9 February 2018

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

Dear Chris

Draft Decision – Proposed amendment to Service Target Performance Incentive Scheme (December 2017)

I refer to the consultation that the AER is undertaking on its proposed amendments to the Service Target Performance Incentive Scheme (**Draft STPIS**). SA Power Networks provides the following comments about the Draft STPIS.

Changing the threshold of a momentary interruption from one minute to three minutes

SA Power Networks supports the adoption of the proposed three-minute duration threshold to measure MAIFI[1]. As detailed in our previous submissions on this matter, the adoption of the three-minute threshold will maximise the number of customers that can benefit from the implementation of automated restoration e.g. via Fault Detection, Isolation and Recovery (**FDIR**) also known as self-healing networks.

In addition, the adoption of a three minute threshold would create alignment with European jurisdictions (eg Ofgem) and provide greater alignment with American practices (which use a five-minute momentary interruption threshold). This could enable improved international benchmarking of reliability performance.

SA Power Networks also supports the adoption of a momentary interruption event (**MAIFIe**[2]) which treats several momentary interruptions within a three-minute period as one event. The impact on a customer from a single momentary interruption or a few momentary interruptions within a very short time period is similar. Consequently, it is an improved measure over MAIFI, which records all momentary interruptions.

We note that the example in the Draft STPIS of MAIFIe and MAIFI depicted by Figure 2 (page 27) should have a MAIFI of three, not two, as the customers experience three, not two, momentary losses of supply prior to supply being permanently restored.

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1 Momentary Average Interruption Frequency Index
2 Momentary Average Interruption Frequency Index event (MAIFIe)

Ratio of SAIFI and SAIDI incentive rates

The AER has proposed a change in the ratio of the incentive between SAIDI[3] and SAIFI[4]. The AER has justified the proposed change on the decline of CAIDI[5] and to provide greater incentives for distributors to improve their operational response to supply interruptions. The AER has concluded that distributors' operational response to supply interruptions has declined due to the increase in CAIDI. This conclusion is incorrect for SA Power Networks and likely for other distributors too.

The CAIDI measure only measures the average restoration time of customers who experience an interruption, unlike the SAIDI and SAIFI measures which measure average duration and frequency of interruptions for all customers (ie includes customers who do not experience an interruption). If a distributor makes improvements on its network which reduces the number of short duration interruptions, SAIFI and SAIDI will reduce but CAIDI will increase. In this case, the decline in CAIDI results from eliminating shorter duration interruptions not a decline in operational response times.

In response to an electricity supply interruption, distributors will typically, where practical, restore supply to some customers via switching, prior to repairing the fault and then restoring supply to all customers. Consequently, some customers affected by the interruption will experience a shorter duration and others a longer duration than the average duration of the interruption. A simple example shown in Attachment 1 illustrates how replacing a manual switch with an automatic recloser device on a distribution feeder experiencing two faults can improve overall customer outcomes. These improvements are reflected in improved SAIFI and SAIDI outcomes but the CAIDI performance actually declines – not by increasing the average duration of interruptions experienced by customers but merely by the mathematical outcome of improving SAIDI and SAIFI.

It is of concern to SA Power Networks that the AER has used the decline in CAIDI as one of the reasons to adjust the incentive rates between SAIDI and SAIFI to provide greater incentives for distributors to improve their operational response to interruptions. The example in Attachment 1 demonstrates that CAIDI can decline without a decline in operational response.

SA Power Networks has analysed the contribution to SAIFI from interruptions which are typically less than and more than the average distribution system CAIDI. Figure 1 below shows the contribution to SAIFI from interruptions of two hours or less, 8 hrs or less but more than 2 hrs, and greater than 8 hours. The figure shows a significant reduction in interruptions where the duration is 2 hours or less and shows no decline in outages between 2 and 8 hours and more than 8 hours. This reinforces our conclusion that our CAIDI is declining due to the elimination of shorter duration interruptions.

