

20 September 2018

Essential Services Commission of South Australia
GPO Box 2605
ADELAIDE SA 5001

Attention: Rowan McKeown, Senior Policy Officer

Dear Rowan,

SA Power Networks' 2020-25 reliability standards

SA Power Networks welcomes the Essential Services Commission of South Australia's (ESCoSA's) Draft Decision and provides the following comments on the decision.

In summary, we:

- support ESCoSA's decision to not require an improvement in reliability performance, as it reflects customers' satisfaction with current reliability outcomes;
- do not support establishing reliability standards using the proposed ten regions. We consider that reliability standards should be established using the current feeder categories, as:
 - this aligns us with the national regime and all main land jurisdictions;
 - it is not possible to effectively normalise the annual regional reliability performance to minimise the annual variation in the reliability measures to acceptable levels; and
 - the adoption of regional standards will eliminate a significant number of currently 'poorly performing' rural feeders from the 'poorly performing feeder' scheme;
- propose ongoing reporting of performance at a regional level to enable customers to determine the average level of historic performance within their region;
- consider that if region based standards were implemented, then a 10-year average should be used to establish those targets. Further, the targets should be rounded up to the nearest five minutes or 0.05 interruptions;
- support the amendments to the Guaranteed Service Level (GSL) payment regimes. However, we consider that the inclusion of Major Event Days (**MEDs**) in the reliability duration regime does not achieve ESCoSA's stated objective, as their inclusion does not primarily target customers where it is not cost effective to improve that performance;
- accept the inclusion of restoration of supply targets, but note that the measure being contemplated can indicate a decline, when there has been an improvement.
- support a change in of the Adelaide Business Area boundary, but recommend a smaller area than proposed;
- support the continuation of a 'best endeavours' performance regime; and
- support the proposed requirement for SA Power Networks to publicly report on our performance to improve transparency;

SA Power Networks provides its detailed comments and suggestions on the proposed service standards for the 2020-2025 Regulatory Control Period (**RCP**) below.

Normalisation of reliability performance

In our submission to the Objectives and Process paper, we highlighted the importance of normalising reliability performance. The current reliability Unplanned System Average Interruption Duration Index (**USAIDI**) and Unplanned System Average Interruption Frequency Index (**USAIFI**) measures are normalised by excluding interruptions that commence on Major Event Days (**MEDs**). A MED is a day where the USAIDI contribution from those interruptions exceed a predetermined threshold (**T_{MED}**). The threshold determines statistical outliers. On average over the past 13 years (ie 1 July 2005 to 30 June 2018) there have been 3.1 MEDs per annum.

There is strong alignment between MEDs and Bureau of Meteorology (**BoM**) verified significant weather events (**SWE**). Over the last 13 years, 39 in a total of 40 MEDs coincided with a day where the BoM verified a SWE. The remaining MED was associated with vandalism of a zone substation. Note that the BoM reports on average about 40 SWEs each year.

T_{MED} is determined in accordance with the methodology detailed in the IEEE Std 1366:2012. That standard highlights that major events (ie MEDs) must be analysed separately from normal daily operation, as the impact on reliability performance of the network from MEDs is statistically significant and would camouflage any underlying trend in daily operational performance.

The normalisation of reliability performance by excluding MEDs works effectively at the total distribution system level, but is less effective at a feeder category level and even less effective at a region level.

We appreciate ESCoSA's reasons for proposing the introduction of region reliability standards, however, we are concerned by the significant annual variability (except Adelaide Metropolitan Area) in regional reliability performance, notwithstanding normalisation. The significant annual variation is due to number of factors, for example:

- low customer numbers connected in most regions (for example a single interruption affecting 3,500 customers for four hours may have a 20-minute impact on regional USAIDI, but only a one-minute impact at the distribution network level);
- the number and severity of local SWEs (**LMSWEs**), which are not associated with MEDs;
- the significant variation in the number of interruptions that occur annually in a region (for example the number of days which have an interruption within a region has varied from a low of 102 to a high of 199 days); and
- the time (ie mobilisation and travel) to site can vary significantly within a region, depending on the distance our crews need to travel to locate and repair the fault.

