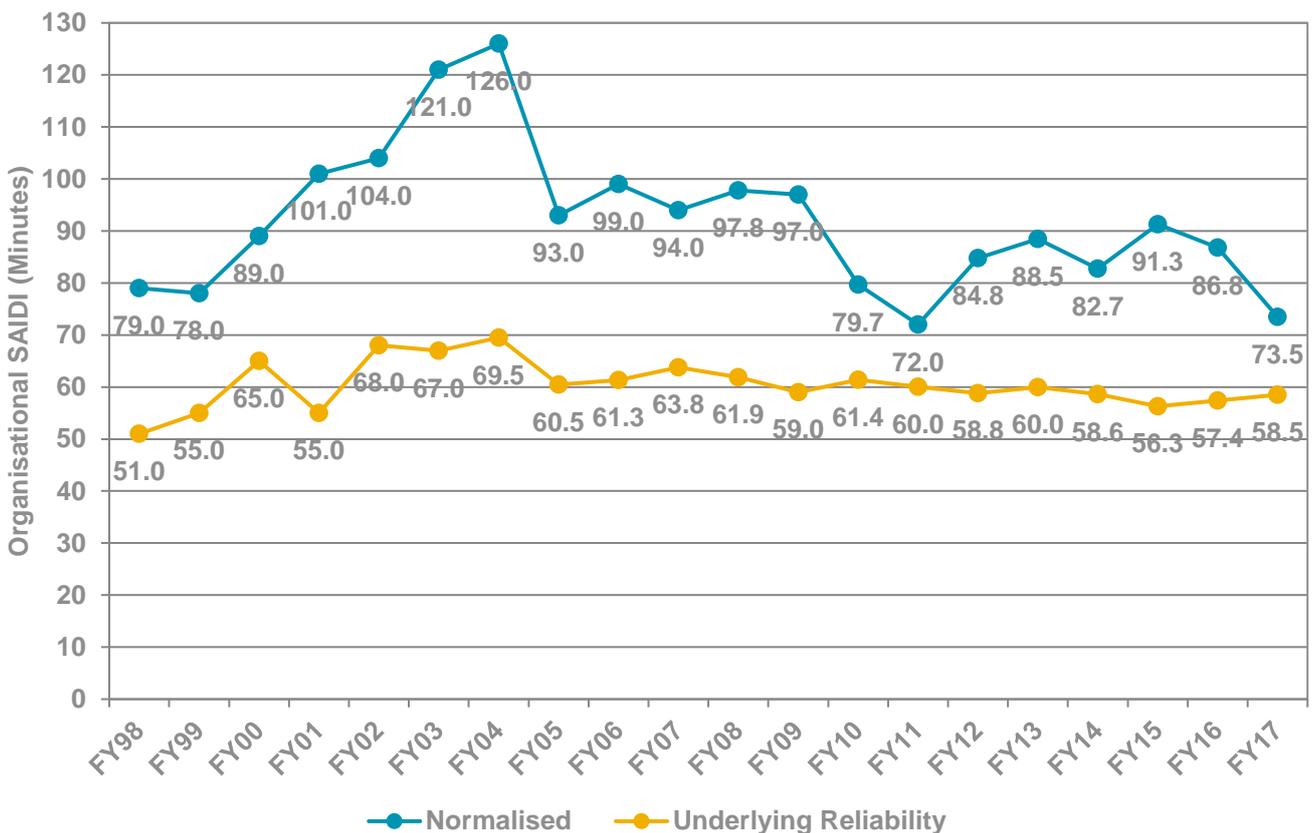
### 3.0 STPIS Parameters and Targets

#### 3.1 Endeavour Energy’s Long Term Performance Context

Endeavour Energy has adopted a corporate strategy of maintaining existing average levels of reliability performance. Normalised reliability trends, whilst removing major event days, are still subject to significant fluctuation as localised storms and significant events are often not excluded as major event days. As such, Endeavour Energy has for some time internally monitored underlying reliability performance, defined as the total SAIDI from all days where the daily SAIDI was less than 1 minute. This better reflects the “day to day” performance of the network in terms of overall investment and maintenance strategies as well as operational response. It is also not subject to changes in normalisation methodology over longer timeframes.

Endeavour Energy’s normalised and underlying SAIDI trends are shown in Figure 1 below. It is evident that recent underlying performance is stable, in line with a corporate strategy of maintaining current average levels of reliability. This is also reflective of Endeavour Energy’s response to the STPIS, which is to avoid penalties rather than pursue rewards. No step change investment for reliability improvement has occurred.

Figure 1 – Normalised and Underlying Reliability



#### 3.2 Application of the STPIS to the 2019-24 Regulatory Control Period

The final F&A paper addresses the application of the STPIS to the regulatory control period; 1 July 2019 to 30 June 2024. Specifically, the AER’s proposed approach to applying the STPIS in the subsequent period will be to:

- Set revenue at risk for each distributor within the range of ±5%
- Segment the network according to the four STPIS feeder categories (CBD, urban, short rural and long rural) as per the schemes’s definitions.
- Set applicable parameters to be:
  - For the reliability of supply component: SAIDI and SAIFI
  - For the customer service component: telephone answering

- Set performance targets based on our average performance over the past five regulatory years.
- Apply the methodology indicated in the national STPIS for excluding specific events from the calculation of annual performance and performance targets
- Apply the methodology and value of customer reliability (VCR) values as indicated in AEMO's 2014 Value of Customer Reliability Review final report escalated to the start of the regulatory control period.
- Not apply the GSL component while NSW distributors remain subject to a jurisdictional GSL scheme.

We accept the application of the STPIS for the 2019-24 regulatory control period and the AER's proposed approach, with the exception of the methodology used to calculate the excluded Major Event Days (MED) threshold. In the following sections we outline our proposed targets, revenue at risk and detail any proposed amendments to the AER's approach in accordance with clause 2.2 of the STPIS.

### 3.2.1 Revenue at Risk

Clause 2.5(b) of the STPIS document allows for a DNSP to "propose in accordance with clause 2.2 a different revenue at risk to apply where this would satisfy the objectives of the scheme described in clause 1.5."

For the 2014-19 regulatory period, the AER accepted Endeavour Energy's proposal that its revenue at risk under the STPIS scheme be limited to  $\pm 2.5\%$ . This proposal was formed out of a consistent view from Networks NSW at the time.