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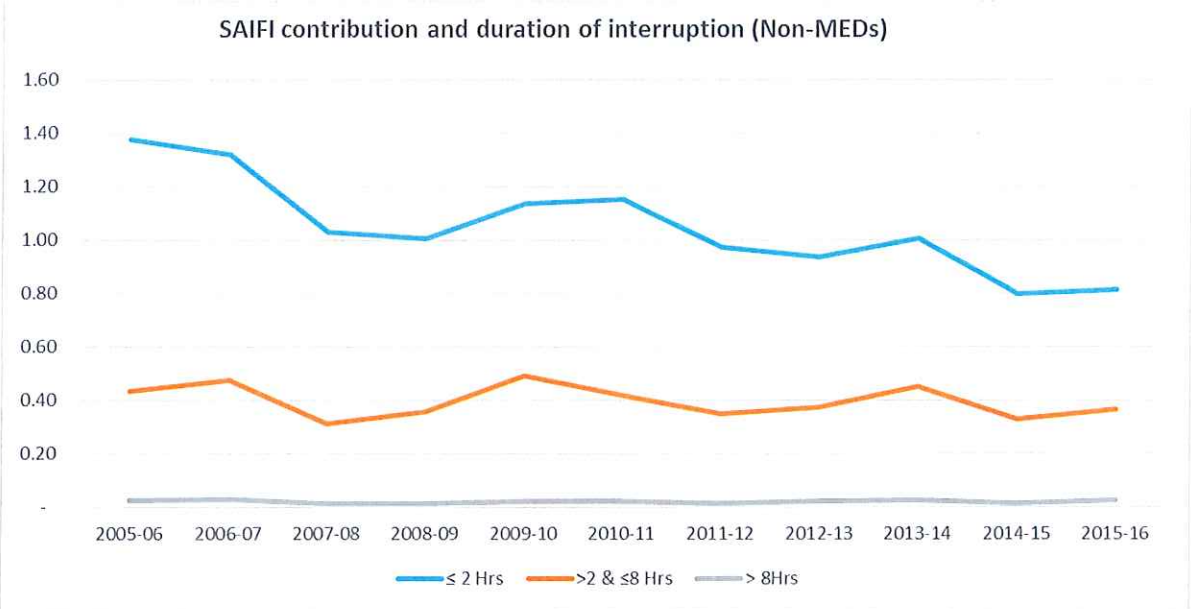
3 SAIDI – System Average Interruption Duration Index is a measure of the average time in minutes that customers are without supply in a specified period (eg annually).

4 SAIFI – System Average Interruption Frequency Index is a measure of the average number of interruptions customers experience in a specified period (eg annually).

5 CAIDI – Customer Average Interruption Duration index is a measure of the average time to restore supply to customers who experience an interruption.

Figure 1 - Contribution to SAIFI from interruption in duration bands



SA Power Networks considers that the current incentive rate ratio between SAIDI and SAIFI is delivering benefits to customers, with some customers no longer experiencing interruptions. We consider that a customer not experiencing an interruption would be valued more by customers than a marginal reduction in the duration of interruptions.

Catastrophic event days

SA Power Networks is concerned that the AER is not proposing to disregard the impacts on normalised reliability due to Catastrophic Days (**CEDs**) because there is no objective method in how to classify CEDs and then exclude them from the determination of Major Event Days (**MEDs**). SA Power Networks demonstrated the effects of CEDs on the determination of MEDs, and consequently normalised reliability, in its previous submission and the additional information provided at the AER's request.

The AER Service Target Performance Incentive Scheme (**STPIS**) Guidelines use the Institute of Electrical and Electronic Engineers (**IEEE**) 2.5 Beta Method as defined in IEEE 1366™ – 2012, to determine MEDs and exclude them from the normalised reliability performance. The AER permits a distributor to use a different method to classify MEDs subject to AER approval. One of the criteria for exclusion is that the different method results in a more normalised distribution of transformed daily SAIDI data than using the default method.

The IEEE, like the AER, could not determine an objective method to classify CEDs, but permits the regulator and the utility (eg distributor) to agree on a method to determine CEDs and then use that method to exclude CEDs from the classification of MEDs. The IEEE documented its findings and recommendation about catastrophic events in its IEEE Std 1366™- 2012 which states in section 5.3:

> "However, the extremely large daily SAIDI values may tend to skew the distribution of performance toward the right, causing a shift of the average of the data set and an increase in its standard deviation. Large daily SAIDI values caused by catastrophic events will exist in the data set for five years and could cause a relatively minor upward shift in the resulting reliability metric trends"; and

"It is recommended that the identification and processing of catastrophic events for reliability purposes should be determined on an individual company basis by regulators and utilities since no objective method has been devised that can be applied universally to achieve acceptable results."