For example, Upper North's annual USAIDI over the last 13 years (until 30 June 2017) has varied from a low of 167 minutes to a high of 941 minutes. If the impact of LMSWEs are excluded the variation is reduced but still significant at 162 to 356 USAIDI minutes. There is a similar variation in the Eastern Hills USAIDI after excluding LMSWE from a low of 173 to a high of 396 minutes. This variation makes it difficult for SA Power Networks to demonstrate the use of 'best endeavours' to meet an average target. This is despite no decline in performance over the longer term.



SA Power Networks has examined two normalisation methods which are excluding MEDs and excluding LMSWE Days. A LMSWE day is a day where a regional based USAIDI threshold is exceeded and the BoM has verified that a SWE occurred on that day. The threshold is the greater of three percent of the average annual USAIDI or so that the USAIDI threshold results on average in no more than 3.5 days in a region being classified as LMSWE Days.

Figure 1 and Figure 2 below show the overall, and the two normalised USAIDIs for the ESCoSA proposed regions of Eastern Hills and Upper North. Note that the un-normalised (overall) USAIDI scaling is on the right-hand axis of the graphs.

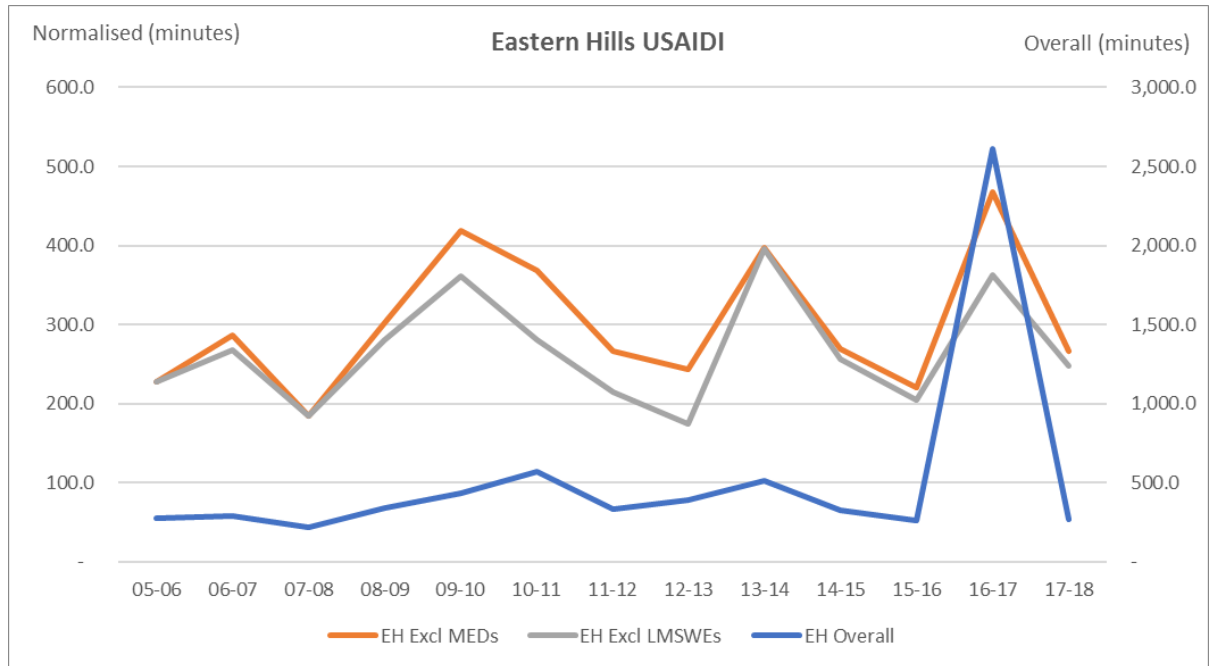


Figure 1 - Eastern Hills Region - overall & normalised performance



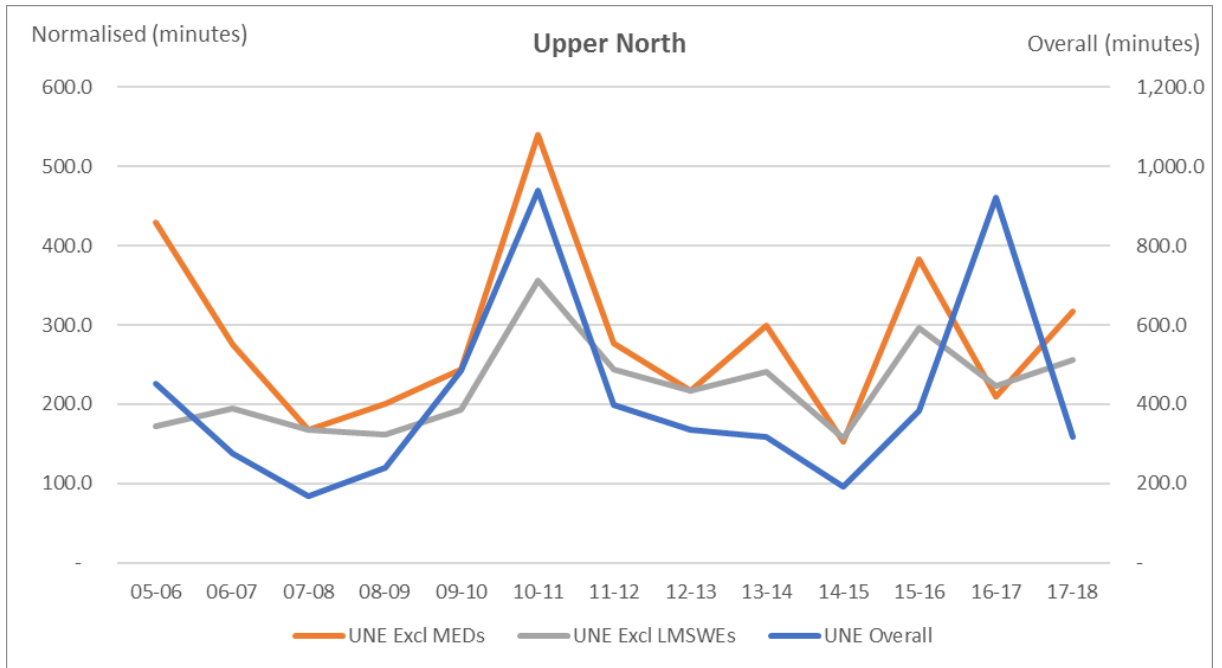


Figure 2 - Upper North Region - overall & normalised performance

Both graphs show significant variation in both the overall and normalised USAIDI from year to year. It could be interpreted that there has been a gradual decline (increasing USAIDI) in performance since 2005/06 in both these regions, but the decline is a result of the increased severity of the SWEs since July 2010 not due to SA Power Networks' performance.

Further, the normalisation process is not perfect as it does not exclude interruptions that occur after the LMSWE day or a MED, but results from the SWE.