However, since this time:

- Endeavour Energy has separated from Networks NSW following the NSW state government's long term lease of electricity businesses Ausgrid and Endeavour Energy.
- The Scheme has been in operation in NSW for three financial years to date, allowing distribution businesses in NSW to understand in detail the application of the scheme and balancing risks and rewards with customer expectations and desires.
- Public attention to power system security and reliability has been heightened due to events in South Australia as well as the ongoing rapid transition of the grid away from centralised generation.
- The EBSS and CESS, which are high value incentive schemes focussed on investment inputs, require a strong balancing signal in the STPIS to ensure performance outcomes for customers are rightly considered.

As such, for the 2019-24 regulatory period, it is proposed that Endeavour Energy's revenue at risk under the STPIS scheme be set to the default  $\pm 5.0\%$ , the full application of the scheme, in line with other states. This is consistent with the AER's final F&A.

## 3.3 STPIS Reliability Component

### 3.3.1 Feeder Categorisation

The scheme requires that to calculate revenue incentives, the electricity distribution network should be divided into segments by network type. Consistent with the application of STPIS to Endeavour Energy for the 2014-19 regulatory control period, the network is to be classified by feeder categories consisting of:

- Urban
- Short Rural

There are no SAIDI and SAIFI CBD targets under the STPIS as Endeavour Energy has no feeders which are categorised as CBD feeders. Furthermore, Endeavour Energy only has one rural long feeder that supplies 314 customers. A single rural long feeder results in significant volatility for which a feeder category target is not sensible. Previous Electricity Network Performance Reports identified this issue, noting that “The Minister has recognised this in not imposing a Rural Long target for Endeavour Energy.” As such there is no application of the STPIS to the Rural Long feeder category for Endeavour Energy.

### 3.3.2 Reliability of Supply Parameters

There are three reliability of supply parameters that may be applied under the scheme including unplanned System Average Interruption Duration Index (SAIDI), unplanned System Average Interruption Frequency Index (SAIFI); and Momentary Average Interruption Frequency Index (MAIFI).

Consistent with the application of STPIS to Endeavour Energy for the 2014-19 regulatory control period, only unplanned SAIDI and SAIFI will be subject to revenue at risk when applying the scheme to the 2019-24 regulatory control period. We consider that the exclusion of MAIFI/MAIFle is consistent with the criteria and objectives of the STPIS as we have previously demonstrated to the AER that we are unable to reliably measure MAIFI for the purposes of revenue incentives.

### 3.3.3 Value of Customer Reliability

The Value of Customer Reliability (VCR) proposed in the scheme is as published in AEMO’s 2014 Value of Customer Reliability Review final report. This value is to be adjusted for CPI from the date of publishing to the start of the 2019-24 regulatory control period, 1 July 2019 as detailed in the STPIS.

### 3.3.4 Proposed Reliability Targets

The AER’s approach to setting SAIDI and SAIFI performance targets under the STPIS is to average performance over the latest five regulatory years. We have adopted this approach for establishing reliability targets. At this stage, the last five regulatory years comprises FY13 to FY17. It is recognised that by the time of the revised regulatory proposal the FY18 performance results will be available and as such targets will be set based on the average of FY14 to FY18. As such, the targets proposed hereafter are indicative.

The feeder category SAIDI performance trend and resultant targets are shown in Figure 2 and Table 1 respectively.

Figure 2 – Feeder Category SAIDI Trends and Targets

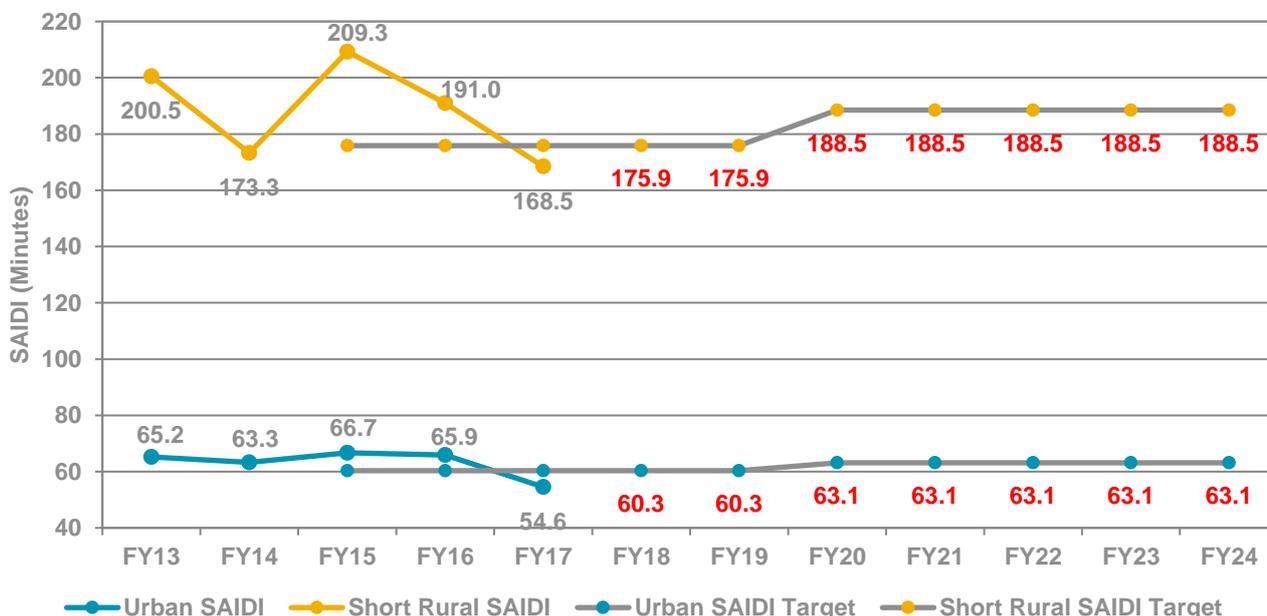


Table 1 – Proposed SAIDI Targets

Year	Existing	2019-20	2020-21	2021-22	2022-23	2023-24
CBD	-	-	-	-	-	-
Urban	60.3	63.1	63.1	63.1	63.1	63.1
Short Rural	175.9	188.5	188.5	188.5	188.5	188.5
Long Rural	-	-	-	-	-	-

The feeder category SAIFI performance trend and resultant targets are shown in Figure 3 and Table 2 respectively.

