



Explanatory statement

Proposed amendment

**Service Target Performance
Incentive Scheme (STPIS)**

December 2017

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Inquiries about this publication should be addressed to:

Australian Energy Regulator
GPO Box 520
Melbourne Vic 3001

Tel: 1300 585 165

Email: AERInquiry@aer.gov.au

1 About this consultation

This explanatory statement and the draft amended STPIS represent our formal consultation with stakeholders on our proposed amendments to the STPIS, under the guideline amendment provisions of the NER.¹ Prior to this paper, we released two consultation documents seeking preliminary views on relevant matters.

The primary purpose of the STPIS is to provide incentives to Distribution Network Service Providers (distributors) to maintain the existing level of supply reliability, and to improve the reliability of supply where customers are willing to pay for these improvements.

A recent rule change requires that we develop a Distribution Reliability Measures Guideline (the Guideline). We considered that the STPIS must measure supply reliability in the same manner as that specified by the Guideline. We initiated our consultation process for the development of the Guideline and a review of the STPIS by publishing an Issues Paper (the issues paper) on 5 January 2017. The issues paper sought stakeholders' feedback on issues we identified through evaluating the distributors' performance outcomes under the STPIS, and outlined our position on setting up uniform distribution reliability measures across all jurisdictions in the guideline.

The issues paper also clarified that, after the initial consultation, we will split up the two matters in further consultations.

After reviewing stakeholders' submissions to the issues paper, we published a draft Guideline and an explanatory statement for consultation on 23 June 2017. This became the second step in the STPIS review because most of the performance measures, if changed from the current measurement method, must also be reflected in the STPIS scheme design.

Some of the matters discussed in this paper are related to the Guideline—therefore forming another round of consultation in finalising the Guideline.

Following this consultation, we will separately publish the final Guideline and the final amended STPIS, taking into consideration stakeholders' submissions, prior to finalising these two documents.

Our proposed timelines are set out Section 1.2 below.

1.1 How to make a submission

Energy consumers and other interested parties are invited to make submissions on this draft amended STPIS by 9 February 2018.

¹ NER, cl 6.6.2(c).

In each section below, we outline our considerations on each issue identified. On these issues we seek and encourage stakeholders to address any matter of relevance.

We prefer that all submissions are in Microsoft Word or another text readable document format. Submissions on our draft amended STPIS should be sent to: AERInquiry@aer.gov.au.

Alternatively, submissions can be sent to:

Mr Chris Pattas
General Manager
Australian Energy Regulator
GPO Box 520
Melbourne VIC 3001

We prefer that all submissions be publicly available to facilitate an informed and transparent consultative process. Submissions will be treated as public documents unless otherwise requested. Parties wishing to submit confidential information should:

1. clearly identify the information that is the subject of the confidentiality claim
2. provide a non-confidential version of the submission in a form suitable for publication.

All non-confidential submissions will be placed on our website. For further information regarding our use and disclosure of information provided to us, see the ACCC/AER Information Policy (October 2008), which is available on our website.

1.2 Timelines

Table 1.1 Indicative project timeline for STPIS review

Project steps for revising the STPIS	Date
Publish draft amended STPIS	December 2017
Submissions on draft amended STPIS close	February 2018
Publish final amended STPIS	May/June 2018

Contents

1	About this consultation.....	2
1.1	How to make a submission.....	2
1.2	Timelines	3
	Contents	4
	Shortened forms	6
2	Summary	7
2.1	Revising our STPIS.....	7
2.2	Consultation process so far	8
2.3	Structure of this explanatory statement	9
3	Overview of key issues	10
4	Explanation of our draft decision.....	13
4.1	Ratio of SAIFI and SAIDI incentive rates	13
4.2	Exclusions and treatment of major event days.....	17
4.3	Adjusting the targets where the reward or penalty exceed the revenue cap under STPIS	21
4.4	Alignment with other changes proposed for the distribution reliability measures guideline (the Guideline)	22
4.5	Balancing the incentive to maintain and improve reliability with the incentive to reduce expenditure	24
4.6	A symmetrical financial incentive scheme	25
4.7	How to link distributor customer engagement findings and the setting of reliability levels.....	25
4.8	Interrelationship with the Demand Management Incentive Scheme	28
4.9	Other minor refinements to the scheme	29
4.10	Future of STPIS	31

4.11	Issues raised during the ACT/NSW Framework and Approach development stage for the 2019-24 period	32
A	Setting the ratio between SAIFI and SAIDI incentive rates	33
B	Distributors' reported SAIDI and SAIFI outcomes	40
C	Adjusting the targets where the reward or penalty exceed the revenue cap under the STPIS	45
D	Simplify the calculation of the s-factor	47

Shortened forms

Shortened form	Extended form
AEMC	Australian Energy Market Commission
AER	Australian Energy Regulator
CAIDI	Customer Average Interruption Duration Index
distributor	distribution network service provider
ENA	Energy Networks Australia
Guideline (the)	distribution reliability measures guideline
MAIFI	momentary average interruption frequency index
MAIFle	momentary average interruption frequency index event
NEL	national electricity law
NER	national electricity rules
RIN	regulatory information notice
SAIDI	system average interruption duration index
SAIFI	system average interruption frequency index
STPIS	service target performance incentive scheme
VCR	value of customer reliability

2 Summary

We are required to publish, administer and maintain a STPIS in accordance with rule 6.6.2 of the National Electricity Rules (NER) with the purpose of providing incentives for maintaining and improving performance of distributors to the extent that customers are willing to pay for such improvements.

This explanatory statement, together with the accompanying draft amended STPIS, outlines our reasons for amending the STPIS. We seek stakeholders' responses on adopting these changes.

Before amending the STPIS, we must have regard to stakeholders' submissions to our issues paper and the draft Distribution Reliability Measures Guideline. It is important that the definitions and measures for distribution reliability are consistent with those used in the STPIS, which provides the financial incentive to distributors' service performance and reliability outcomes.

We have received submissions to our draft guideline on the treatment of “catastrophic days” with respect to major events day (MED) exclusion. Since MED exclusion under the guideline should be closely reflected in the STPIS, we set out our proposed approach on the treatment of MED exclusion in this draft amended STPIS.

Some of the matters discussed in this paper are related to the distribution reliability measures guideline—therefore forming another round of consultation in finalising the distribution reliability measures guideline (the Guideline).

Following this consultation, we will separately publish the final Guideline and the final amended STPIS, taking into consideration stakeholders' submissions, prior to finalising these two documents.

2.1 Revising our STPIS

The STPIS was first implemented in Queensland and South Australia from July 2010, in Victoria from January 2011, in Tasmania in July 2012 (but in a modified form²) and in New South Wales and Australian Capital Territory from July 2015.

The AEMC recently reviewed the definitions of some distribution reliability measures. This resulted in a rule change requiring the AER to publish a distribution reliability measures guideline that can be used to measure supply reliability consistently across all jurisdictions. This is also useful for performance reporting.

The AEMC's key recommendations (not mandated), amongst other things, are to change the definition of momentary interruption (from less than 1 minute to less than 3

² Due to historical data limitation issues, the scheme is applied based on per kVA capacity measures rather than the standard approach of per customer measures. Full application of the scheme to TasNetworks began from July 2017.

minutes). This recommended change alters the definitions of SAIDI, SAIFI, MAIFI and sustained interruptions and will have substantial impacts on the operation of the STPIS.

As part of our consideration of amendments to reflect any changes to reliability definitions for the STPIS, we have also used this process to consider other refinements to the scheme to improve the operation of the scheme in meeting its objective to encourage network businesses to maintain reliability while also pursuing efficiency improvements.

This explanatory statement also outlines the process for the staged implementation of the amended STPIS.

2.2 Consultation process so far

We have undertaken two rounds of consultations with stakeholders in establishing a new guideline and revising the STPIS.

First consultation - issues paper on STPIS and Guideline

We published an Issues Paper on our intention to review the STPIS and to establish a guideline on 5 January 2017. The issues paper sought stakeholders' feedback on issues we identified through evaluating the distributors' performance outcomes under the STPIS, and outlined our position on setting up uniform distribution reliability measures (in the guideline) across all jurisdictions.

The issues paper also clarified that, after the initial consultation, we would carry out further consultation on the Distribution Reliability Measures Guideline and the STPIS through somewhat distinct processes.

Our issues paper sought inputs from stakeholders on the STPIS including:

- our observations in implementing the STPIS to date, in particular the average time to restore power supply (after an unplanned outage has occurred) has increased substantially compared to historical levels and whether this requires changes to the SAIDI-SAIFI ratio used in the scheme.
- other improvements to the STPIS where the scheme is currently unclear and ambiguous.
- issues that we need to consider in future given the emergence of renewable energy and distributed generation.

Second consultation - draft guideline

After reviewing stakeholders' submission to the issues paper, we published a draft Distribution Reliability Measures Guideline and an explanatory statement for consultation on 23 June 2017.

Most proposals for the guideline were welcomed by stakeholders, except for:

- the treatment of “catastrophic days” with respect to major events day (MED) exclusion
- the definition to identify the “worst served” customers.

Since MED exclusion under the guideline should be closely reflected in the STPIS, we have set out our approach in response to stakeholders’ submissions in this draft decision on the amended STPIS.

This (third) consultation - draft amended STPIS

This explanatory statement and the draft amended STPIS represent our third consultation with stakeholders, however, the focus of this is on our proposed amendments to the STPIS.

The result of this consultation will inform the final guideline—in particular the Major Event Day exclusion approach—and the STPIS.

2.3 Structure of this explanatory statement

The remainder of the explanatory statement is structured as follows:

- Chapter 3: Outlines the key issues raised on the STPIS and draft Distribution Reliability Measures Guideline.
- Chapter 4: Explains our proposed changes to the current STPIS scheme design.
- Appendices A to D: Contains technical models and equations.

3 Overview of key issues

This section sets out the key issues raised by the stakeholders to our issues paper on the STPIS amendments and the draft Distribution Reliability Measures Guideline.

Changing the threshold of a momentary interruption from 1 minute to 3 minutes

In the draft decision for the Guideline, we supported the AEMC's recommendation to change the definition of momentary interruption from less than 1 minute to less than 3 minutes. We agree that this change will encourage investment in automation facilities to restore supply more quickly after a network fault.³

We received overwhelming support for this change responding to the draft decision for the guideline.

Therefore, we have also included this change in the draft amended STPIS.

Ratio of SAIFI and SAIDI incentive rates

In the issues paper, we identified that distributors typically achieved better improvements to their SAIFI results (reduction to the number of outages in a year) than their SAIDI results (reduction to the duration of outages in a year). The combined effect of improvements to SAIFI relative to SAIDI is that the average supply restoration time, CAIDI, is getting longer.

We believe at least part of this increase in supply restoration time is due to the current STPIS design of an approximate 50/50 allocation of the incentives to SAIDI and SAIFI measures. The current STPIS rewards each SAIFI improvement to the equivalent value of the reduction of SAIDI by the standard CAIDI amount. That is, the assumption that each SAIFI improvement will result in the corresponding SAIDI improvement (the CAIDI value) which is about 60-80 minutes for urban feeders.

We believe that the current incentive framework may have resulted in a bias towards capex to improve supply reliability. While the increased capex has been effective in reducing the number of supply interruptions, we are concerned that the performance indicators show an increasing trend of the average supply restoration time (CAIDI).

Our draft position is to change the ratio of the SAIDI/SAIFI incentives from 50/50 to 60/40 based on the allocation of energy value.

We consider that this change should achieve a better balance between the incentive to repair network faults in a timely manner and the incentive to invest in more automation to isolate the impact of network faults by additional automation.