SA Power Networks has determined the 10-year (2008-09 to 2017-18) and five-year (ie 2013-14 to 2017-18) average USAIDI for each of the proposed regions. For eight of the ten regions (including the ABA) there has either been no decline or an improvement in USAIDI comparing the 5-year to the 10-year average. For the other two regions there is a slight decline in performance. The decline in the recent performance of the Eastern Hills has been driven by performance in 2013-14 and 2016-17 and in the South East Region by the performance in the 2013-14 year. See Figure 3 below:



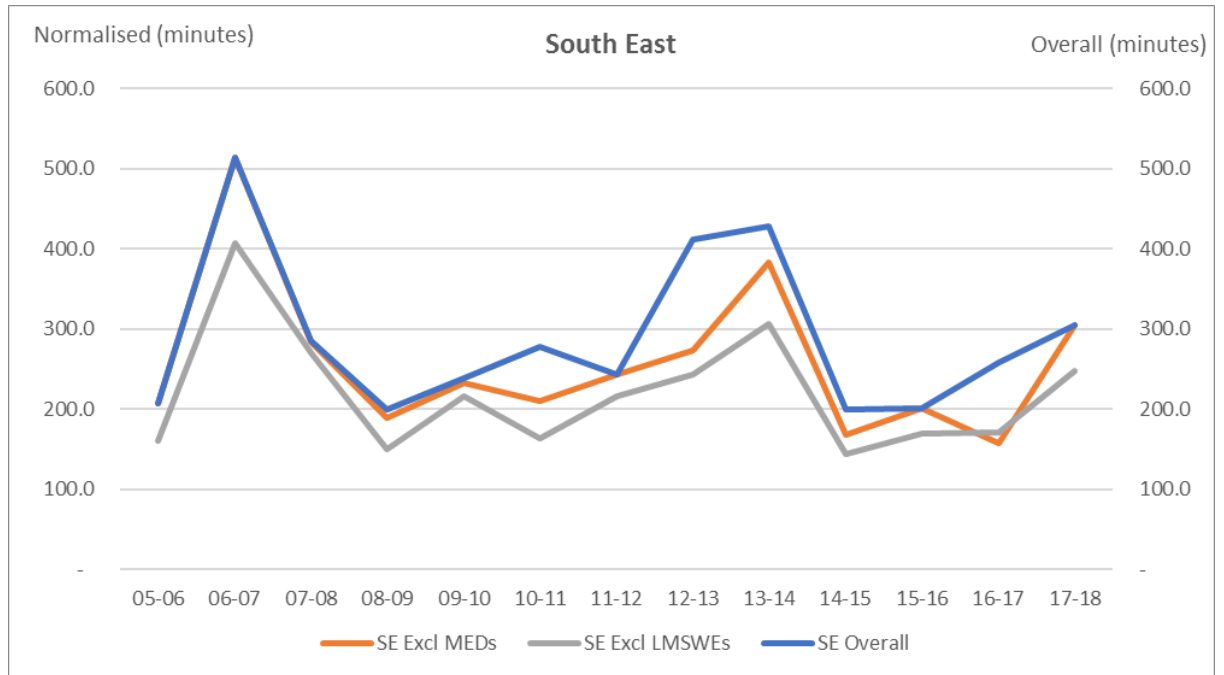


Figure 3- South East Region - overall & normalised performance

The above analysis demonstrates that setting reliability targets at a region level (ie supplying relatively small customer numbers) will result in significant annual variability in reliability performance despite using different methods to normalise the reliability performance.

Neither the exclusion of MEDs or LMSWE Days provides an effective normalisation method but both provide some reduction in annual variation. SA Power Networks would recommend normalising the performance by excluding MEDs as this is used to normalise reliability in most other jurisdictions, and by the Australian Energy Regulator (AER) in its Service Target Performance Incentive Scheme (STPIS) and the Australian Energy Market Commission’s (AEMC) report on National Reliability Measures.

SA Power Networks recommends that reliability service standards be established on the existing feeder categories, which is the approach used in all other jurisdictions except Tasmania. Feeder categories are also used in the AER’s STPIS and in the AEMC’s report on National Reliability.

If ESCoSA were to adopt region based standards, SA Power Networks considers that a 10-year average should be used to establish the targets. Further, the targets should be rounded up to the nearest five minutes or 0.05 interruptions.