Figure 3 - Feeder Category SAIFI Trends and Targets

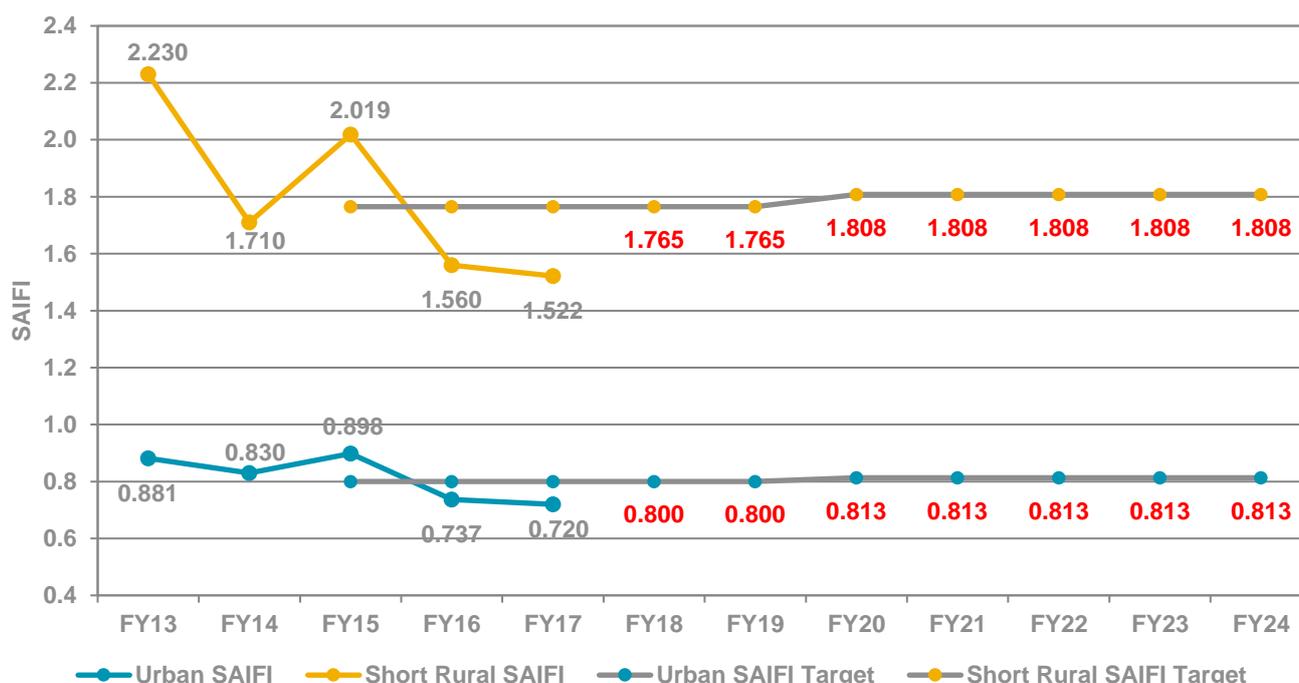


Table 2 - Proposed SAIFI Targets

Year	Existing	2019-20	2020-21	2021-22	2022-23	2023-24
CBD	-	-	-	-	-	-
Urban	0.800	0.813	0.813	0.813	0.813	0.813
Short Rural	1.765	1.808	1.808	1.808	1.808	1.808
Long Rural	-	-	-	-	-	-

### 3.3.5 Adjustments to Targets

Endeavour Energy has not proposed any further adjustment to the proposed targets as there has been no direct investment in overall reliability improvement for which forward targets should reflect. Targeted reliability improvement investment has occurred on feeders non-compliant to NSW reliability licence conditions. This is in line with Endeavour Energy’s reliability strategy. Any demonstrated average improvement in recent performance will naturally be reflected in forward targets through the base five year average target setting process under the STPIS.

### 3.3.6 Exclusions - Major Event Day Threshold

Appendix D of the STPIS document allows for an alternative daily unplanned SAIDI data normalisation method to be proposed where this improves the normality of transformed data on the basis of statistical analysis. As part of its 2014-19 regulatory submission, Endeavour Energy requested approval from the AER for the use of the alternative Box-Cox transform for daily SAIDI normalisation under the STPIS on the basis of statistical analysis. This was accepted and approved by the AER.

A statistical review, highlighting the validity of continued use of the Box-Cox transform is provided as an Appendix to the this document.

### 3.4 STPIS Customer Service Component

The F&A specifies that the applicable customer service parameter for the next regulatory control period is telephone answering.

#### 3.4.1 Proposed Customer Service Targets

Customer service targets are set as the average of the past five regulatory years according to the STPIS. At this stage, the last five regulatory years comprises FY13 to FY17, however it is recognised that by the time of the revised regulatory proposal the FY18 performance results will be available and as such targets will be set based on the average of FY14 to FY18. The indicative proposed targets are shown in Table 3. Endeavour Energy's customer service target for the 2014-2019 regulatory control period was 75%.

Table 3 - Telephone Answering Actuals and Target

Year	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24
Actual (%)	84.17	73.14	75.11	90.17	84.74	-	-	-	-	-	-	-
Target (%)	N/A	N/A	75.0	75.0	75.0	75.0	75.0	81.5	81.5	81.5	81.5	81.5

#### 3.4.2 Revenue at Risk

We propose that the revenue at risk for telephone answering is  $\pm 0.50$  per cent for each year of the 2019-24 regulatory period.

#### 3.4.3 Incentive rates

We propose to use the AER's incentive rate for the 'telephone answering' parameter of -0.040% per unit of the 'telephone answering' parameter. This is consistent with clause 5.3.2 of the scheme.

#### 3.4.4 Exclusions

Endeavour Energy proposes that where a reliability exclusion occurs, this should also be excluded from the calculation of telephone answering performance. This is consistent with the scheme which states that where the impact of an event is to be excluded from the calculation of a revenue increment or decrement under the 'reliability of supply' component as provided for in clause 3.3, the impact of that event may be excluded from the calculation of a revenue increment or decrement for the 'telephone answering' parameter as appropriate. Endeavour Energy proposes to apply the reliability exclusion as set out below for the purposes of the measurement of telephone answering performance.

## 4.0 Required Expenditure for NSW Licence Conditions Compliance

### 4.1 Endeavour Energy Licence Conditions Requirements

Endeavour Energy's NSW reliability Licence Conditions define minimum performance standards for reliability, namely:

- Network overall reliability standards (Schedule 2),
- Individual feeder standards (Schedule 3); and
- Customer service standards (Schedule 5).

The network overall reliability standards for Endeavour Energy are as per Table 4.