³ AEMC, *Review of Distribution Reliability Measures*, Final Report, 5 September 2014, p. ii.

Exclusions and major event day (MED)

The AEMC's recommendations included a definition for catastrophic events and a method to identify catastrophic events interruptions.⁴ Under this proposal, the effect of catastrophic days is to be discounted from the performance data set when determining the MED thresholds under the standard 2.5 beta (standard deviations) method. This approach will likely increase the number of days to be excluded from the distributors' standard performance measures.

In the draft guideline decision, we did not support this proposition for a number of reasons, including:

- There is no current objective or definitive method to identify catastrophic events as outlined by the AEMC.
- There are material differences between network characteristics in Australia, ranging from highly urban and inner city networks such as CitiPower, to physically diverse and geographically large networks such as SA Power Networks and Ergon Energy, so any definition of catastrophic events and their measurement methods are not likely to be uniform across all distributors.

We have undertaken further analysis on the number of MED for the 13 distributors under the IEEE 2.5 beta method as well as under a modified 4.15 beta threshold.

The IEEE method is the standard method we use in the existing STPIS. This method attempts to transform daily unplanned SAIDI data through a natural log application—in order to make the data set resemble a “normal distribution”.

Our analysis indicates that there are wide variations across the distributors regarding the actual number of MED. Under the 2.5 beta method, localised urban networks such as CitiPower or ActewAGL only have one MED per year. However, physically diverse and geographically large networks, such as Essential Energy or Ergon Energy, have four or five MEDs per year. Importantly, similar patterns are evident under the 4.15 beta method.

Under a normal distribution, 2.5 and 4.15 standard deviations represent an expected frequency of 2.6 events per year and 0.000167 events per year (equivalent to 1 in 163 years frequency) respectively. Our findings suggest that the IEEE method to transform daily SAIDI data into a normal distribution data set does not apply equally to every distributor. Substantial further research will need to be undertaken to find an alternative method.

Given that there is no clear method to identify catastrophic events in a manner that applies consistently to all distributors, our draft decision is to maintain our position in the draft guideline to not implement this change.

⁴ AEMC, *Review of Distribution Reliability Measures*, Final Report, 5 September 2014, pp. 28–31.

Simplification of current approach for s-factor calculations

We propose to simplify the operation of the scheme by applying STPIS outcomes as a fixed monetary amount (fixed dollar) in accordance with the actual performance outcomes of each year; rather than as a percentage adjustment to the maximum allowable revenue (MAR) of each year.

We consider a simplification to the STPIS calculation is desirable to address the following issues:

- The current scheme design adjusts the allowed revenue each year by the s-factor percentage. Hence, the maximum allowable revenue (MAR) in the price control formula is not equal to that under the CPI-X model. The MAR of the following year must first be readjusted by removing the s-factor of the previous regulatory year, before applying the new s-factor
- The s-factor has a two-year time delay between the performance outcome and the adjustment of the MAR. Therefore, the s-factors of the last two years of a regulatory control period are applied to the MAR of the first two years of the next period. Hence, there is a need to adjust for any step change in MAR between regulatory control periods—that is 1 per cent of MAR in one period does not equal the same percentage figures in the next period
- There is potential for the s-bank mechanism under the current scheme being misused. Under the current approach, a distributor could bank the s-factor results for more than a year if it expects to receive a windfall gain through an increased revenue in future regulatory years due to a rising CPI or cost of debt.

Other minor improvements

Our draft decision is to correct errors in the scheme that have previously been identified, including the alignment of the definition of year “t” in the STPIS with that in the revenue control formula. Stakeholders support our proposal.

We also clarify that the guaranteed service level (GSL) payment conditions for each supply reliability parameter are made separately. For example, the GSL payment for excessive total hours of supply interruptions in a year must be paid separately from the payments for each single interruption exceeding the relevant threshold.

4 Explanation of our draft decision

This chapter provides the background and our reasons for the proposed changes to the STPIS.

4.1 Ratio of SAIFI and SAIDI incentive rates

Background

As discussed in the issues paper, distributors typically achieved better improvements to their SAIFI results (the number of outages) than their SAIDI results (duration of outages) (red lines vs the blue lines of the charts in Appendix B).

This outcome reflects that the average service supply restoration time (CAIDI) is getting longer.⁵ The extent of the deterioration of CAIDI is shown in Table B.1 of Appendix B.

This difference in performance improvement between SAIDI and SAIFI may be in part due to the current scheme design regarding the ratio of the reward/penalty incentive rates between SAIFI and SAIDI.

The current STPIS rewards each SAIFI improvement to the equivalent value of the reduction of SAIDI by the standard CAIDI amount. That is, the assumption that each SAIFI improvement will result in the corresponding SAIDI improvement of the CAIDI value, which is about 60-80 minutes for urban feeders. When this assumed improvement is not achieved, the distributor would be over-rewarded.

We believe that:

- Improvements to SAIFI are mainly achieved through capital expenditures on more network automation such as auto-reclosers.
- Improvements to supply restoration time are mainly related to refinements of the operational arrangement of the distributors.

Based on the observed outcomes, our analysis as shown in Appendix A and distributors' submissions, we believe that the current incentive framework may have resulted in a bias towards a capex option to improve supply reliability. While the capex option has been effective in reducing the number of supply interruptions, we are concerned that the performance indicators suggested that the average supply restoration time (CAIDI) is showing an increasing trend.

Hence, we consider that there is a need to provide more incentives to improve the operational response of the distributors; but with no diminution to the total incentives to the distributors under the scheme.

⁵ CAIDI is the measurement of the average duration of supply outages. CAIDI equals SAIDI divided by SAIFI.

Submissions

- Energy Networks Association (ENA) and most electricity distributors (except ActewAGL) made submissions on this issue.⁶
 - Majority of the distributors and ENA suggested we maintain the current ratio. However, no specific reasons were provided. Most of the submissions stated that DNSPs typically target network improvements to reduce instances of supply interruption—hence, resulting in reduction to both SAIFI and SAIDI.
 - ENA submitted that "experience from its members suggests that capex invested to improve SAIFI and SAIDI delivers better outcomes in terms of service reliability and value for money than opex initiatives to deliver SAIDI alone".
- We note, however, Ergon Energy and Endeavour Energy expressed similar concerns on this issue:
 - Ergon Energy' submitted that:

Ergon Energy agrees that a greater economic incentive for SAIDI aligns with our customer survey results and value distribution our residential customers have. However, it is not clear that this will provide a more balanced approach between incentives to improve reliability between capex and opex, or that there will be an even improvement to all customers. The relationship between capex and SAIFI and opex and SAIDI is not 1:1. Rather, increased investment in capex is likely to result in improved SAIFI and SAIDI, while increased investment in opex is likely to favour improvement in SAIDI over SAIFI. Moreover, a one-off investment in capex will return a perpetual benefit, whereas to return a benefit from an opex investment will require a continual investment in order to maintain the improvement. As such, Ergon Energy does not agree that allocating a higher incentive rate to SAIDI will have a proportional impact on capex and opex investment. Furthermore, while Ergon Energy agrees that a greater incentive for SAIDI aligns with our residential customer value proposition, there will always exist more cost beneficial opportunities where customer densities are higher and network infrastructure development costs are lower. There exists a gap in the regulatory framework to address those outliers and improvement opportunities that are beyond the STPIS incentives to fund.

- Endeavour Energy' submitted that:

The positive feedback effect caused by using SAIDI/SAIFI (CAIDI) in its current form is inappropriate. This should be changed to be either a

⁶ Ausgrid, Submission to STPIS and DMRG issues paper, p. 6; AusNet Services, Submission to STPIS and DMRG issues paper, p. 2; CitiPower and Powercor, Submission to STPIS and DMRG issues paper, p. 3; ENA, Submission to STPIS and DMRG issues paper, pp. 5-7; Endeavour Energy, Submission to STPIS and DMRG issues paper, p. 2; Energex, Submission to STPIS and DMRG issues paper, p. 5; Ergon Energy, Submission to STPIS and DMRG issues paper, p. 3; Essential Energy, Submission to STPIS and DMRG issues paper, p. 2; Jemena, Submission to STPIS and DMRG issues paper, p. 5; SA Power Networks, Submission to STPIS and DMRG issues paper, p. 7; TasNetworks, Submission to STPIS and DMRG issues paper, p. 1; United Energy, Submission to STPIS and DMRG issues paper, p. 1.

historical average constant ratio or a negative feedback mechanism using SAIDI/SAIFI (CAIDI).... There is a lack of objective evidence to confidently determine what weighting is appropriate. The network type and historical performance of that network type for the particular organisation will vary significantly and therefore weightings should be specific to each organisation. A possible approach is utilising the average of the lowest 5-10 CAIDI yearly results as a static benchmark weighting to be used into the future.

- The Victorian Energy Minister and two submissions from bodies representing customers—St Vincent de Paul Society and Energy & Water Ombudsman SA—expressed concerns about CAIDI getting longer.⁷
- The Victorian Energy Minister also expressed her concern that the CAIDI measures in Victoria have deteriorated from period to period.⁸
- S and C Electric Company, a power industry manufacturer, suggested including CAIDI as an incentive measure.⁹

Proposed approach

Based on our observation of the outcome of the current scheme, we identified that, in general, the average supply restoration time is getting longer—as demonstrated by the worked example of Appendix A. We are concerned about the increase in CAIDI because it indicates that distributors' response to network faults may not meet customers' expectations. We consider it is important that customers should not wait unnecessary long time for supply to be restored.

We believe that the current capex biased outcome is further exacerbated by the feedback loop of applying the increasing CAIDI value again to the SAIFI incentive in the ensuing periods.

There are two potential options to manage the feedback effect:

- to freeze the CAIDI value of the SAIFI incentive rate calculation formula as suggested by Endeavour Energy
- to reduce the size of the CAIDI feedback effect.

However, we agree with Endeavour Energy that the first option is very difficult to implement because there is no single definitive and suitable CAIDI value that can be objectively determined. We cannot be confident that either the current year CAIDI value, or the historical average CAIDI value, can represent a suitable balanced ratio for this purpose that will meet the customers' expectations.

⁷ Minister for Energy, Environment and Climate Change (Victoria), Submission to STPIS and DMRG issues paper, pp. 1-3; Energy and Water Ombudsman of South Australia, Submission to STPIS and DMRG issues paper, p. 1; St Vincent de Paul Society, Submission to STPIS and DMRG issues paper, p. 1.

⁸ Minister for Energy, Environment and Climate Change (Victoria), Submission to STPIS and DMRG issues paper, p. 2.

⁹ S and C Electric Company, Submission to STPIS and DMRG issues paper, p. 3.

We believe that this issue can be addressed by modifying the ratio of the SAIDI/SAIFI incentive weights from 50/50 to 60/40 based on the allocation of unserved energy value to CBD, urban and rural feeders. This 60/40 ratio is based on our analysis findings as detailed in Appendix A, that:

- Currently, the typical improvement to SAIFI of an outage improvement is 5 per cent more than improvement to SAIDI, as demonstrated in Appendix B.
- If a distributor's CAIDI deteriorates by 5 per cent because of a higher level of SAIFI improvement than SAIDI improvement, changing to the 60/40 ratio would result in a 4.7 per cent reduction in overall STPIS reward—this appears to closely offset the existing SAIFI bias compared to maintaining the current 50:50 ratio.
- For comparison, a 55/45 ratio would only represent a 2 per cent reduction in overall STPIS reward, which may not be sufficient to influence a change in a distributor's response to restore supply interruptions in a more timely manner.
- More importantly, if a distributor delivers the same levels of improvement to both SAIFI and SAIDI—including maintaining the existing average fault repair time, it will receive the same STPIS reward under the 60/40 ratio as the existing approximately 50/50 ratio. This change to the incentive rate ratio between SAIFI and SAIDI would therefore not reduce the financial incentive to implement more automation to restore supply because the financial reward to the distributor would remain unchanged, if the current level of supply repair time (CAIDI) is maintained.