We consider that the AER's STPIS Guideline should permit the exclusion of CEDs subject to AER approval.

SA Power Networks advises that the number of MEDs and CEDs provided in Table 1 and Table 2 (Explanatory Statement Pg. 20) are incorrect. The number of MEDs for SA Power Networks in 2008-09 was three not zero, and in 2012-13 was five not three, which then provides an average of 3.5 not 2.9. The number of CEDs in 2013-14 was one not zero providing an average of 0.1 not 0.0. In addition, SA Power Networks had a CED in 2016/17.

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

SA Power Networks agrees that the performance in a year where the STPIS cap is exceeded needs to be adjusted to reflect the actual reward or penalty received for that year. We consider that the simplest method to exclude the component of the performance that exceeded the cap is to adjust the performance in that year to align with the STPIS cap. This adjusted performance can then be used to establish the targets for the future regulatory control period.

SA Power Networks used this method when we changed from the Box-Cox to the natural logarithm method (ie default STPIS method) for determining MEDs. This method was detailed in our regulatory proposal and attached spreadsheet. This method for adjusting performance for a year and then using that adjusted performance to establish the STPIS targets for the future Regulatory Control Period (**RCP**) was accepted and adopted by the AER when establishing our targets for the 2015-20 RCP. The method used the same proportional adjustment for both SAIDI and SAIFI of each feeder category.

SA Power Networks has some concerns with the AER's proposed method detailed in Appendix C of the Explanatory Statement:

- it does not exclude the telephone response STPIS outcome from the overall STPIS cap when calculating the reliability target adjustment;
- it does not appear to cater for the STPIS incentive being based on the difference between the performance for that year and the STPIS target for that measure for each feeder category;
- equation 10 uses $3/Y_n$ not $0.6/Y_n$ as $P_{SAIDI} = 0.6P$ (equation 2) not $P_{SAIDI} = 3P$; and
- it does not define $SAIDI_{CBD}$, $SAIDI_{Urban}$, $SAIFI_{CBD}$, nor $SAIFI_{Urban}$.

SA Power Networks would welcome the opportunity to explain our proposed method as detailed in our regulatory submission for the 2015-20 period to the AER.

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

SA Power Networks has no concerns with the proposed changes to unmetered loads (as we exclude these as customers), the definition of feeders and standardising the reporting of affected customers.

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

SA Power Networks has no comments about the proposed position.

Interrelationships with the Demand Management Incentive Scheme

SA Power Networks has no comments about the proposed position.

Other minor refinements to the scheme

SA Power Networks is concerned by the proposed simplification of the calculations for the s-factor calculations, as this will in effect reduce the incentives on distributors to maintain or improve performance as measured by the STPIS.

The current and proposed STPIS delay the STPIS outcome for at least two years. For example, the STPIS outcome from Year 1 of a RCP is not fully recovered until the end of Year 3 of the RCP. Consequently, in Net Present Value[6] (**NPV**) terms this two-year delay in recovery devalues the STPIS incentive by more than 10%. The current STPIS provides partial compensation for this devaluation by applying the STPIS Outcome (ie percentage of revenue) to the Maximum Allowed Revenue (**MAR**) in the year of recovery, as typically the revenue is greater in future years of a RCP.

The AER's proposal to use the STPIS Outcome year's MAR (ie STPIS outcome for Year 1 will use Year 1's MAR) to calculate the dollar value of the STPIS Outcome will eliminate the partial compensation, and reduce the incentive on distributors to maintain or improve performance. SA Power Networks has estimated that if this change were to apply to the current 2015-20 RCP, the STPIS incentive would be reduced for us by about 5%.

SA Power Networks strongly disagrees with the AER's conclusion that delaying the STPIS Outcome by more than two years provides a wind fall gain to distributors as it actually results in a reduction in the STPIS incentive, due to the time value of money, as highlighted above (ie NPV reduces even more).

Consequently, SA Power Networks considers that the current STPIS incentive recovery should not be amended as proposed by the AER.

If you have any queries or require further clarification on our submission, please contact Mr Grant Cox on 08 8404 5012 or grant.cox@sapowernetworks.com.au.

Yours sincerely

Richard Sibly
Acting Head of Regulation

[6] Using nominal Weighted Average Cost of Capital (**WACC**) which includes CPI.