**Table 4 - Licence Conditions Feeder Category Limits**

Feeder Type	SAIDI (Minutes per customer)	SAIFI (Number per customer)
Urban	80	1.2
Short-Rural	300	2.8
Long-Rural	n/a	n/a

The individual feeder standards for Endeavour Energy are as per Table 5.

**Table 5 - Licence Conditions Schedule 3 Individual Feeder Limits**

Feeder Type	SAIDI (Minutes per customer)	SAIFI (Number per customer)
Urban	350	4
Short-Rural	1000	8
Long-Rural	1400	10

Jurisdictional Guaranteed Service Levels (GSL) apply for Endeavour Energy in the form of Customer Service Standards (Schedule 5) as per Table 6.

**Table 6 - Licence Conditions Schedule 5 Customer Service Standards**

Feeder Type	SAIDI (Minutes per customer)	SAIFI (Number per customer)
Type of Area in which Customer's premises is located	Interruption Duration (hours)	Interruption Frequency (number and duration)
Metropolitan	12	4 interruptions of greater than or equal to 4 hours
Non-metropolitan	18	4 interruptions of greater than or equal to 5 hours

### 4.2 Endeavour Energy's NSW Licence Conditions Obligations

In regards to reliability performance, Endeavour Energy's NSW Licence Conditions requires that it:

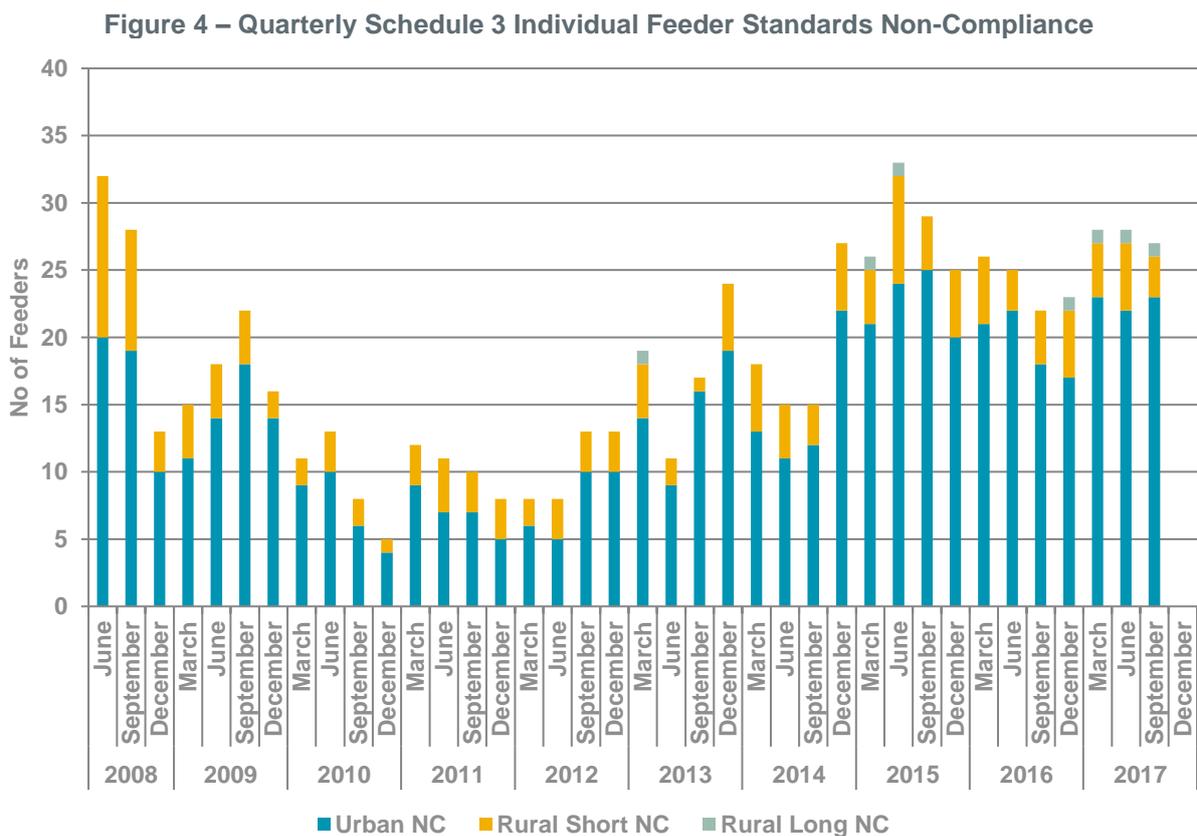
- Must not exceed its Schedule 2 Network Overall Reliability performance limits .
- Investigate and "take all reasonable steps to improve supply reliability" to feeders which are non-compliant to the Schedule 3 Individual Feeder Limits. This includes implementing operational actions, investigation of non-network options as well as develop and implement capital improvement projects.

Endeavour Energy investigates non-compliant feeder performance and develops improvement strategies and projects in accordance with the Licence Conditions framework (Chapter 3). This is a significant business priority and is a key component of Endeavour Energy’s reliability strategy. Capital projects for improving performance on non-compliant feeders are developed and released as a six-monthly program of works, namely the Reliability Works Program (RWP), that aligns with the implementation timeframe requirements as specified in the NSW Licence Conditions.

Endeavour Energy’s compliance to the reliability requirements of its NSW Licence Conditions is subject to yearly audits by IPART.

### 4.3 Current Licence Compliance Performance

To date, Endeavour Energy has always been compliant to its Schedule 2 network overall reliability standards. Historical non-compliance levels to its Schedule 3 individual feeder standards is shown in Figure 4 below.



The five year average levels of non-compliance is some 22 feeders or 1.5% of all feeders per quarter. It can be seen that there is a trended increase in non-compliance levels in recent years which will need to be arrested.

### 4.4 Licence Conditions Expenditure History and Requirements

Changes in regulatory requirements and environment have in recent years shifted the focus of reliability improvement investment towards lower-cost capital works, particularly leveraging new technology and automation.