We note the proposal by S and C Electric Company to introduce a new STPIS component to provide a direct incentive in order to ensure CAIDI rates do not get any worse. However, our analysis shows that this approach would not work in all situations. As shown in Appendix A, the use of auto-reclosers to restore supply quickly after a network fault—all else being equal, including the fault repair time—would result in the same level of improvements to SAIDI and SAIFI in percentage terms. This means that the CAIDI time would not change if a distributor invests in more automation and at the same time maintains its operational response time. Hence, if we allocated some of the incentives in terms of energy value directly to the CAIDI measure, as proposed by S&C Electric, the rewards to the distributors would be reduced. This financial outcome would not be fair to distributors delivering good service and would reduce their incentive to improve their overall network reliability.

We therefore consider that this proposed change to a 60/40 incentive allocation should achieve a good balance between the need to be able to repair network faults in a timely manner and the incentive to invest in more automation to isolate the impact of network faults.

4.2 Exclusions and treatment of major event days

This section discusses the treatment of exclusions and major event days when calculating distribution reliability measures under the STPIS and the guideline.

4.2.1 Exclusions

Background

In the draft guideline, we supported the AEMC's recommendation on two additional exclusions for:

- Load interruptions caused by the exercise of any obligation, right or discretion imposed upon or provided for under jurisdictional electricity legislation and national electricity legislation applying to a Distribution Network Service Provider.
- Load interruptions caused or extended by a direction from state or federal emergency services, provided that a fault in, or the operation of, the network did not cause, in whole or part, the event giving rise to the direction.¹⁰

In addition to the above AEMC recommendations, we also proposed to modify the current exclusion criterion for "load interruptions caused by a failure of transmission connection assets except where the interruptions were due to inadequate planning of transmission connections" to add another test that this exclusion is also subject to the condition that:

- the primary cause of outages was not due to any act or omission by the distributor.

Submissions

No issue has been raised on our proposal.

Proposed approach

We maintain our draft guideline position to include these two additional exclusions in the STPIS.

4.2.2 Treatment of major event day

Background

Currently, the STPIS allows the removal of some types of interruptions from the set of reliability data being considered when calculating distribution reliability measures for SAIDI, SAIFI, MAIFI and MAIFLe. These interruptions are removed because they are either beyond the control of the distributors (exclusions) or are not representative of a

¹⁰ AER, *Draft Distribution Reliability Measures Guidelines*, June 2017, p. 8.

normal day in terms of reasonable network resource availability, the Major Event Day (MED).¹¹

The methodology used in STPIS to identify major events days is based on the Institute for Electrical and Electronic Engineers (IEEE) Standards 1366, called the 2.5 beta method. This method transforms daily unplanned SAIDI data through a natural log application in order to make the data set resemble a “normal distribution”.

The AEMC recommended adding a new exclusion for catastrophic events.¹² Under this proposal, the effect of catastrophic days are to be discounted from a distributor’s daily unplanned SAIDI data set when determining the MED thresholds under the standard 2.5 beta (standard deviations) method. This will likely increase the number of days to be excluded from performance measurement.

In our draft Guideline, we proposed no further exclusion of catastrophic events, before the 2.5 beta method is applied to identify major event day threshold, when calculating distribution reliability measures.¹³ This draft decision was based on a number of considerations, including that:

- There is no current objective or definitive method to identify catastrophic events as outlined by the AEMC.
- There are material differences between network characteristics in Australia, ranging from localised urban networks such as CitiPower, to physically diverse and geographically large networks such as SA Power Networks and Ergon Energy, so any definition of catastrophic events and their measurement methods are not likely to be uniform across all distributors.

Submissions

A number of distributors expressed support for the AMEC’s suggestion to adopt a 4.15 beta threshold method to identify catastrophic events because:¹⁴

- inclusion of a catastrophic day in the calculation can result in a substantial increase in the MED threshold, which could result in an otherwise significant outage day being not treated as a MED
- extremely rare, yet very significant events have a material and long lasting impact on the threshold for MED when retained in the daily SAIDI

¹¹ Major event days are typically caused by severe weather conditions.

¹² AEMC, *Review of Distribution Reliability Measures*, Final Report, 5 September 2014, pp. 28–31.

¹³ AER, Explanatory statement to draft distribution reliability measures guidelines, June 2017, pp. 14–15.

¹⁴ ENA, Submission to draft distribution reliability measures guidelines and explanatory statement, pp. 1–2; Energex and Ergon, Submission to draft distribution reliability measures guidelines and explanatory statement, p. 6, p. 8; Essential Energy, Submission to draft distribution reliability measures guidelines and explanatory statement, p. 2; SA Power Networks, Submission to draft distribution reliability measures guidelines and explanatory statement, p. 2.

Public Interest Advocacy Centre (PIAC) submitted that further investigations are required, stating that including catastrophic events may skew the reliability measure and could be used to justify excessive networks reinforcement.¹⁵

Proposed approach

The tables below provide our analysis on the number of MED under the 2.5 beta and 4.15 beta thresholds, respectively. The results indicate that—based on analysis of outage information of the past eight years—there are wide variations across the distributors regarding the actual number of MED. Under the 2.5 beta method, localised urban networks such as CitiPower or ActewAGL only have one MED per year. However, physically diverse and geographically large networks, such as Essential Energy or Ergon Energy, have four or five MEDs per year. Similar patterns are evident under the 4.15 beta method.

Under a normal distribution, 2.5 and 4.15 standard deviations represent a 2.6 events frequency per year and a 1 in 163 year's frequency respectively. Our analysis findings suggest that the IEEE method to transform daily SAIDI data into a normal distribution data set does not apply equally to every distributor. Substantial further research will need to be undertaken to find an alternative method to identify MEDs and rare events with catastrophic impacts.

We acknowledge that catastrophic events may have significant impact on the MED boundary. However, given there is no clear method to identify catastrophic events consistently for all distributors, our draft decision is to maintain our position in the draft guideline to not implement this change.

Regarding PIAC's concerns, we consider that separately discounting of catastrophic days' effect on a distributor's performance measures would make the distributor's supply reliability measures appear better than not separately discounting catastrophic days. Hence, such treatment of catastrophic days is unlikely to be a basis for more expenditure to maintain the networks.

Our concern is that there is no clear method to identify catastrophic events in a manner that applies consistently to all distributors to identify catastrophic events that are rare and exceptional. Hence, our draft decision is to maintain our position in the draft guideline to not implement this change. It is also important to note that:

- Under the current scheme, "catastrophic days" are excluded from performance measures because they meet the definition of MEDs.
- For distributors such as Ergon Energy, Energex and Essential Energy with almost one "catastrophic day" per year under the 4.15 beta method, this kind of occurrence frequency would not normally be considered rare.

¹⁵ PIAC, Submission to draft distribution reliability measures guidelines and explanatory statement, p. 1.

Table 1 Number of MED under 2.5 beta threshold

	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	Total	Average
ActewAGL	2	1	0	1	2	0	0	2	8	1.0
Ausgrid	1	2	4	1	2	3	8	0	21	2.6
Endeavour Energy	1	0	2	1	1	3	5	4	17	2.1
Essential	7	3	7	5	6	2	5	5	40	5.0
Energex	6	3	8	1	6	3	4	3	34	4.3
Ergon Energy	3	6	5	3	7	6	1	2	33	4.1
SAPN	0	2	5	2	3	7	3	1	23	2.9
AusNet	2	6	2	3	2	5	3	7	30	3.8
CitiPower	1	2	1	1	0	5	0	1	11	1.4
Jemena	3	1	0	1	0	1	1	1	8	1.0
Powercor	6	2	5	2	1	5	2	4	27	3.4
United	4	1	1	0	1	4	2	1	14	1.8
TasNetworks	0	2	5	2	3	7	3	1	23	2.9
Average	2.8	2.4	3.5	1.8	2.6	3.9	2.8	2.5		2.8

Source: AER analysis.

Note: MED has been calculated using network SAIDI for 8 years of 2008-09 (2009 for Victoria distributors) to 2015-16 (2016 for Victoria distributors).

Table 2 Number of MED under 4.15 beta threshold

	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	Total	Average
ActewAGL	0	0	0	0	0	0	0	0	0	0.0
Ausgrid	0	0	0	0	0	0	3	0	3	0.4
Endeavour Energy	0	0	0	1	0	0	0	0	1	0.1
Essential	0	1	0	0	2	1	1	0	5	0.6
Energex	1	0	2	0	2	0	1	0	6	0.8
Ergon Energy	0	2	2	0	2	0	0	0	6	0.8
SAPN	0	0	0	0	0	0	0	0	0	0.0
AusNet	1	0	0	0	1	0	0	1	3	0.4
CitiPower	0	0	0	0	0	0	0	0	0	0.0
Jemena	0	0	0	0	0	0	0	0	0	0.0
Powercor	0	0	0	0	0	0	0	0	0	0.0
United Energy	0	0	0	0	0	0	0	0	0	0.0
TasNetworks	0	0	0	0	0	0	0	0	0	0.0
Average	0.2	0.2	0.3	0.1	0.5	0.1	0.4	0.1		0.2

Source: AER analysis.

Note: MED has been calculated using network SAIDI for 8 years of 2008-09 (2009 for Victoria distributors) to 2015-16 (2016 for Victoria distributors).

4.3 Adjusting the targets where the reward or penalty exceed the revenue cap under STPIS

Background

When a distributor's actual performance is much better or worse than the performance targets leading to the financial reward or penalty under the STPIS exceeding the revenue at risk cap under the scheme, its actual performance for the purpose of setting the performance targets for the subsequent period must be adjusted accordingly.

This is to ensure that the distributor's performance target in future reflects the financial reward/penalty they received. In particular, a distributor should not be rewarded for poor performance because of the financial cap protection mechanism under the STPIS.

While the current STPIS specifies that an adjustment must be made, the scheme currently does not set out how this is done.¹⁶

We consider that there needs to be a clear method based on a sound hierarchy, which reflects customers' values, to determine the adjustment quantity. In the issues paper, we proposed a method to adjust the targets, with details provided in Appendix C.

Submissions

Most distributors supported in principle the need for the AER's proposed method of making adjustments to the performance targets.¹⁷ Jemena proposed a variation to the AER's proposed method, which includes MAIFI in the adjustment.¹⁸

Proposed approach

We do not consider Jemena's proposed variation is appropriate given it introduces inconsistency to methods across the distributors because only Victoria has MAIFI in the STPIS. Further it introduces unnecessary complexity to the method with the inclusion of MAIFI and telephone answering.

Accordingly, we maintain our proposed method for the adjustment of performance targets.

¹⁶ Clause 3.2.1(a)(1B) of STPIS.

¹⁷ Ausgrid, Submissions to AER's issues paper, p. 13; Endeavour, Submissions to AER's issues paper, p. 4; Essential Energy, Submissions to AER's issues paper, p. 4; Energex, Submissions to AER's issues paper, p. 9; Ergon Energy, Submissions to AER's issues paper, p. 9; SA Power Networks, Submissions to AER's issues paper, p. 11.

¹⁸ Jemena, Submissions to AER's issues paper, p. 11.