Feeder Category based vs Regional based reliability standards

SA Power Networks considers that it is too early to conclude that the current Feeder Category reliability service standards could lead to a decline in regionally based reliability performance as suggested by ESCoSA. SA Power Networks’ current assessment is that, adjusting for the impacts of MSWEs and localised SWE separately, there has been no decline in underlying reliability performance of the network from a regional perspective.



We are concerned about the significant variation in annual reliability that occurs at a region level due to the small number of customers supplied in that region. The small customer numbers mean that normal variation in the number or severity of interruptions can result in large annual variations in reliability. These large annual variations are not an indication of a decline in a region's reliability performance from one-year to the next. The typical variation¹ in a region's (excluding ABA) USAIDI excluding MEDs is 72%, in comparison to the average annual variation in a feeder category (excluding ABA) of 30%. It is more manageable to achieve the average target based on feeder categories compared with the proposed regions.

SA Power Networks can report reliability on a regional basis as it currently does in accordance with ESCoSA's Guideline No.1. The cost of providing dual reporting (ie for both regions and feeder categories) is minimal, provided that the basis for recording an interruption remains aligned with our reporting obligations under other regulators' reliability reporting regimes. For example, ESCoSA adopts the same definition of a customer and a momentary interruption as is used in the AER's Distribution Reliability Measures Guideline. However, if we must provide reasons for normal variations in performance in a region's reliability, our reporting costs will significantly increase.

Consequently, we advocate for a retention of the existing regime where by reliability standards are established by the national feeder category definitions with reporting on reliability, performance at the proposed regional level. This reporting will enable the monitoring of a regions performance and will enable customers to determine the average level of historic performance within that region.

Restoration of supply times

ESCoSA has proposed the reintroduction of restoration of supply times standards. SA Power Networks accepts the inclusion of restoration targets however notes that the supply restoration measures (ie Customer Average Interruption Duration Index (CAIDI) and “% of customers restored within x hours” (% restoration)) used prior to 1 July 2005 can indicate a decline in performance when customers have not experienced a decline in their restoration of supply times.

The decline in the measure is associated not with a decline in individual customers restoration times but a change in the mix of customer restoration times that go into the supply restoration measure. The SAIDI and SAIFI measures include customers who have not had an outage whereas CAIDI and % restoration only include customers who have had an outage. Reducing the number of customers who have shorter than average duration outages can result in a decline (increase in CAIDI) in these measures. We explain how this occurs in the following paragraphs.

SA Power Networks, like most distributors, typically improves reliability performance by either:

1. minimising the number of customers affected by a fault on the network (ie a fault still occurs but is 'sectionalised' so that less customers lose their electricity supply); and/or
2. eliminating a systemic fault, or protecting against a systemic cause (these actions eliminate further faults from this cause).

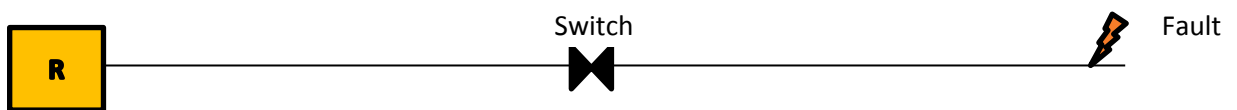
Sectionalising faults will improve both SAIDI and SAIFI but result in a decline in the previous supply restoration measures (eg CAIDI). This is despite no customer experiencing a longer duration interruption post the improvement actions. It is merely a result of how the measure is calculated.

¹ Variation based on one standard deviation either side of the average.



Interruptions to supply typically involve multiple stages of restoring supply to customers and some customers will have their supply restored before other customers. The supply restorations are performed manually by field crews who locate the fault, isolate or repair it, and restore supply to remaining customers. This results in groups of customers having different periods that they were without supply for the fault/interruption. The average duration of the interruption is the weighted (by customer numbers) average interruption duration.

The following diagram illustrates how SAIDI, SAIFI and CAIDI are determined for a fault on a simplified high voltage feeder. The feeder is divided into two halves by a manually operated switch with each half of the feeder supplying 500 customers. The feeder power supply source is from recloser (R).