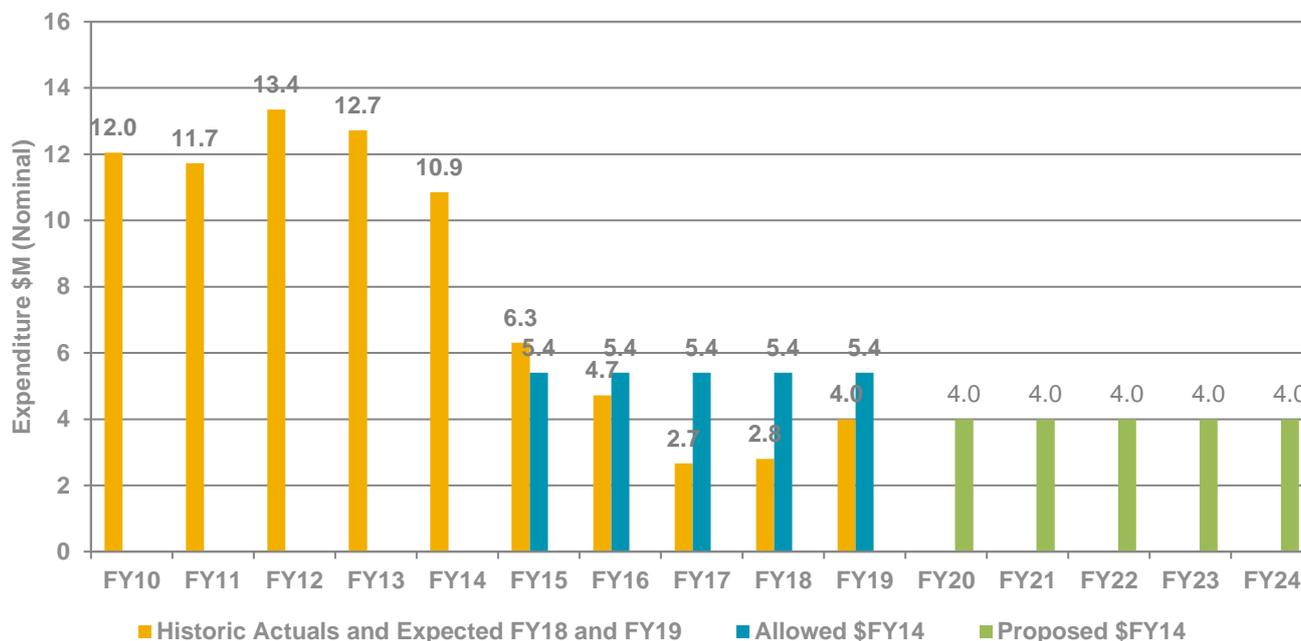
In 2014 the NSW Licence Conditions were updated with the introduction of a requirement for cost-benefit analysis to be applied on any further investment in the rectification of non-compliant feeder performance. In response, Endeavour Energy introduced a Value of Customer Reliability (VCR) based cost-benefit analysis test for justification of Licence Conditions reliability improvement investment. This has resulted in a reduction in justifiable capital expenditure since then.

With the introduction of the STPIS for the 2014-19 regulatory period, the AER allowed only for expenditure targeting NSW Licence Conditions compliance, arguing that additional expenditure is self-funded through the STPIS. As such, Endeavour Energy's revised Reliability Compliance Capex proposal was based on historic expenditure levels relating only compliance to feeders non-compliant to NSW licence conditions. This revised proposal of \$27.2M (FY19 real) was accepted in full by the AER.

Furthermore, Endeavour Energy has developed a reliability strategy which focusses more attention on process and data analysis improvement and low cost operational actions to help maintain performance at existing average levels, rather than capital intensive actions. Recognising this, Endeavour Energy has over time reduced overall expenditure targeted at Licence Compliance improvement.

This discussion of historical and proposed expenditure is represented graphically in Figure 5 below.

**Figure 5 - Historical and Proposed Licence Compliance Expenditure**



In determining the required capital expenditure for Licence Compliance for the 2019-24 regulatory period, Endeavour Energy has considered the following:

- The underlying increasing trend in the number of non-compliant feeders in recent years. This will increase the number of investigations and investment requirement.
- Recognition of historical CAPEX efficiency improvement through leveraging new technology.
- Recognition of average actual expected expenditure over the 2014-19 regulatory period of \$4M (FY19 real) per year.
- Recognition of the potential for ongoing, albeit limited, CAPEX efficiency improvement.

Considering the above factors, Endeavour Energy proposes that the required expenditure for Licence Compliance obligations over the 2019-24 regulatory period is to be equivalent to the average expenditure over current regulatory period of \$4M (FY19 real) per year. This equates to a requirement of \$20M (FY19 real) over the 2020-24 regulatory period. This represents a 26% reduction on the 2014-19 regulatory determination allowed capex and is considered to be the minimum necessary level of expenditure to maintain existing average levels of compliance to Endeavour Energy's Licence Conditions obligations.

## Appendix - Major Event Days Proposal

### Current Process

As part of its 2015-19 regulatory submission, Endeavour Energy requested approval from the AER for the use of the alternative Box-Cox transform for daily SAIDI normalisation under the STPIS on the basis of statistical analysis. This was accepted and approved by the AER.

This section details a review of the statistical performance of the Box-Cox transform in comparison to the natural log transform. In doing so it reaffirms the justification for the continued use of the Box-Cox transform as part of the derivation of Major Event Day thresholds for Endeavour Energy.

### Statistical Performance of the Box-Cox Transform

A number of techniques exist to evaluate the normality of a dataset. Some of the key approaches are discussed below. These will be utilised as the basis for comparison.