4.4 Alignment with other changes proposed for the distribution reliability measures guideline (the Guideline)

Background

In our second stage consultation, we proposed a number of minor changes which will be incorporated in the Guideline to:

- clarify that unmetered connections should be excluded from the performance measures
- modify the definition of CBD and urban feeders
- codify the approach on how to report the number customers impacted by an outage event where the exact number of affected customers is not known.

Unmetered load

The AEMC recommended standardising the definition of customers to improve consistency in reliability measurements. It suggested to remove the currently discretion under STPIS that unmetered connection points may or may not be included for the purposes of calculating reliability measures. The AEMC recommended that the definition of customer should exclude all unmetered connection points from being considered as customers for the purposes of calculating reliability measures. This is because:¹⁹

- It noted that incentive schemes do not generally target unmetered supplies as the reliability of the supply of unmetered loads such as public lighting are generally considered separately.
- Adopting this definition for a customer would mean that the current inconsistencies in the definitions across the NEM would be removed going forward.
- As the number of unmetered connection points is relatively small and would be unlikely to cause a material impact on distribution reliability measures.

We agreed with the AEMC's recommendation not to include unmetered load in the definition of distribution customers, because:

- The reliability performance of metered load should also reflect the reliability performance provided to unmetered loads.
- Including unmetered load in the overall performance reporting does not provide further clarity on street lighting service outcomes

¹⁹ AEMC, *Review of Distribution Reliability Measures*, Final Report, 5 September 2014, pp 17-18.

- The quantity of unmetered connections other than street lights is not significant compared with metered connections. Including such loads in the overall performance reporting may not provide further clarity on the service level to such loads.
- Outages of street lights do not necessarily represent power supply failures, performance of public lighting should be addressed separately under a specific public lighting code.

Definition of feeders

In the draft Guideline, we proposed that:

- For consistency, urban and rural feeders' classification should be based on a longer term average demand level, rather than based on one year's variation. Hence, we propose that the feeder classification should be based on a 3-year average maximum demand level.
- Amending the definition of CBD feeder, as recommended by the AEMC, to include one or more geographic areas that are determined by the relevant jurisdiction.

Standardise reporting of affected customers

In order to improve the level of consistency in reporting performance, we proposed the following additional reporting approaches—to provide greater clarity on the capture and reporting of specific events.

- National Metering Identifiers—clarifying which NMI status codes should be reported (e.g. active, not energised, extinct, greenfield).
- Single premises outages—Standardising on the reporting of single premises interruptions as a network interruption unless the customer's fault is actively identified.
- For partial network failure, where more accurate (i.e. smart meter) information is absent to identify the specific affected customers
- High Voltage (HV) single phase outage—Standardising on the reporting of 33 per cent of all downstream customers for a single-phase HV outage on a three phase network. Reporting of 100 per cent of customers for all other HV outages, for example; when there is a single HV phase outage on a two phases or single phase HV system.
- Low Voltage (LV) single phase outage—Standardising on the reporting of 33 per cent of all downstream customers for a single phase outage.

Submissions and proposed approach

Majority of the submissions supported the proposed changes.

CitiPower and Powercor suggested that we should take into account the annual variation of customer demands and the effect of network reconfiguration from time to time.²⁰

Proposed approach

In consideration of CitiPower and Powercor's suggestion and in recognition of the difference in customer information systems currently deployed by the distributors, we make the following changes to the original proposed approaches:

- The measurement of energy density per km threshold for urban feeder will be based on a 3-year average maximum demand over the 3-year average feeder route length.
- Unmetered supplies should be excluded from the calculation of reliability measures, except where a DNSP is unable to identify the unmetered supplies due to the inadequacy of the existing customer record systems from its historical performance data.

4.5 Balancing the incentive to maintain and improve reliability with the incentive to reduce expenditure

Background

The revenue and pricing principles require that distributors should be provided with effective incentives to promote economic efficiency. Consequently, it is important that distributors be provided an incentive to improve customer reliability where customers value that improvement in reliability more than the cost of achieving the improvement. To this end, it is important that the incentive to improve reliability is balanced with the incentive to reduce expenditure, both capex and opex or alternatively, that incentive to reduce expenditure (capex and opex) is balanced with incentive to maintain or improve reliability, where this is valued by customers.

Currently, the efficiency benefit sharing scheme (EBSS) and the capital expenditure sharing scheme (CESS) allow distributors to retain 30 per cent of opex and capex efficiency gains, respectively. Similarly, by setting performance targets based on a five year historical average distributors should be able to retain around 30 per cent of the value of reliability improvements. Therefore, incentives exist in the regulatory

²⁰ CitiPower and Powercor - Submission on AER Draft distribution reliability measures guidelines - 11 August 2017, pp2-3

framework to maintain and improve reliability to balance the incentive to reduce expenditure.

Submissions

No issue has been raised that the STPIS should be amended to better balance reliability and efficiency incentives.

Proposed approach

No change to the STPIS on this regard.

4.6 A symmetrical financial incentive scheme

Background

Currently, STPIS provides a direct financial incentive for a DNSP to maintain or improve service standards. It operates in a symmetrical way by rewarding performance improvement as well as penalising deteriorating performance. It achieves this by providing a financial reward if service improves and a financial penalty at the same rate as rewards if service declines. In this way it operates in a symmetrical way and provides a direct link between a DNSP's revenue and the standards of service it provides.

Submissions

All Stakeholders submitted that the STPIS should continue to operate in symmetrical way, and that no change is needed.

Proposed approach

No change to the STPIS on this regard.

4.7 How to link distributor customer engagement findings and the setting of reliability levels

Background

Customer engagement is an important aspect for any business and electricity networks are no exception. Distributors have a formal requirement to engage with customers²¹ and the AER has established a guideline for distributor customer engagement.²²

As part of our regulatory determinations that set the revenues of network businesses on a periodic basis, we assess the efficiency of all capex and opex against prescribed parameters in the NER, including the capex and opex objectives, criteria and factors.

²¹ NER, cl.6.5.6.(e)(5A) and 6.5.7(5A).

²² AER, Consumer Engagement Guideline for Network Service Providers, AER. November 2013.

Specifically, we must have regard to the extent to which the operating and capital expenditure forecast includes expenditure to address the concerns of electricity consumers as identified by the Distribution Network Service Provider in the course of its engagement with electricity consumers.²³

We have also established consumer engagement guidelines that recognise the important relationship between price and service and, in particular, identify that distributors could consult on:²⁴

- making price and reliability trade-offs
- setting and designing tariffs (including time of use and critical peak tariffs)
- setting reliability targets and standards when appropriate

The quality of a service provider's consumer engagement will be a factor in how we assess expenditure proposals.²⁵ Our guidelines also identify that consumer engagement may also result in greater ease (for the distributor) in regulatory approval of expenditure proposals.²⁶

We sought stakeholders' feedback on whether and how to link the STPIS with distributor customer engagement findings seeking changes to reliability level.²⁷

Submissions

Submissions were varied. Stakeholders submitted that consumer's preferences should be reflected either through the capital and operating funding level,²⁸ or through the STPIS incentives,²⁹ or a combination of both measures³⁰.

A number of stakeholders submitted that no change to the STPIS is required given that the existing regulatory framework provides sufficient flexibility for the AER to allow for consumer preferences to be reflected in capital and operating expenditure levels and the application of incentive schemes.³¹

²³ NER, Cl.6.5.6.(e)(5A) and 6.5.7(5A).

²⁴ AER, Consumer Engagement Guideline for Network Service Providers, AER. November 2013, p. 12.

²⁵ Ibid, p.13.

²⁶ Ibid.

²⁷ AER, STPIS issues paper, January 2017, pp. 35–36.

²⁸ Ergon Energy, Submission to STPIS issues paper, p. 10; Essential Energy, Submission to STPIS issues paper, p. 5; SA Power Networks, Submission to STPIS issues paper, p. 13;

²⁹ Jemena, Submission to STPIS issues paper, p. 12.

³⁰ Endeavour Energy, Submission to STPIS issues paper, p. 5; S and C Electric Company, Submission to STPIS issues paper, p. 8.

³¹ Ausgrid, Submission to STPIS issues paper, p. 14; Energy Networks Australia, Submission to STPIS issues paper, p. 15; Energex, Submission to STPIS issues paper, p. 10.

Where consumer preferences on reliability levels are reflected through the STPIS, stakeholders submitted that it may be appropriate to allow flexibility in the value of customer reliability (VCR) rates and the level of revenue at risk, but the MED exclusion should not be a flexible parameter given that it does not reflect consumer preference.³² ENA also submitted that this matter is best dealt with as a DNSP specific issue during the revenue determination, rather than opening the STPIS to uncertain outcomes.³³

Proposed approach

We agree with the view that no change to the STPIS is required as the STPIS is adequately flexible to reflect consumer preferences, in conjunction with the capital and operating expenditure forecast levels. We note that consumer preferences are reflected in the STPIS incentives rates for rewards or penalties through the VCR. There is also flexibility in the level of revenue at risk based on different consumer preferences and willingness to pay for reliability.

We also note that:

- Current funding criteria for distributors' operating and capital expenditures are to maintain current level of reliability, safety and security of the distribution system.³⁴ Our STPIS provides incentives to distributors to maintain the existing level of supply reliability, and to improve the reliability of supply where customers are willing to pay for these improvements. Under the NER, we must consider customers' willingness to pay for improved service performance so benefits to consumers are sufficient to warrant any penalty or reward under the STPIS.³⁵
- Our STPIS also provides that the performance targets to apply during the regulatory control period may be modified by a number of factors that are expected to materially affect network reliability performance. In particular, these factors include any reliability improvements completed or planned where the planned reliability improvements are included in the expenditure program.³⁶

³² Energy Networks Australia, Submission to STPIS issues paper, p. 15; Endeavour Energy, Submission to STPIS issues paper, p. 5.

³³ Energy Networks Australia, Submission to STPIS issues paper, p. 15.

³⁴ NER, cl. 6.5.6 and 6.5.7.

³⁵ NER, cl. 6.6.2(b)(3)(vi).

³⁶ Clause 3.2.1(a), STPIS.

4.8 Interrelationship with the Demand Management Incentive Scheme

Background

During our initial consultation with stakeholders regarding the review of the Demand Management Incentive Scheme (DMIS), some stakeholders suggested that we consider modifying the exclusion criteria of the STPIS to “further exclude supply interruptions associated with unexpected underperformance of demand management projects”, so as to facilitate the adoption of demand management projects.

Proposed approach

As a part of the DMIS review, the AER has decided not to accept this proposal, because:³⁷

- These would not produce benefits if the STPIS is balancing incentives as intended. We do not consider the STPIS creates a perverse incentive against demand management.
- To the extent some distributors perceive demand management options to be less reliable than network options, we do not support addressing these perceptions with STPIS exclusions, because:
 - (a) Exclusions could further embed the perception that demand management options are less reliable than network options.
 - (b) Distributors' inexperience in providing demand management relative to network solutions would have likely influenced this perception. As such, creating a Scheme that incentivises distributors to undertake more demand management where efficient should already go some way in addressing this inexperience.
 - (c) STPIS exclusions could skew distributors' incentives towards undertaking relatively unreliable demand management projects. These skewed incentives could incentivise a number of unreliable demand management options, which would further embed the perception that demand management is unreliable.
- Stakeholders generally showed little support for providing exemptions to the STPIS.

³⁷ AER, Explanatory statement - Draft demand management incentive scheme, August 2017, p. 55.

4.9 Other minor refinements to the scheme

Background

In the current operation of the scheme, we have also identified a number of other issues requiring attention, which include:

- simplification of the current approach for s-factor calculations
- line up the definition of year "t" in the STPIS with the price control formula
- the need for greater clarity in the GSL section of the scheme.