Introduction

Consider a High Voltage (**HV**) distribution feeder which is supplied via a recloser (**R1**) at location 'A', it is connected to a switch (**Sw1**) at 'B' and ends at 'C'. The distribution line supplies a total of 1,000 customers with 500 connected to each network section A-B and B-C.

In this simplified example, we will consider two scenarios one the base case and other (Scenario 1) where switch Sw1 is replaced with a recloser (R2). The HV feeder experiences two faults in the reporting period F1 and F2. The location of the two faults is shown in the diagram below. The explanation below details the process taken to repair each fault, the reliability impact of each fault and the impact on the HV Feeder's reliability of the two faults, under the Base Case and Scenario 1.

Reliability measures

The reliability measures used in this example are:

System Average Interruption Duration Index (**SAIDI**) indicates the total duration of interruptions for the average customer during a predefined period (eg a year). It is measured in minutes. Mathematically, this is given in Equation (1)

$$SAIDI = \frac{\sum Customer\ minutes\ of\ interruption}{Total\ number\ of\ customers} \quad (1)$$

Where:

"*Customer minutes of interruption*" = number of customers interrupted multiplied by the time (in minutes) they were interrupted.

System Average Interruption Frequency Index (**SAIFI**) indicates how often the average customer experiences a sustained interruption over a predefined period (eg a year). Mathematically, this is given in Equation (2).

$$SAIFI = \frac{\sum customers\ interrupted}{Total\ number\ of\ customers} \quad (2)$$

Customer Average Interruption Duration Index (**CAIDI**) is the average time taken to restore supply to a customer who has been interrupted. Mathematically, this is given in Equation (3)

$$CAIDI = \frac{\sum Customer\ minutes\ of\ interruption}{Total\ number\ of\ customers\ interrupted} \quad (3)$$

Base case

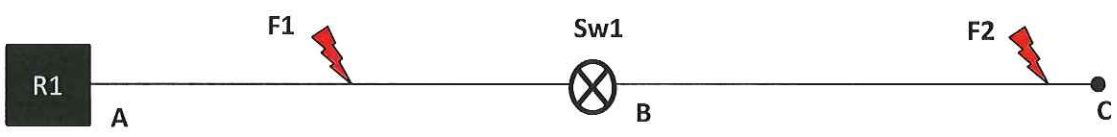


Figure 2 - Simplified HV feeder - base case

The following describes the process to restore supply to customers affected by the two faults under the base case and the reliability outcome for the feeder and each section (ie A-B and B-C).

Fault 1

Customers report a supply interruption, crews are then dispatched, travel to site and then patrol the line commencing at 'A' and find fault F1 after 60 minutes. Crews take a further 60 minutes to repair the fault and supply is restored to all customers after a total of 120 minutes. As the fault F1 affects all customers the SAIFI is 1 (ie 1,000 customers affected) and the SAIDI is 120 minutes (ie total time customers are without supply) and CAIDI is also 120 minutes (ie SAIDI/SAIFI). The Table below shows the reliability outcome from Fault F1 for the feeder and each section.

Reliability (Fault F1)	SAIDI	SAIFI	CAIDI
Section A-B	120 (ie 120*500/500)	1 (500/500)	120 (ie 120/1)
Section B-C	120 (ie 120*500/500)	1 (500/500)	120 (ie 120/1)
Feeder	120 (ie 120*1000)/1000)	1 (ie 1000/1000)	120 (ie 120/1)

Fault 2

Customers report a supply interruption, crews are then dispatched, travel to site and then patrol the line from recloser R1 to switch Sw1 and find no fault in section A-B, so supply is restored to customers supplied by section A-B (ie 500 customers) after 60 minutes by opening switch Sw1 and closing recloser R1. Crews then patrol section B-C and locate the fault F2 after a further 30 minutes, which takes a further 60 minutes to repair and then restore supply to customers connected to section B-C (ie 500 customers). As the fault F2 affects all customers the SAIFI is 1 (ie 1,000 customers affected) and the SAIDI is 105 minutes (ie 500 customers for 60 minutes plus 500 customers for 150 minutes divided by the number of customers ie 1,000). The CAIDI is 105 minutes (ie 105/1). The Table below shows the reliability outcome from Fault F2 for the feeder and each section.