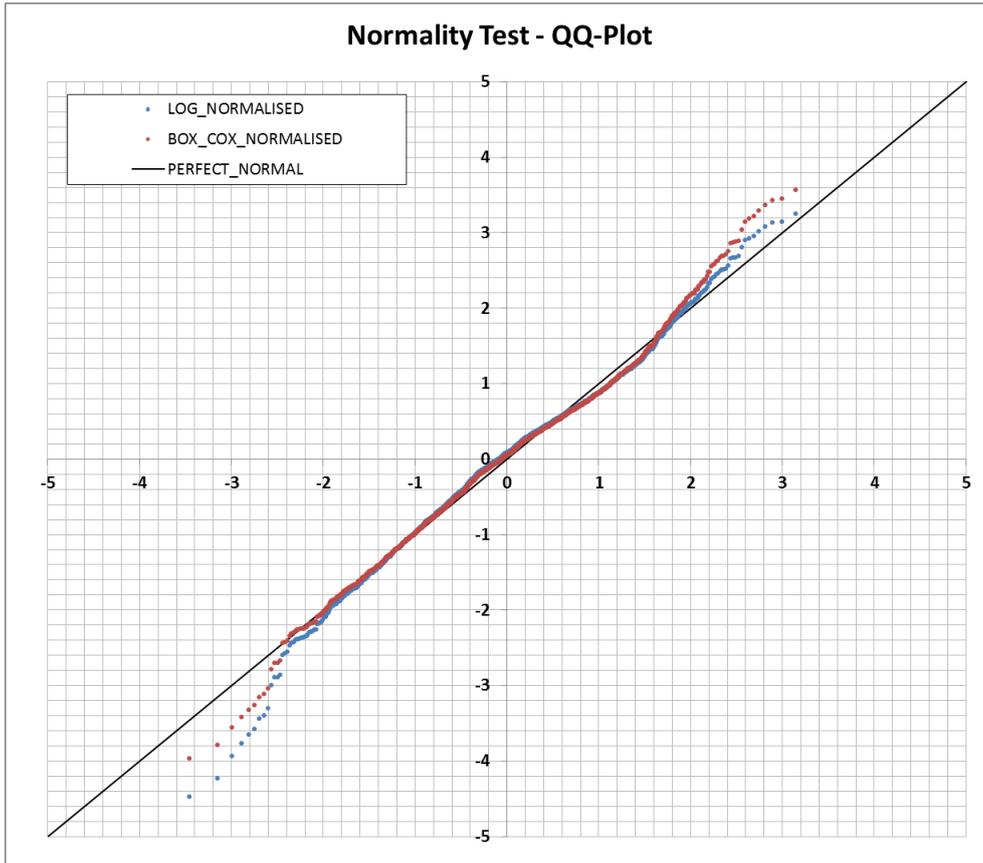
- Inspection of Distribution Properties** – A normal distribution has the following properties:
  - The *Skewness* is equal to 0
  - The *Excess Kurtosis* is equal to 0
- Statistical test of Normality** – Examples of statistical “goodness-of-fit” tests for normality include the Anderson Darling and Jarque-Bera test. For the Jarque-Bera test, a Jarque-Bera (JB) statistic can be calculated using the sample size, the Skewness and the Excess Kurtosis. The assumption of normality is accepted or rejected based on a comparison with a Chi-squared distribution where the assumption of normality is rejected with a 95% confidence level if the JB statistic is greater than 5.99. It is important to be mindful that the power of these statistical tests to reject the normality assumption typically increases greatly with the size of the dataset.
- Visual Inspection** – A normal distribution is a straight line on a Quantile-Quantile or “Q-Q” plot and therefore it follows that the better the data overlays this straight line by visual inspection the more normal the dataset is.

Endeavour’s Box-Cox spreadsheet model has been utilised along with 5 historical iterations of 5-year daily SAIDI data to compare and contrast the performance of normalisation methodologies using the above mentioned common statistical measures and tests. A summary of the results are provided in Table 7 below.

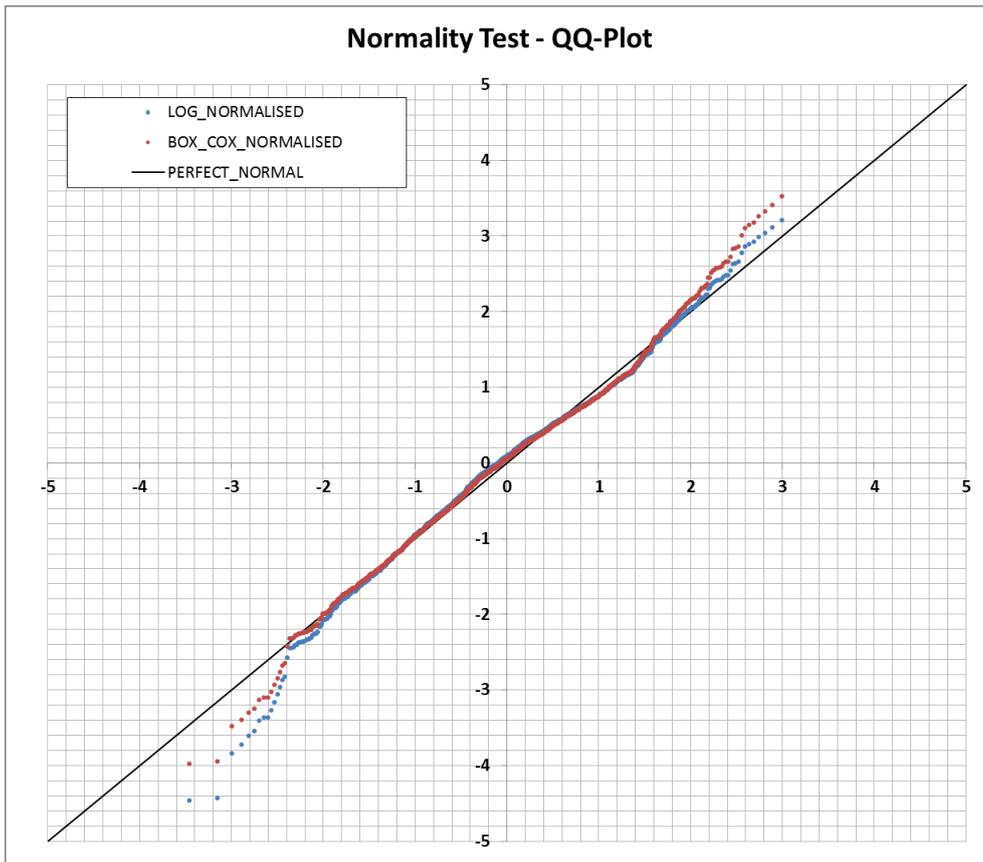
Table 1 – Statistical Comparison

Data Years (for TMED of next FY)	Skewness		Excess Kurtosis		JB-Test	
	Criteria: For a normal distribution = 0		Criteria: For a normal distribution = 0		Criteria: Normality rejected if stat is > 5.99*	
	Log Natural	Box Cox	Log Natural	Box Cox	Log Natural	Box Cox
FY13 – FY17	-0.240	<b>0.016</b>	0.949	<b>0.856</b>	86.0	<b>55.8</b>
FY12 – FY16	-0.242	<b>0.020</b>	1.033	<b>0.973</b>	99.2	<b>72.3</b>
FY11 – FY15	-0.379	<b>0.037</b>	1.449	<b>1.256</b>	203.5	<b>120.5</b>
FY10 – FY14	-0.466	<b>0.039</b>	1.286	<b>1.203</b>	192.0	<b>110.5</b>
FY09 – FY13	-0.408	<b>0.032</b>	1.076	<b>1.010</b>	138.6	<b>77.9</b>