In the Issues Paper, we identified that the operation of the scheme could be simplified by implementing STPIS outcomes as a fixed monetary amount (fixed dollar) each year in accordance with the actual performance; rather than as a percentage adjustment to the maximum allowable revenue (MAR).

We propose changing the application of s factor from $AR_t * S_{t-2}^{\%}$ to $AR_{t-2} * S_{t-2}^{\%}$, using the raw s factor and annual smooth revenue of same regulatory year. We consider there are a number of advantages with this proposal:

- This method will result in directly linking the reward/penalty for the performance outcome each year to the revenue input of the same year—changing from the current method of calculating the reward/penalty by adjusting each year's allowable revenue by the s-factor outcome of two years ago (t-2). Therefore, it will remove the need to make adjustment for revenue increment or decrement between regulatory years.
- Therefore, there will also be no need to make inter-period adjustments because of changes in the annual smooth revenue under the current approach of using the percentage of allowable revenue.³⁸
- In addition to reducing the administrative steps, we consider that the fixed dollar approach would also eliminate the possibility for misuse of the s-factor banking provision of the scheme by distributors receiving windfall gains in later years.

The s-bank mechanism intends to allow a DNSP to delay a revenue increment or decrement or a portion of a revenue increment or decrement for one regulatory year, in accordance with clauses 2.5(d) and 2.5(e) and appendix C of the scheme, for the purposes of reducing price variations to customers.

³⁸ A distributor's performance in the last two regulatory years of its regulatory control period will affect its revenues in the first two regulatory years of the next regulatory control period. Since the s-factor is currently expressed in percentage terms of the average revenue requirement (ARR), it is necessary to account for any step change in revenues (or prices) from one regulatory control period to the next. This process is described in formula (6) of Appendix C of the current version of the STPIS.

While the STPIS rules only allow a distributor to bank the s-factor result by one year, a distributor can repeat the banking percentage consecutively by treating the banking percentage as that of the subsequent year of the initial banking application.

The current banking arrangement effectively allows the delay of a revenue (or a portion of a revenue) increment or decrement by more than one regulatory year. If the adjustment is still in the form of a certain percentage of MAR, a distributor may be incentivised to bank the s-factors for more than a year, if it expects to receive an increased revenue in future regulatory years due to a rising price path under a negative X factor scenario or cost of debt. This is contrary to the purposes of smoothing price variations to customers due to unexpected s-factor outcomes, usually as the result of mild or harsh weather.

Submissions

Submissions varied on whether a simplification is necessary to the current approach to calculate the award or penalty under the STPIS. A number of distributors submitted that the existing calculation is appropriate and no change is needed.³⁹ Others supported simplification of the current method that would make the STPIS more accessible to customers, noting the need to demonstrate benefits from a more simplified approach and avoid opportunities for DNSPs to be advantaged or disadvantaged by the transition to a new approach.⁴⁰

Jemena supported our proposal, noting that the adjustment should be aligned to the price control mechanism where a percentage factor adjustment should apply under a price cap and a dollar adjustment should apply under a revenue cap.⁴¹

TasNetworks submitted that S-factor contributions for reliability of supply should be independent from customer service components, consistent with transmission the STPIS system. It also argued that due to a lag in MED related telephone calls, call service MED should be defined separately to system reliability MEDs.⁴²

Proposed approach

We consider a simplification to the STPIS calculation steps will reduce the administrative cost and remove the risk of gaming by distributors for future price movements. Our proposed method is provided in Appendix D to treat STPIS rewards and penalties as fixed dollar values rather than as a percentage of the MAR each year.

³⁹ Ausgrid, Submissions to AER's issues paper, p. 15; Endeavour, Submissions to AER's issues paper, p. 5; Essential Energy, Submissions to AER's issues paper, p. 6; Energex, Submissions to AER's issues paper, p. 10; SA Power Networks, Submissions to AER's issues paper, p. 14.

⁴⁰ ENA, Submissions to AER's issues paper, p. 16; Ergon Energy, Submissions to AER's issues paper, p. 10.

⁴¹ Jemena, Submissions to AER's issues paper, p. 13.

⁴² TasNetworks, Submissions to AER's issues paper, p. 3.

We will correct errors in the scheme including the alignment of the definition year “t” in the STPIS with the price control formula. Stakeholders support this proposal.

We will also clarify in the guaranteed service level (GSL) section that payments for each supply reliability parameter are made separately. For example, the GSL payment for excessive total hours of supply interruptions in a year must be paid separately from the payments for each single interruption exceeding the relevant threshold.

4.10 Future of STPIS

Background

We set out our consideration on the likely challenges on how the scheme may operate in future years, given likely industry developments, such as increasing PV installations and battery storage systems and other changes from the greater use of distributed energy resources (DER). We sought comments on what way the STPIS could be changed to reflect the needs of consumers using DER and other similar technologies.⁴³

Submissions

In the submissions, stakeholders recognised the potential need in the future but considered it would be difficult to amend the STPIS incentives to reflect changes amongst a small sub-category of customers under the current scheme design.⁴⁴

Proposed approach

We concur with stakeholders that it may not be possible to address all these issues in the foreseeable timeframe for this review. We will be reviewing this matter when these trends and developments are clearer.

⁴³ AER, AER STPIS and DMRG issues paper, pp. 39-42.

⁴⁴ Ausgrid, Submission to STPIS and DMRG issues paper, p. 18; CitiPower and Powercor, Submission to STPIS and DMRG issues paper, p. 8; ENA, Submission to STPIS and DMRG issues paper, p. 14; Endeavour Energy, Submission to STPIS and DMRG issues paper, p. 5; Energex, Submission to STPIS and DMRG issues paper, p. 10; Ergon Energy, Submission to STPIS and DMRG issues paper, p. 9; Essential Energy, Submission to STPIS and DMRG issues paper, p. 5; Jemena, Submission to STPIS and DMRG issues paper, p. 12; SA Power Networks, Submission to STPIS and DMRG issues paper, p. 13.

4.11 Issues raised during the ACT/NSW Framework and Approach development stage for the 2019-24 period

Background

In Ausgrid's submission to the preliminary Framework and Approach for 2019-24, it indicated that Ausgrid is currently exploring a pilot scheme under the NER on different customer service measures. It has also proposed amending the telephone answering definition, to further exclude the day following a major event.⁴⁵

Proposed approach

A major event day starts from 12:00am to 11:59pm (00:00 to 23:59 hours) of a calendar day. It is expected that most customers would make telephone calls to distributors within two hours from the occurrence of an outage event. Consequently, there is only a very small window of time within a major event day where calls to a distributor's call centre are made in the ensuing calendar day—for example when a major event occurs after 10 pm. Modifying the call centre measurement method may result in unnecessary distortion of a distributor's call centre performance in response to further or unrelated events. Accordingly, we consider the current telephone answering definition should be maintained.

⁴⁵ Ausgrid, *Submission on AER's preliminary framework and approach paper*, 27 April 2017, pp. 115–16.

A Setting the ratio between SAIFI and SAIDI incentive rates

A worked example

We observed that the current STPIS incentive may have led to more improvement to SAIFI than SAIDI. As a result the average supply restoration time (CAIDI) is getting longer. The following example demonstrates the effect of modifying the SAIFI/SAIDI incentive rate ratio to provide a higher incentive:

- to maintain the CAIDI performance, and at the same time
- NOT diminish the overall incentive amount if the current average supply restoration time (CAIDI) remains unchanged.

We believe that this approach would provide more incentive to maintain the current supply restoration time. More importantly, the total value of incentives for network automation investment should remain unchanged, if the network fault repair time remains unchanged.

The following steps are taken:

A – Derive the baseline SAIFI and SAIDI targets (prior to the introduction of network automation)

B – Derive the SAIFI and SAIDI outcomes after the introduction of network automation, assuming supply restoration time (CAIDI) remains unchanged

C – Derive the SAIFI and SAIDI outcomes after the introduction of network automation, assuming supply restoration time (CAIDI) is 5per cent longer than historical figure

D – Derive the incentive rates under the current SAIDI/SAIFI incentive rate ratio

E – Derive the incentive rates under a 60/40 SAIDI/SAIFI incentive rate ratio

F – Derive the incentive rates under a 55/45 SAIDI/SAIFI incentive rate ratio

G and H – Compare the result under different incentive ratios

(A) Derive the baseline STPIS target

The following distribution feeder is representative of a typical rural feeder of a typical medium size distributor.

Assumptions:

- A long rural feeder has 10,000 customers.

- The 10,000 customers on the rural feeder are distributed evenly along the length of the feeder from the origin.
- On average, there are 3 supply interruptions per year (total number of customer interruptions or 3 SAIFI events).
- The average restoration time to restore supply is 80 minutes (CAIDI).
- Mathematically SAIDI, SAIFI and CAIDI are expressed as:
- $SAIDI = \frac{\text{sum of all customer interruption duration}}{\text{total number of customers served}}$
- $SAIFI = \frac{\text{total number of customer interruptions}}{\text{total number of customers served}}$
- $CAIDI = \frac{\text{sum of all customer interruption duration}}{\text{total number of customer interruptions}} = \frac{SAIDI}{SAIFI}$

Using the above assumptions and formulas, we can calculate the STPIS targets being:

$$SAIFI = 3 \text{ interruptions}$$

$$SAIDI = \frac{\text{sum of all customer interruption duration}}{\text{total number of customers served}} = \frac{80 * 3 * 10000}{10000}$$

$$= 240 \text{ minutes}$$

$$CAIDI = 240/3 = 80 \text{ minutes}$$

(B) STPIS outcomes Scenario 1: Effect of auto-recloser, no change to the average supply restoration time (CAIDI)

Assumptions

- An auto-recloser is installed at a distance 40 per cent of the length of the feeder from its origin. The feeder has 10,000 customers spread evenly along its length. The auto-recloser can automatically attempt to reclose a feeder after a supply interruption, in an attempt to restore supply very quickly to customers.
- As per average, there are 3 network faults leading to supply interruptions during the year or 3 SAIFI events.
- Two of the outages occurred near the origin. Hence, the auto-recloser was unable to have an effect. Both outages lasted 80 minutes.
- The third fault occurred at the end of the feeder. For this event the auto-recloser was successful in isolating the healthy part of the feeder from the fault. Hence, the 4,000 customers between the feeder origin and the auto-recloser only experience a momentary interruption. The supply to the other 6,000 customers was restored at 80 minutes.