A fault occurs as shown near the end of the feeder and recloser (R) isolates the feeder, so that all 1000 customers lose supply. Crews are dispatched and patrol the feeder from recloser (R) to the switch and determine no fault in this section so manually restore supply after 60 minutes to that section of the feeder by opening the switch and closing the recloser (ie 500 customers' supply is restored after 60 minutes). Crews then patrol the section beyond the switch and locate the fault and repair it and restore supply to the remaining customers after a further 120 minutes (ie 500 customers have been without supply for 180 minutes). Consequently, the average restoration of supply time for all customers is 120 minutes (ie $(500 \times 60 + 500 \times 180)$ divided by 1,000) and the percentage of customers restored within 2 hours (120 minutes) is 50% (ie 500 customers out of 1,000 customers were restored in 1 hour and 500 restored in 3 hours).

If a reliability improvement is made to the feeder which automatically isolates the prolonged interruption to only customers beyond the switch (such as replacing the switch with a sectionaliser or another recloser), then the customers in the section between the recloser and the switch would no longer have a one-hour interruption. If we assume that it took 10 minutes to patrol and restore supply to customer on the source side of the switch, then the crews would take 170 minutes (ie 180 less 10 minutes) to restored supply to the customers beyond the switch, who were affected by the interruption.

The Table below highlights the resulting SAIDI, SAIFI, CAIDI and the supply restoration measures prior to and post the reliability improvement.



| Reliability Improvement | SAIDI | SAIFI | CAIDI | % customers restored in 2 hours |
|-------------------------|-----------------------------------|-----------------------|-----------------------------------|--|
| Prior to | 120 [(500*60 + 500*180) /1000] | 1.0 (500+500)/1000 | 120 [(500*60 + 500*180) /1000] | 50% (500/1000) |
| Post | 85 [(500*170)/1000] | 0.5 (500/1000) | 170 (500*170/500) | 0% (all customers restored after 2 hours) |

The Table highlights that while the improvement action has improved SAIDI and SAIFI performance CAIDI and the percentage of customers restored in 2 hours has declined.

Figure 4 below illustrates the outcome of our reliability improvements since 2005/06 and the associated changes in the reliability measures of USAIDIn, USAIFIn, CAIDIn and percentage of customers restored in 2 hours.