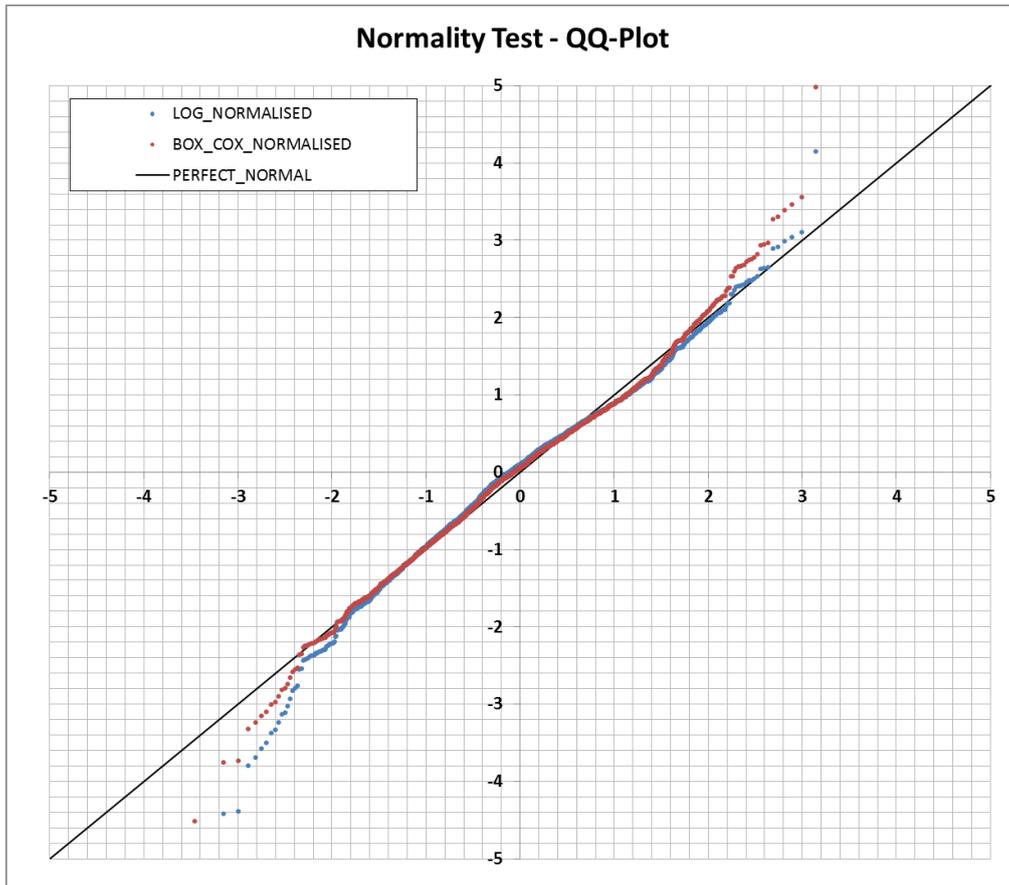
FY13 – FY17 normalised dataset (FY18 MED day)



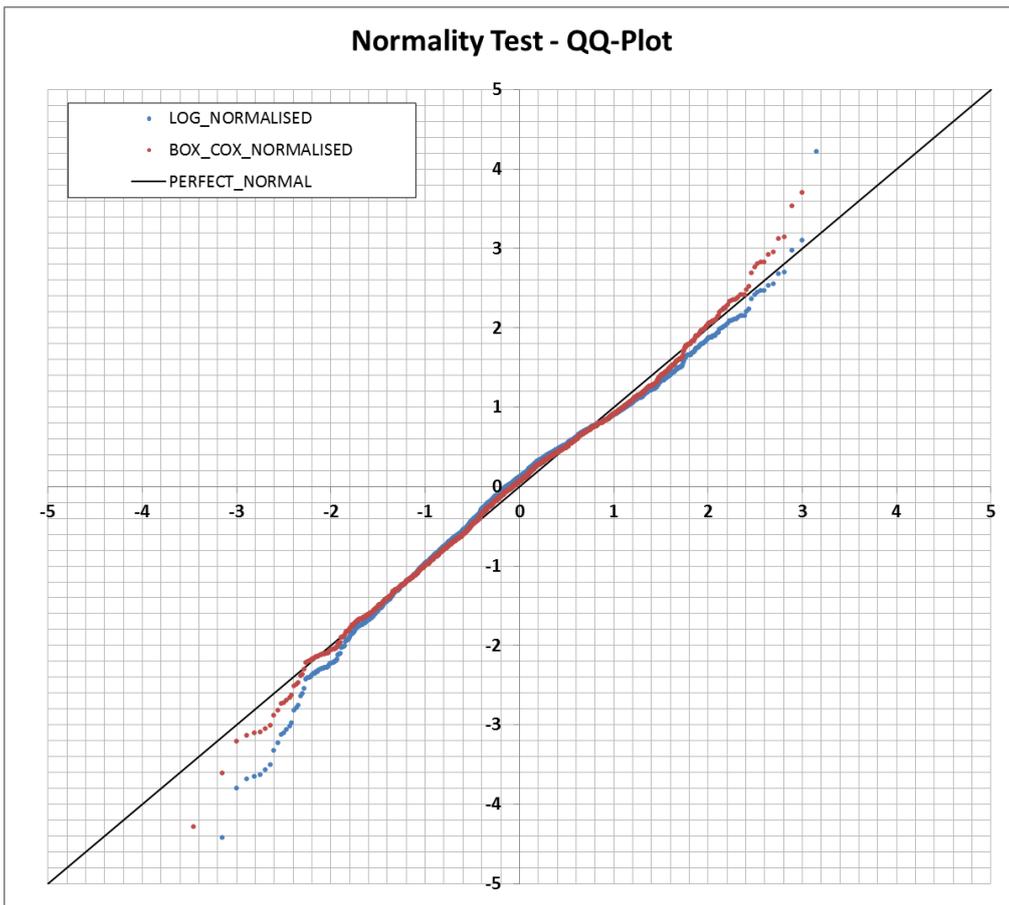
FY12 – FY16 normalised dataset (FY17 MED day)