Mathematically the STPIS performance outcomes may be calculated as follows

- SAIFI

$$\text{SAIFI} = \frac{\text{total number of customer interruptions}}{\text{total number of customers served}}$$

$$\text{SAIFI (all events)} = \text{SAIFI (event 1)} + \text{SAIFI (event 2)} + \text{SAIFI (event 3)}$$

$$\text{SAIFI} = \frac{10000}{10000} + \frac{10000}{10000} + \frac{6000}{10000}$$

$$\text{SAIFI} = 2.6$$

Percentage SAIFI improvement over pre-existing performance

$$= (3-2.6)/3 = 13.33\%$$

- SAIDI

$$\text{SAIDI} = \frac{\text{sum of all customer interruption duration}}{\text{total number of customers served}}$$

$$\text{SAIDI (all events)} = \text{SAIDI (event 1)} + \text{SAIDI (event 2)} + \text{SAIDI (event 3)}$$

$$\text{SAIDI} = \frac{10000 * 80}{10000} + \frac{10000 * 80}{10000} + \frac{6000 * 80}{10000}$$

$$\text{SAIDI} = 208 \text{ minutes}$$

Percentage SAIDI improvement over pre-existing performance

$$= (240-208)/240 = 13.33\% \text{ [same percentage improvement as SAIFI]}$$

- CAIDI

$$\text{CAIDI} = \text{SAIDI}/\text{SAIFI} = 208/2.6 = 80 \text{ (no change from pre-existing performance)}$$

(C) STPIS outcomes Scenario 2: Effect of auto-recloser, deterioration of supply restoration time by 5% (SAIDI improvement 5% less than SAIFI improvement) [that is CAIDI is 5% higher]

Assumptions

- Same as scenario 1, an auto-recloser is installed at a distance 40% of the length of the feeder from its origin. The feeder has 10,000 customers spread evenly along its length. The auto-recloser can automatically attempt to reclose a feeder after a supply interruption, in an attempt to restore supply very quickly to customers.
- As per average, there are 3 network faults leading to supply interruptions during the year or 3 SAIFI events.
- Two of the outages occurred near the origin. Hence, the auto-recloser was unable to have an effect. Both outages lasted 84 minutes (5% longer than previous average).

- The third fault occurred at the end of the feeder. For this event the auto-recloser was successful in isolating the healthy part of the feeder from the fault. Hence, the 4,000 customers between the feeder origin and the auto-recloser only experience a momentary interruption. The supply to the other 6,000 customers was restored at 84 minutes. 5% longer than previous average).

Mathematically the STPIS performance outcomes may be calculated formulas follows

- SAIFI

$$\text{SAIFI} = \frac{\text{total number of customer interruptions}}{\text{total number of customers served}}$$

$$\text{SAIFI (all events)} = \text{SAIFI (event 1)} + \text{SAIFI (event 2)} + \text{SAIFI (event 3)}$$

$$\text{SAIFI} = \frac{10000}{10000} + \frac{10000}{10000} + \frac{6000}{10000}$$

$$\text{SAIFI} = 2.6$$

Percentage SAIFI improvement over pre-existing performance

$$= (3-2.6)/3 = 13.33\%$$

- SAIDI

$$\text{SAIDI} = \frac{\text{sum of all customer interruption duration}}{\text{total number of customers served}}$$

$$\text{SAIDI (all events)} = \text{SADFI (event 1)} + \text{SAIDI (event 2)} + \text{SAIDI (event 3)}$$

$$\text{SAIDI} = \frac{10000 * 84}{10000} + \frac{10000 * 84}{10000} + \frac{6000 * 84}{10000}$$

$$\text{SAIDI} = 218.4 \text{ minutes}$$

Percentage SAIDI improvement over pre-existing performance

$$= (240-218.4)/240 = 9\%$$

- CAIDI

$$\text{CAIDI} = \text{SAIDI/SAIFI} = 218.4/2.6 = 84 \text{ (5\% longer than pre-existing performance)}$$

(D) SAIFI and SAIDI incentive rates under current scheme SAIDI/SAIFI incentive rate ratio

Under the current STPIS scheme, the incentive rate formulae for the unplanned SAIDI and unplanned SAIFI parameters are expressed as:

$$ir_{SAIFI,rural} = \frac{\left(\frac{\left(\frac{VCR_n * (1 + CPI)}{1 + w_n} \right) * C_n}{R} \right)}{(365.25 * 24 * 60)} * \frac{SAIDI_n}{SAIFI_n} * 100 \dots\dots\dots (1)$$

$$ir_{SAIDI,rural} = \frac{\left(\frac{VCR_n * (1 + CPI) * \left(1 - \left(\frac{1}{1 + w_n} \right) \right) * C_n}{R} \right)}{(365.25 * 24 * 60)} * 100 \dots\dots\dots (2)$$

Where

- ir is the incentive rate (expressed in a percentage per unit of the parameter)
- n is the network type (rural)
- VCR_n is the Value of Customer Reliability for network type n escalated to the start of the relevant regulatory control period. For this example we use the current typical VCR value of \$37,000/MWh.
- CPI the consumer price index used to adjust VCR from the initial value to the present day value. For this example, we use the value of 3%.
- W_n is the network type weighting for the unplanned SAIDI or unplanned SAIFI parameter. **The W_n values for CBD, urban and rural networks are 1.13, 0.97 and 0.92 respectively. Hence, the factor of $[1/(1 + W_n)]$ equals 0.47, 0.51 and 0.52 respectively (roughly half the value).**
- C_n is the average annual energy consumption for network type n (say 1,250,000)
- R is the average of the smoothed annual revenue requirement for the relevant regulatory control period (say \$ 600,000,000)
- $SAIDI_n$ is the average of the unplanned SAIDI targets in the regulatory control period for network type n
- $SAIFI_n$ is the average of the unplanned SAIFI targets in the regulatory control period for network type n .
- Using the above equations with the following we derive:

$$ir_{SAIFI,Rural} = \frac{\left(\frac{\left(\frac{37,000 * (1 + 0.03)}{1 + .92} \right) * 1,250,000}{600,000,000} \right)}{(365.25 * 24 * 60)} * \frac{240}{3} * 100 = 0.628976 \%$$

$$ir_{SAIDI,Rural} = \frac{\left(\frac{37,000 * (1 + 0.03) * \left(1 - \left(\frac{1}{1 + 0.92} \right) \right) * 1,250,000}{600,000,000} \right)}{(365.25 * 24 * 60)} * 100 = 0.007233 \%$$

(E) SAIFI and SAIDI incentive rates when the allocation of energy value changed to 60/40 ratio for SAIDI/SAIFI incentive component

We can use the same formula above, with the exception that the value for Wn would become 1.49985. Under this allocation:

- The proportion of energy value allocated to the SAIDI component is $[1 - (1/(1+Wn))]$, equals to 0.60.
- Similarly, the proportion of energy value allocated to the SAIFI component is $[1/(1+Wn)]$, equals to 0.40.

Using equations (1) and (2), the incentive rate for SAIDI and SAIFI become 0.009057 per minute of SAIDI and 0.483082 per SAIFI interruption respectively.

(F) SAIFI and SAIDI incentive rates when the allocation of energy value changed to 55/45 ratio for SAIDI/SAIFI incentive component

We can use the same formula above, with the exception that the value for Wn would become 1.2229. Under this allocation:

- The proportion of energy value allocated to the SAIDI component is $[1 - (1/(1+Wn))]$, equals to 0.55.
- Similarly, the proportion of energy value allocated to the SAIFI component is $[1/(1+Wn)]$, equals to 0.45.

Using equations (1) and (2), the incentive rate for SAIDI and SAIFI become 0.008305 per minute of SAIDI and 0.543270 per SAIFI interruption respectively.

(G) Differences between total STPIS reward under different Wn factor, where CAIDI remains under changed, representing equal improvements to both SAIDI and SAIFI improvement

Table A.1

for equal improvements to both SAIDI and SAIFI improvement, Scenario 1			
	SAIDI reward (%)	SAIFI reward (%)	Total reward (%)
No changes to incentive rate formula	0.2315	0.2516	0.4831
Allocate 60% of energy value to SAIDI, 40% to SAIFI	0.2898	0.1932	0.4831

(H) Differences between total STPIS reward under different SAIDI/SAIFI incentive rate ratios, where CAIDI is 5% worse than the pre-existing level

Under this outcome, the STPIS reward based on the existing incentive rates are:

For SAIDI reduction 0.1562%

For SAIFI reduction 0.2516%

Total reward = 0.4078%

Table A.2 provides a comparison of the effect on a distributor's STPIS reward compared with the existing scheme, if the SAIDI/SAIFI incentive rate ratio is changed.

Table A.2

for SAIDI improvement 5% less than SAIFI improvement, Scenario 2				
	SAIDI reward (%)	SAIFI reward (%)	Total reward (%)	Percentage difference in total rewards, from pre-existing SAIDI/SAIFI incentive rate ratio arrangement
Allocate 60% of energy value to SAIDI, 40% to SAIFI	0.1956	0.1932	0.3889	4.7%
Allocate 55% of energy value to SAIDI, 45% to SAIFI	0.1794	0.2173	0.3967	2.7%

B Distributors' reported SAIDI and SAIFI outcomes

The charts in this appendix present the details of the business-wide average number of unplanned outages (SAIFI) and the average total duration of unplanned supply outages (SAIDI) of each of the Queensland, South Australian and Victorian distributors. Based on the observed results, the scheme appears successful in delivering improvements in supply reliability as:

- only United Energy reported significant deterioration of performance.
- CitiPower reported a slight improvement (reduction) in the average number of outages (SAIFI) but a substantial deterioration (increase) in the supply outage time (SAIDI), resulting in a 0.02 per cent average annual s-factor penalty.
- all other distributors achieved significant improvements.
- most significantly, distributors typically achieved better improvements to their SAIFI results (the number of outages) than their SAIDI (duration of outages) results (red lines vs the blue lines of the charts in this appendix).⁴⁶
- typically, the improvement in SAIFI is about 5 per cent better than the improvement in SAIDI.

We believe this difference in performance between SAIDI and SAIFI may be due to the current scheme design regarding the ratio of the reward/penalty incentive rates between SAIFI and SAIDI. We consider this a key issue that needs to be considered in the operation of the current STPIS and this is further discussed in the next chapter.

⁴⁶ Notes:
We have not yet had the results from NSW/ACT distributors.
Historical performance results for TasNetworks are not included in this analysis because its STPIS measures were on per kVA capacity base instead of the STPIS scheme standard of per customer base.

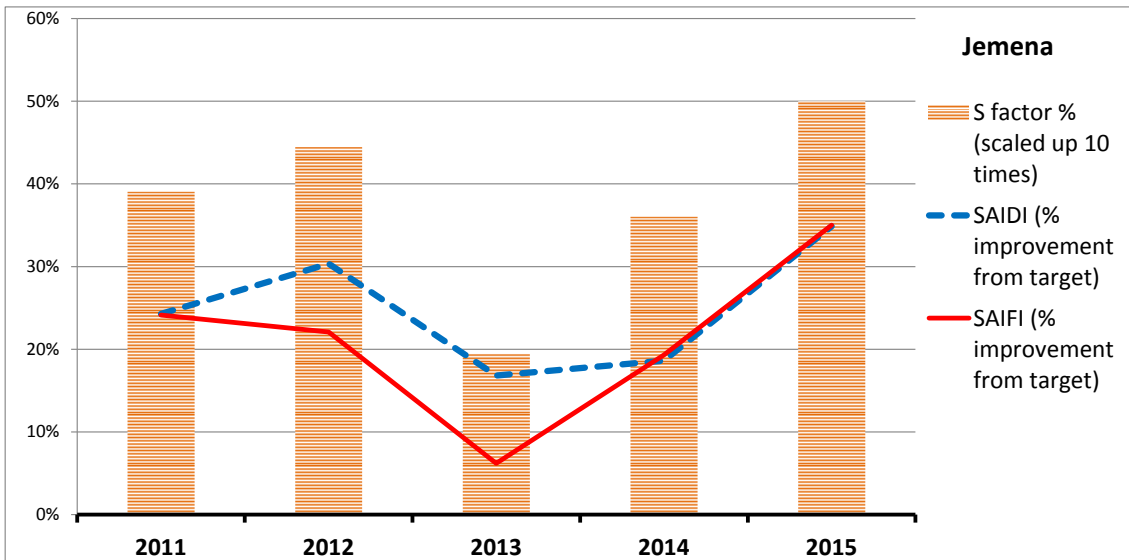
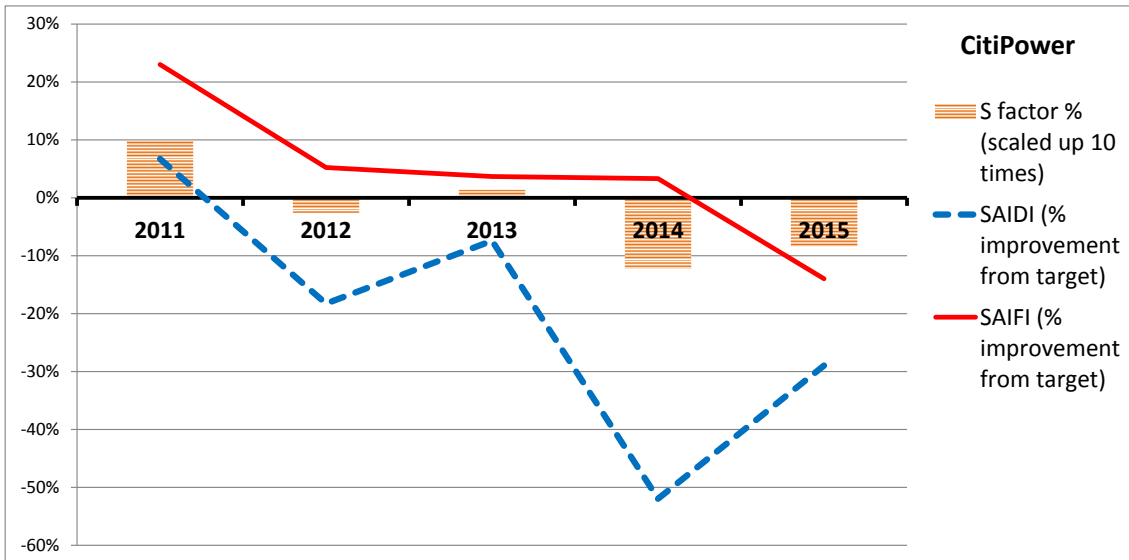
Table B1: Percentage change in ratio of SAIFI/SAIDI targets (CAIDI) from the previous period to the current period