Reliability (Fault F2)	SAIDI	SAIFI	CAIDI
Section A-B	60 (ie 60*500/500)	1 (500/500)	60 (ie 60/1)
Section B-C	150 (ie 150*500/500)	1 (500/500)	150 (ie 150/1)
Feeder	105 (ie (60*500+150*500)/1000)	1 (ie 1000/1000)	105 (ie 105/1)

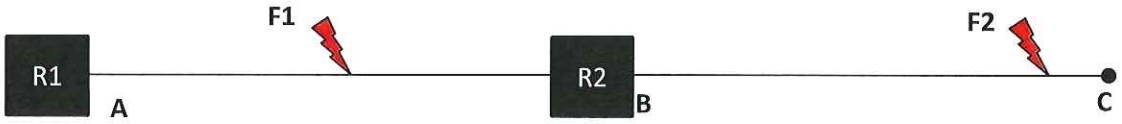
Summary

The Table below highlights the combined reliability measure outcomes for SAIDI, SAIFI and CAIDI from the two faults for the base case.

Reliability (Fault F1 and F2)	SAIDI	SAIFI	CAIDI
Section A-B	180 (ie (120*500+ 60*500)/1000)	2 (ie (500+500)/500)	90.0 (ie 180/2)
Section B-C	270 (ie (120*500+ 150*500)/500)	2 (ie (500+50)/500)	135.0 (ie 270/2)
Feeder (Total)	225 (ie 1000*120+ 60*500+ 150*500)/1000)	2 ((ie 1000+1000)/1000)	112.5 (ie 225/2)

Scenario 1 (additional recloser at B)

Now let us determine the SAIDI, SAIFI and CAIDI for the two faults (ie F1 and F2) if we replace switch Sw1 with a recloser R2.



Fault 1

There is no change to the reliability outcome for all customers associated with Fault F1.

Fault 2

As the fault F2 is beyond recloser R2, the line is isolated at point B, customers connected to section A-B no longer experience a prolonged interruption but may experience a momentary interruption.

Customers report a supply interruption, crews are then dispatched to recloser R2 to commence the patrol. Crews travel to recloser R2 and commence the patrol of section B-C and locate fault F2 after 80 minutes (ie a shorter time than under the base case as crews can travel directly to B without patrolling A-B first), the fault is repaired after a further 60 minutes and supply restored to customers connected to section B-C. The total time customers connected to section B-C are without supply is 140 minutes. As the fault F2 only affected customers connected to B-C the SAIFI is 0.5 (ie 500/1,000) and the SAIDI is 70 minutes (ie 500 customers for 140 minutes divided by the total number of customers (ie 1,000)). The CAIDI is 140 minutes (ie 70/0.5). The Table below shows the reliability outcome from Fault F2 for the feeder and each section for Scenario 1.

Reliability (Fault F2)	SAIDI	SAIFI	CAIDI
Section A-B	0	0	n/a
Section B-C	140 (ie 140*500/500)	1 (500/500)	140 (ie 140/1)
Feeder	70 (ie 0+140*500)/1000)	0.5 (ie 500/1000)	140 (ie 70/0.5)

Scenario 1 - Summary (after reliability improvement)

The Table below highlights the SAIDI, SAIFI and CAIDI for each section associated with the two faults for Scenario 1.

Reliability (Fault F1 and F2)	SAIDI	SAIFI	CAIDI
Section A-B	120 (ie (120*500+ 0*500)/500)	1 ((500+0)/500)	120.0 (120/1)
Section B-C	260 (ie (120*500+140*500)/500)	2 ((500+500)/500)	130.0 (260/2)
Feeder (Total)	190 (120*1000+140*500)/1000)	1.5 (1000+500)/1000	126.7 (190/1.5)

Conclusion

There is no difference to in the reliability outcome associated with Fault F1, with all customers on the feeder still experiencing the interruption which lasted for 120 minutes (ie no change). However, there is considerable improvement in F2 comparing the base case and Scenario 1. Customers connected to section A-B no longer experience a sustained interruption and customers connected to B-C experience an interruption with the duration reduced from 150 to 140 minutes. As a result of installing the recloser, all customers see an improvement in reliability outcomes, but the overall HV feeder CAIDI declined by 13% from 112.5 minutes to 126.7, despite no decline in individual customer response times (ie how quickly they are restored in response to an interruption).