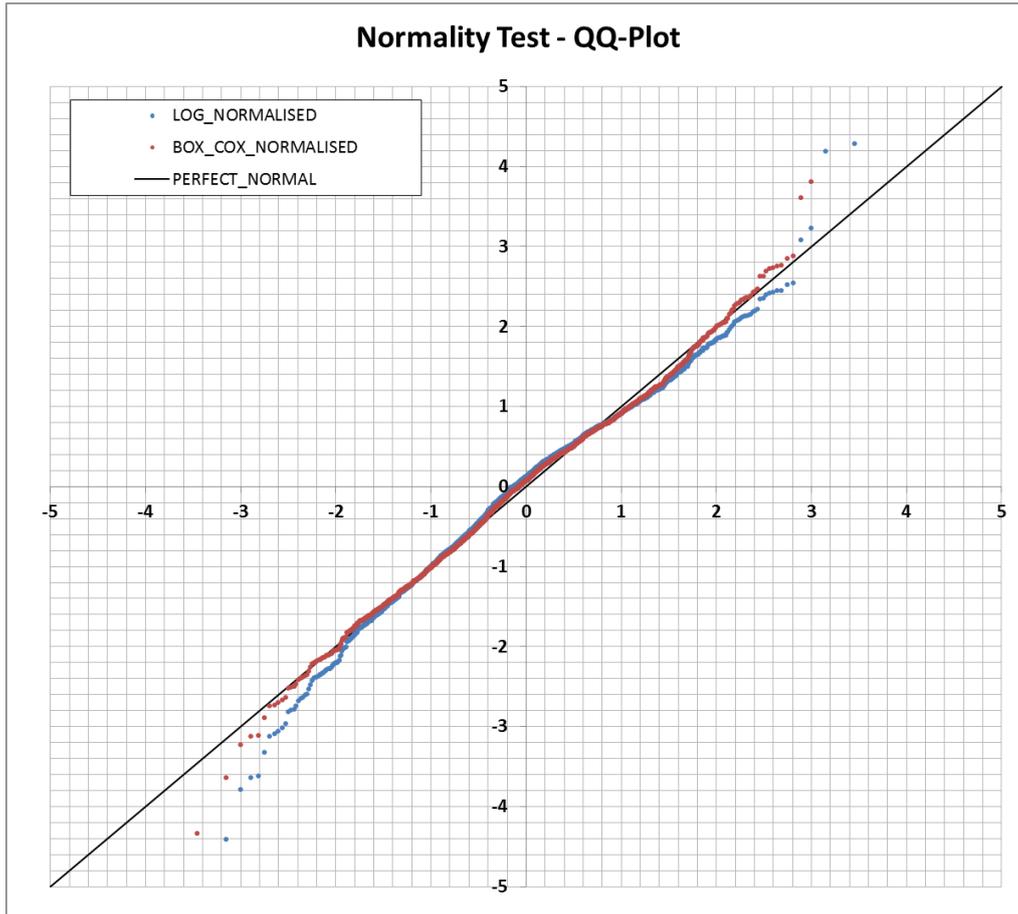
### FY11 – FY15 normalised dataset (FY16 MED day)



### FY10 – FY14 normalised dataset (FY15 MED day)



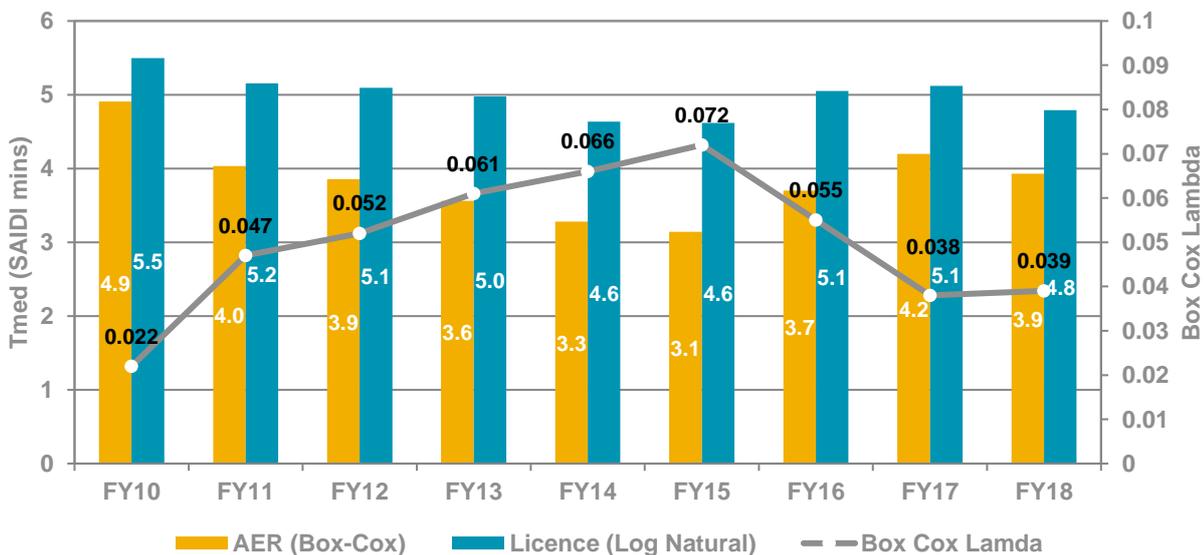
### FY09 – FY13 normalised dataset (FY14 MED day)



### MED Threshold Trends

The resulting trend in Major Event Day thresholds resulting from Log Natural and Box Cox normalisation approaches is provided in Figure 6 below. Also shown is the trend in the Lambda value which is an input to the Box Cox normalisation equation. As the value of Lambda approaches 0, the two normalisation approaches (vertical bars) converge. This feature is evident in the trend below, highlighting the adaptive nature of the Box-Cox transform to improve the likelihood of producing a normalised dataset.

Figure 1 – MED threshold comparison



## MED Days Removed

For the regulatory period to date, including 2014/15 to 2016/17, the following MEDs as per Table 8 have been excluded in accordance with the major event day threshold methodology of the STPIS Appendix D and the application of the Box-Cox normalisation transform.

**Table 2 - Excluded Major Event Days 2014/15 to 2016/17**

DATE	DAILY SAIDI (minutes)
14-10-2014	10.46
15-10-2014	5.22
27-10-2014	4.32
01-11-2014	12.66
05-11-2014	4.64
03-12-2014	6.24
08-02-2015	3.62
11-03-2015	4.79
20-04-2015	4.40
21-04-2015	9.04
14-01-2016	26.51
29-01-2016	8.63
30-01-2016	7.56
04-06-2016	4.07
05-06-2016	14.72
23-07-2016	6.04
04-10-2016	4.89
22-03-2017	12.37