Distributor	CBD feeders	Urban feeders	short rural feeders	long rural feeders
CitiPower	17% worse	36% worse	na	na
Jemena	na	4% better	25% worse	na
Powercor	na	22% worse	14% worse	25% worse
AusNet Services	na	5% worse	3% worse	7% worse
United Energy	na	12% worse	32% worse	na
Ergon Energy	na	10% worse	9% worse	11% worse
Energex	7% worse	0%	2% worse	na
SA Power Networks	8% better	11% worse	13% worse	20% worse

Source: AER analysis.

Note: Overall reliability outcomes for consumers (SAIDI) have improved for all distributors with the exception of United Energy;
na represents not applicable, the distributor does not have this feeder type.

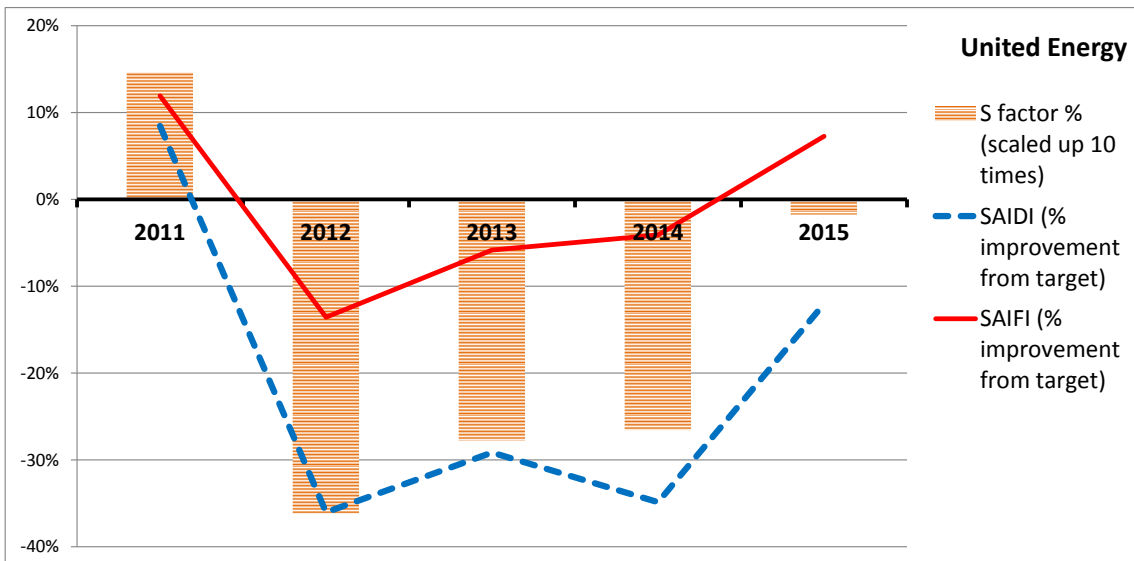
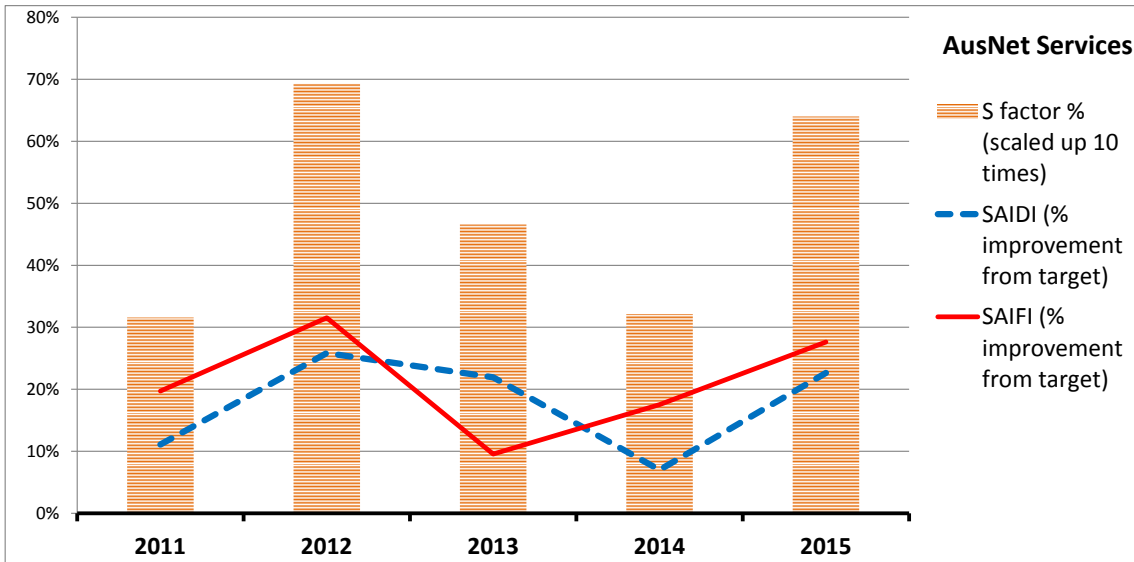
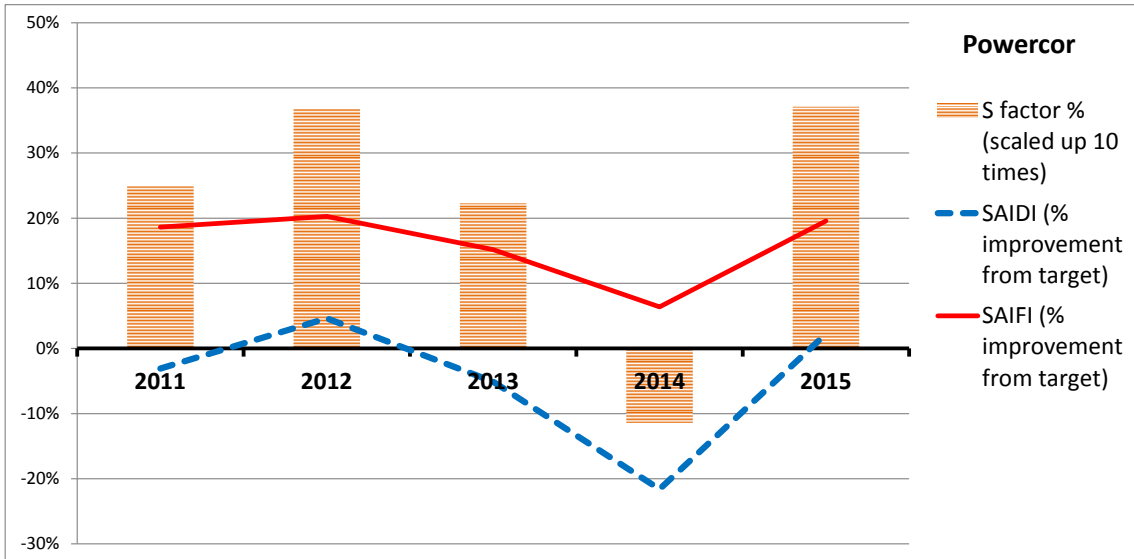
The charts below show distributors' SAIDI and SAIFI against the performance targets) in normalised form for 2011–15^{47,48}