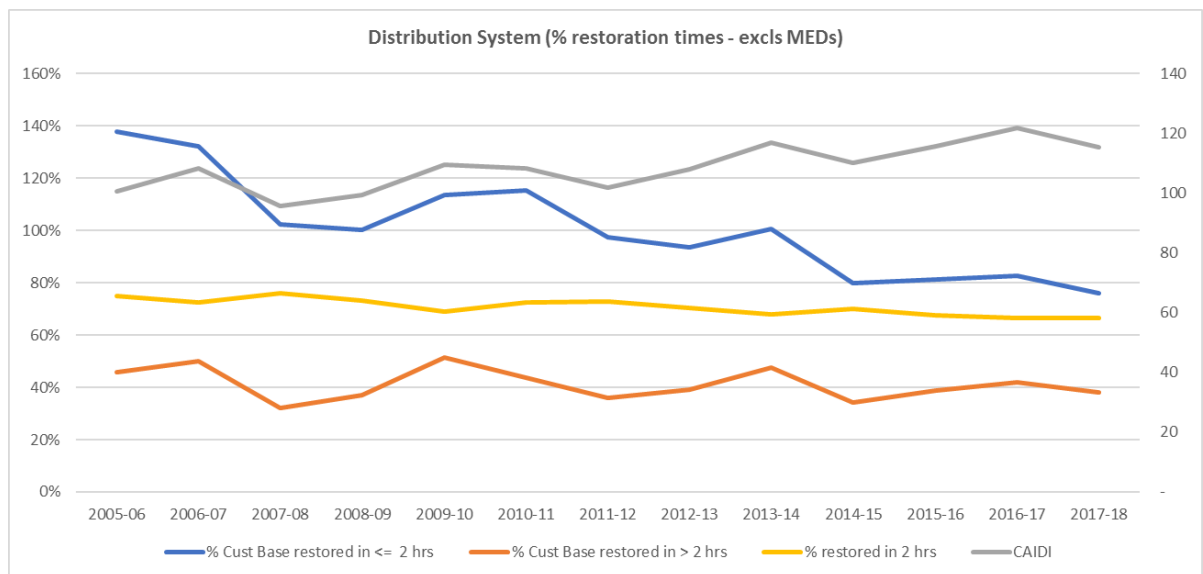


Figure 4 – Distribution System restoration of supply times (excluding MEDs)

Figure 4 above highlights that the customers interrupted as a percentage of the customer base (or USAIFIn) has improved over the last 13 years. This improvement is mainly the result of eliminating shorter duration outages for some customers. This is demonstrated by the significant decline in the number of customers who experience outages of 2 hours or less as a percentage of the total customer base. In addition, there has been a marginal improvement in the number of customers who experience outages longer than two hours as a percentage of total customer base. These two customer beneficial outcomes result in a decline in CAIDI and a decline in the number of customers restored in 2 hours as a percentage (ie decline from 75% to 67% over the last 13 years) of the customers interrupted. These declines merely reflect a significant reduction in the number of customers interrupted who were previously included in the CAIDI calculations.



Adopting an alternative measure such as the percentage of the customer base who experience an outage of more than x hours, would better reflect customer outcomes.

Low reliability feeders

The potential adoption of region based reliability standards, instead of feeder category based standards, means that some feeders previously classified as low reliability feeders, will no longer be classified as low reliability feeders. This change will affect regions where the historic average reliability performance is worse than the feeder category based reliability targets. For example, 26 feeders on Eyre Peninsula that are consistently on the poorly performing feeder list will no longer be classified as poorly performing because of adopting region based reliability standards.

We consider that this supports our proposal for adopting feeder category based reliability but still reporting reliability by regions.

Guaranteed Service Level payments

SA Power Networks agrees with ESCoSA's objective that reliability guaranteed service level (**GSL**) payments should target customers who are "unlikely to receive future service improvements due to the high costs of improving their supply". This objective implies that customers who consistently receive poor reliability performance should receive reliability duration GSL payments and not those who receive one off poor performance or poor performance in a single year. The proposed amendment to the reliability duration GSL regime goes part way to achieving that objective.

However, as the regime still includes the impacts of MSWE (ie MEDs), customers who receive poor performance in one year due to a MED(s) will receive a duration GSL payment. This is not congruent with the poor reliability feeder regime where a feeder is only considered to have poor performance if that performance is over two consecutive years. Further, the current poor performing feeder regime excludes MEDs.

The exclusion of MEDs from the proposed scheme would more effectively target customers who are unlikely to receive future service improvements due to the high costs of improving their supply, and better align to the poor performing feeder regime. Further it more appropriately narrows the payment of GSLs to factors that are within the reasonable control of distributors. Reliability performance during MEDs, and consequently duration GSL payments associated with MEDs, is not within a distributor's reasonable control.

The Table below highlights the variability in reliability duration GSL payments in recent years associated with the proposed total annual duration GSL payments, with MEDs and excluding MEDs, and the USAIDI contribution from MEDs.