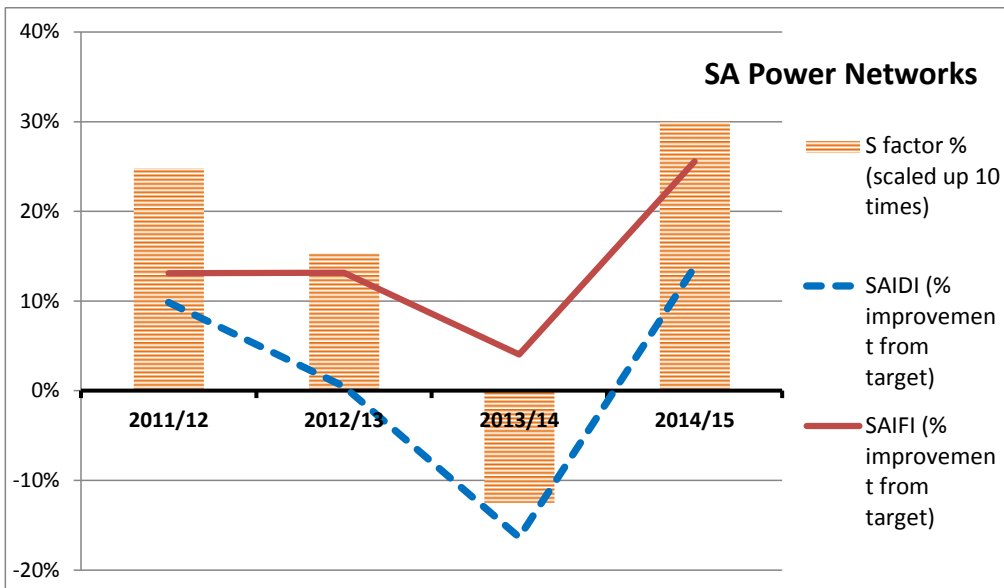
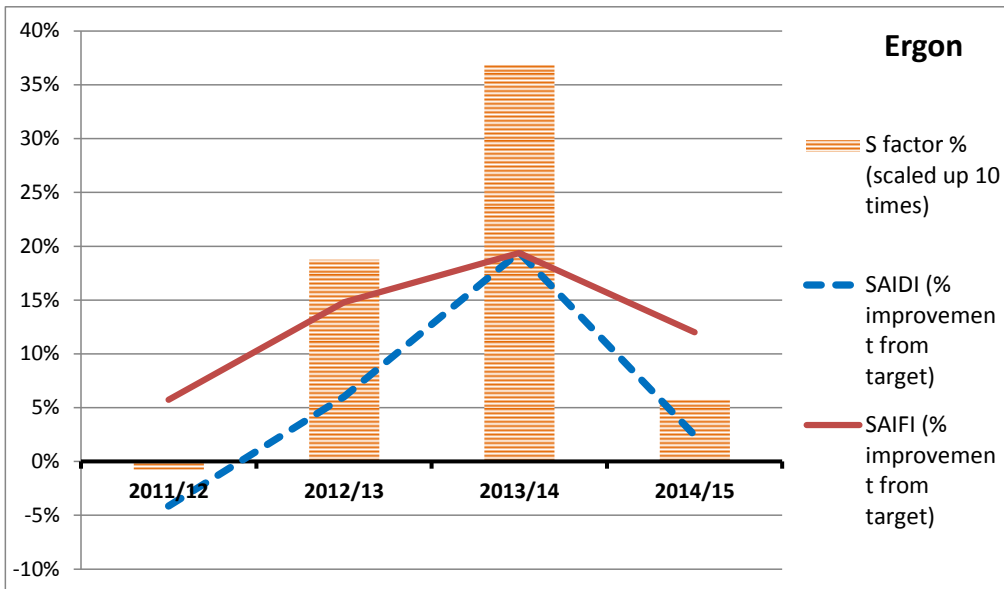
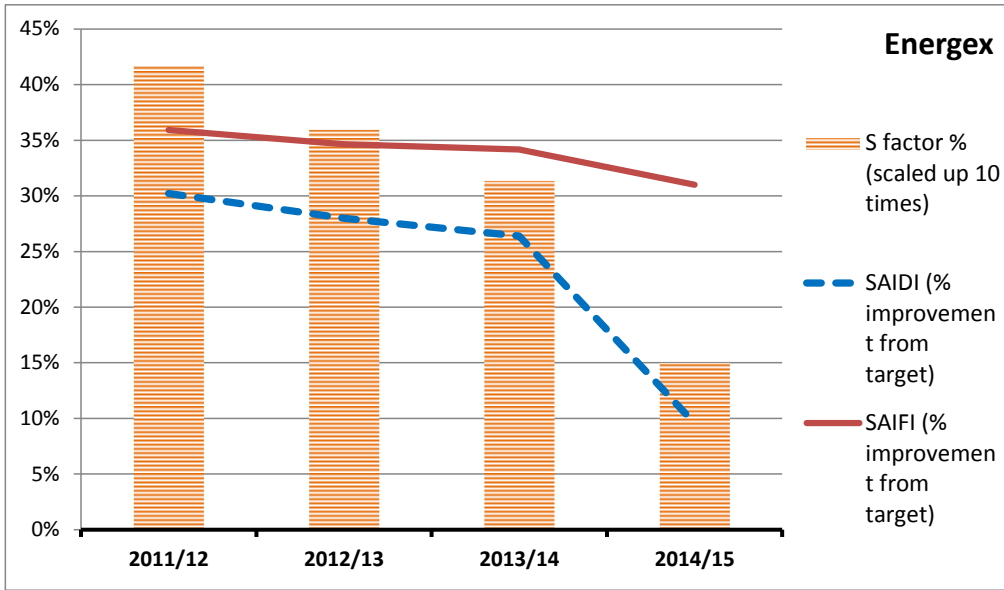


⁴⁷ Notes:

- SAIDI and SAIFI overall charts are normalised by scaling different network type performance by the relevant incentive rates so that the charts are reflective of the s-factor impacts of these measures.
- The MAIFI and call centre performances (both have effect on the s-factor) not shown on the charts.
- Charts show improvement from targets (improvements are shown as above the base line).
- The s factor outcomes are scaled up by a factor of 10 for easy presentation.

⁴⁸ Historical performance for TasNetworks not shown because its STPIS measures were on per kVA capacity base instead of the STPIS scheme standard of per customer base.





C Adjusting the targets where the reward or penalty exceed the revenue cap under the STPIS

We propose the following steps to make adjustments to the performance targets:

Assuming the calculated total raw s-factor for the regulatory year t is $(P + P_0)\%$, with $P\%$ being residue above or below the revenue at risk, typically $\pm 5\%$, as set during the revenue determination. We also assume the distributor only has CBD and urban networks. We need to make the adjustment according to the SAIDI and SAIFI targets for the forthcoming regulatory period, between CBD and urban networks, based on the incentive rates respectively. The VCR of previous regulatory control period will be adopted for the calculation of SAIFI and SAIDI incentive rates.

First, consistent with our proposed new ratio between SAIDI and SAIFI incentive rates, we allocate $0.6P$ to SAIDI minutes and $0.4P$ to SAIFI.

1. $P = P_{SAIDI} + P_{SAIFI}$
2. $P_{SAIDI} = 0.6P$
3. $P_{SAIDI} = P_{SAIDI,CBD} + P_{SAIDI,urban}$
4. $P_{SAIDI,CBD} = P_{SAIDI} \times \frac{ir_{SAIDI,CBD}}{ir_{SAIDI,CBD} + ir_{SAIDI,urban}}$
5. $P_{SAIDI,urban} = P_{SAIDI} \times \frac{ir}{ir_{SAIDI,CBD} + ir_{SAIDI,urban}}$
6. $SAIDI_{CBD} = \frac{P_{SAIDI,CBD}}{ir_{SAIDI,CBD}} = \frac{P_{SAIDI}}{ir_{SAIDI,CBD} + ir_{SAIDI,urban}}$
7. $SAIDI_{Urban} = \frac{P_{Urban}}{ir_{SAIDI,urban}} = \frac{P_{SAIDI}}{ir_{SAIDI,CBD} + ir_{SAIDI,urban}}$
8. $SAIDI_{CBD} = SAIDI_{Urban}$
9. Y_n is the number of years covered by the regulatory control period where such adjustments are necessary. Typically this value is 5.

Therefore, SAIDI performance targets for CBD and urban networks require same adjustments. Dividing this adjustment by the number of years covered by the relevant regulatory control period " Y_n ", the corresponding adjustment to the annual performance target is derived:

$$10. \frac{1}{Y_n} SAIDI_{CBD} = \frac{1}{Y_n} \frac{P_{SAIDI}}{ir_{SAIDI,CBD} + ir_{SAIDI,urban}} = \frac{3}{5Y_n} \frac{P}{ir_{SAIDI,CBD} + ir_{SAIDI,urban}}$$

Secondly, we allocate the rest of P to SAIFI

11. $P_{SAIFI} = 0.4P$
12. $P_{SAIFI} = P_{SAIFI,CBD} + P_{SAIFI,urban}$
13. $P_{SAIFI,CBD} = P_{SAIFI} \times \frac{ir_{SAIFI,CBD}}{ir_{SAIFI,CBD} + ir_{SAIFI,urban}}$

$$14. P_{SAIFI,urban} = P_{SAIFI} \times \frac{ir}{ir_{SAIFI,CBD} + ir_{SAIFI,urban}}$$

$$15. SAIFI_{CBD} = \frac{P_{SAIFI,CBD}}{ir_{SAIFI,CBD}} = \frac{P_{SAIFI}}{ir_{SAIFI,CBD} + ir_{SAIFI,urban}}$$

$$16. SAIFI_{Urban} = \frac{P_{Urban}}{ir_{SAIFI,urban}} = \frac{P_{SAIFI}}{ir_{SAIFI,CBD} + ir_{SAIFI,urban}}$$

$$17. SAIFI_{CBD} = SAIFI_{Urban}$$

Similarly, SAIFI annual performance targets for CBD and urban networks require same adjustments as below:

$$18. \frac{1}{y_n} SAIFI_{CBD} = \frac{1}{Y_n} \frac{P_{SAIFI}}{ir_{SAIFI,CBD} + ir_{SAIFI,urban}}$$

D Simplify the calculation of the s-factor

Below is proposed formula to apply to standard control services revenues. We consider that the formula gives effect to the revenue cap.

Figure D.1 Proposed revenue cap to apply to distributors' standard control services

1. $TAR_t \geq \sum_{i=1}^n \sum_{j=1}^m p_t^{ij} q_t^{ij}$ $i = 1, \dots, n$ and $j = 1, \dots, m$ and $t = 1, 2, \dots, 5$
2. $TAR_t = AAR_t + I_t + S_t + B_t + C_t$ $t = 1, 2, \dots, 5$
3. $AAR_t = AR_t$ $t = 1$
4. $AAR_t = AAR_{t-1} \times (1 + \Delta CPI_t) \times (1 - X_t)$ $t = 2, \dots, 5$

where:

TAR_t is the total allowable revenue in year t.

p_t^{ij} is the price of component 'j' of tariff 'i' in year t.

q_t^{ij} is the forecast quantity of component 'j' of tariff 'i' in year t.

t is the regulatory year.

AR_t is the annual smoothed revenue requirement in the Post Tax Revenue Model (PTRM) for year t.

AAR_t is the adjusted annual smoothed revenue requirement for year t.

I_t is the sum of incentive scheme adjustments in year t. Likely to incorporate but not limited to revenue adjustments for f-factor. To be decided in the distribution determination.

S_t is the s-factor amount for regulatory year t.⁴⁹ As it currently stands, the s-factor will incorporate any adjustments required due to the application of the AER's STPIS.

B_t is the sum of annual adjustment factors in year t. Likely to incorporate but not limited to adjustments for the unders and overs account. To be decided in the distribution determination.

C_t is the sum of approved cost pass through amounts (positive or negative) with respect to regulatory year t, as determined by the AER. It will also include any end-of-period adjustments in year t. To be decided in the distribution determination.

⁴⁹ The meaning for year "t" under the price control formula is different to that in Appendix C of STPIS. Year "t+1" in Appendix C of STPIS is equivalent to year "t" in the price control formula of this decision.

ΔCPI_t is the CPI for year t, as determined in the relevant distribution determination.

X_t is the X-factor in year t, incorporating annual adjustments to the PTRM for the trailing cost of debt where necessary. To be decided in the distribution determination.

Figure D.2 Proposed S-factor formula

$$5. S_t = AR_{t-2} S_{t-2}^{\%} \times (1 + \Delta CPI_{t-1}) - Sb_t + Sb_{t-1} \times (1 + \Delta CPI_{t-1}) \quad t = 1, \dots, 5$$

S_t is the s-factor for regulatory year t.⁵⁰ As it currently stands, the s-factor will incorporate any adjustments required due to the application of the AER's STPIS.⁵¹

AR_{t-2} For t=1 and 2, AR_{t-2} represents the annual smoothed revenue requirement in the Post Tax Revenue Model (PTRM) for year 4 and 5 of the previous regulatory control period, respectively.

$S_{t-2}^{\%}$ is the sum of the raw s-factors for all parameters for regulatory year t -2, before banking, expressed as a percentage of revenue (or prices) calculated annually through the compliance assessment. For t =1 and 2, $S_{t-2}^{\%}$ represents the sum of the raw s-factors for year 4 and 5 of the previous regulatory control period, respectively.

Sb_t is the s-bank for the current regulatory year t, expressed as real dollars amounts.

Sb_{t-1} is the s-bank for the previous regulatory year t-1, expressed as real dollar amounts. For t =1, it represents the s-bank for year 5 of the previous regulatory control period.

⁵⁰ The meaning for year "t" under the price control formula is different to that in Appendix C of STPIS. Year "t+1" in Appendix C of STPIS is equivalent to year "t" in the price control formula of this decision.

⁵¹ AER, *Electricity distribution network service providers - service target performance incentive scheme*, 1 November 2009.