Table 1 - Proposed reliability duration GSL payments including and excluding MEDs

| | 2013/14 | 2014/15 | 2015/16 | 2016/17 | 2017/18 |
|----------------|-------------|-------------|-------------|--------------|-------------|
| Including MEDs | \$6,863,280 | \$2,102,880 | \$1,626,720 | \$19,198,980 | \$1,136,340 |
| MED USAIDI | 113 | 28 | 9 | 329 | 0 |
| Excluding MEDs | \$1,753,920 | \$747,120 | \$366,780 | \$543,840 | \$1,136,340 |

The Table highlights a strong correlation between MED USAIDI and total duration GSL payments, under the proposed GSL regime. That is, the proposed regime results in payments associated with MSWE in a year and not on customers who consistently receive poor performance. The Table highlights that the exclusion of MEDs would result in more stable payments, and consequently will target customers who consistently receive poor performance, and more closely align with the scheme’s objective.

SA Power Networks advocates for a total annual duration GSL regime that excludes MEDs and note that payment thresholds could be adjusted to provide the payment to more or fewer customers based on their willingness to pay.

SA Power Networks supports the other aspects of the proposed GSL regime and agrees with ESCoSA’s reasoning for removal of the appointment and Street Light Out payments. If ESCOSA were to retain a SLO GSL payment, we advocate for a simplification of the current regime, and to align it with other jurisdictions, where the GSL payment is only made to a customer whose supply address is adjacent to the SLO and then only a single payment (ie no multiple payments are made for the same light). This provides a suitable incentive to quickly repair the SLO, if no other performance monitoring mechanisms are in place.

Amendment to Adelaide Business Area/CBD boundary

The current Adelaide Business Area (**ABA**) boundary was established in 1998, on the basis that it supplied predominately commercial customers. In the ABA approximately 95% of the powerlines are underground. In addition, each feeder supplied similar numbers of customers. The number of residential customers supplied within the current boundary has significantly increased in recent times due to the rapid development of apartment towers, in the ABA, without an increase in the consumption (total ABA consumption has remained steady around 480 MWh pa). Currently, about 40% of customers in the ABA are commercial with the remainder residential. The increase in residential customers has mainly occurred near the Whitmore Square Substation where many cable faults have occurred recently.

SA Power Networks considers that there is justification for expanding the ABA boundary. However, we consider that the proposed boundary expands the CBD into areas we consider are more Urban in nature than CBD. We can see the justification for including the new Royal Adelaide Hospital and the University of South Australia city campus and areas west of Morphett Street where high-rise buildings have been or are currently being built.



We consider that the ABA boundary should be expanded as proposed by ESCoSA but should exclude the area west of Morphett Street and south of Grote Street, as these are more Urban in nature and do not warrant the classification of ABA and a higher standard (and cost) of service.

We support ESCoSA's proposed boundary except that the area west of Morphett Street and south of Grote Street be excluded.

Customer communication standards

It is currently voluntary for customers to register for SMS notification from SA Power Networks through Power@MyPlace. Customers have the option when registering for Power@MyPlace to select items (eg outages, meter reading) about which to receive SMS messaging. SA Power Networks messages customers when we become aware of an outage that affects that customer. The messaging assists reducing the number of telephone calls to our Faults and Emergency telephone number. The reduced call volume helps other customers to report higher priority (eg wires down) issues.

We consider that there is sufficient incentive for us to provide accurate messaging to customers without imposing a service standard. It is in our interest to ensure that our messaging is as accurate as possible, and for us to continue to modify and refine our process and messages to find the best possible approach to using SMS messaging for customer benefit.

The requirement to monitor overall SMS communication quality can be extraordinarily onerous. There are many times that issues outside of our control impact our communication and we may incur significant time/resource, to justify our messaging diverting the resources we currently use to continuously improve our messaging.

There has only been one extraordinary instance (associated with severe storm activity in December 2016) where there were issues associated with our SMS messaging. This single poor instance should not justify the introduction of a SMS messaging standard.

SA Power Networks does not consider that introducing an SMS messaging standard would benefit customers.

SA Power Networks looks forward to working cooperatively with ESCoSA to finalise the reliability standards for the 2020-25 RCP.

If you wish to discuss this submission or clarify any points please contact Mr Grant Cox on 8404 5012.

Yours sincerely



Doug Schmidt
General Manager Regulation

