S&C ELECTRIC COMPANY
Excellence Through Innovation

141 Osborne Street
South Yarra VIC 3141
Australia

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

Our Ref: JC 2018-053

9 February 2018

Dear Mr. Pattas,

S&C Electric Company submission to the Proposed Amendment to the Service Target Performance Incentive Scheme (December 2017)

S&C Electric Company welcomes the opportunity to provide a response to the review of measures to the support the good performance of Australia's Electricity distribution network service providers.

We are still concerned about the redefinition of a momentary outage to 3 minutes and we have concerns about the approach to driving improvement in SAIDI via a rebalancing of SAIDI to SAIFI.

S&C Electric Company has been supporting the operation of electricity utilities in Australia for over 60 years, while S&C Electric Company in the USA has been supporting the delivery of secure electricity systems for over 100 years. S&C Electric Company not only supports the "wires and poles" activities of the networks, but has delivered over 8 GW wind, over 1 GW of solar and over 45 MW of electricity storage globally, including several battery projects in Australia.

S&C Electric are particularly interested in facilitating the development of markets and standards that deliver secure, low carbon and low cost networks and would be very happy to provide further support to the Australian Energy Regulator on the treatment and potential of emerging technologies and approaches.

Yours Sincerely

Dr. Jill Cainey
Global Applications Director – Energy Storage
Email: jill.cainey@sandc.com
Mobile: 0467 001 102

141 Osborne Street
South Yarra VIC 3141
Australia

Comments

Change in the Definition of Momentary Outages

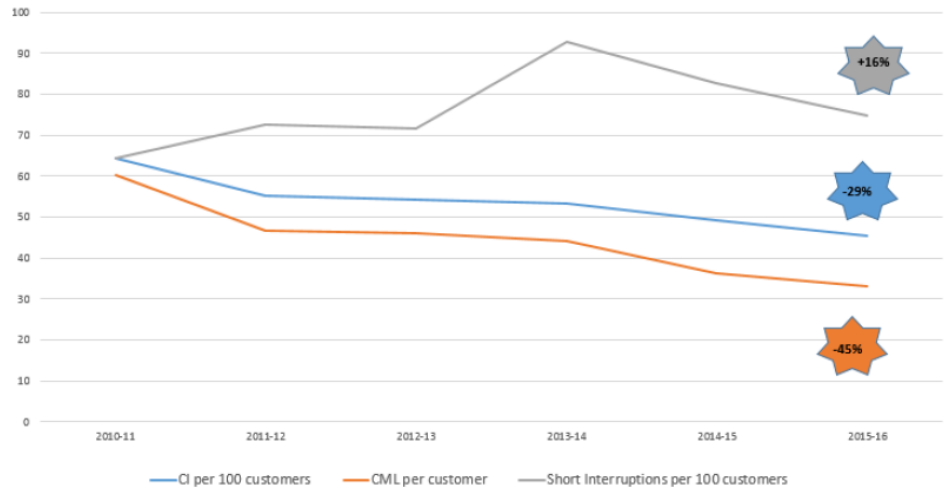
The AER in the "Proposed amendment: Service Target Performance Incentive Scheme (STPIS)" (page 10) has accepted the earlier AEMC recommendation to change the definition of a momentary interruption from "less than one minute" to "less than 3 minutes". We provided commentary on this point in our response dated 24 February 2017 (JC-2017-002) and note the AER's comments.

It is still troubling that by moving from a 1 to 3-minute definition for a momentary interruption, the performance of all networks is likely to be immediately improved purely on the basis of mathematics, rather than any investment or change in approach by a DNSP. It will also make comparisons between the performance in this regulatory period and the next complex. However, we welcome the AER's plan to remove sub-three-minute interruption from historic data (p12, Explanatory Statement: Draft Distribution Reliability Measures Guidelines, June 2017).

While the move to define a momentary outage to "less than 3 minutes" would align the definition to that of other countries, such as the UK, outages of less than one minute are still problematic and we share our experience from the UK, where the Regulator Ofgem, is currently starting work on the RIIO-2 arrangements.

SAIDI and SAIFI improve, but MAIFI does not – UK example

Data from the UK indicates that while incentive schemes have successfully resulted in improvements in SAIDI and SAIFI, transient outages have increased. Momentary outages in the GB system are defined as outages of 3 minutes or less.



Note: CI is Customer Interruptions which is equivalent to SAIFI x 100 and CML is Customer Minute Lost, which is equivalent to SAIDI.

Figure 1: Trends in reliability performance for GB DNSPs from 2010.

This increase in momentary outages arises because the technical approach to improve SAIDI and SAIFI typically results in an increase of transient outages.

141 Osborne Street
South Yarra VIC 3141
Australia

Approximately 70 to 80% of faults affecting overhead lines are transient in nature. A key part of the way in which interruptions in GB system have been tackled for transient faults is to replace fuses on tee or spur lines with auto-sectionalisers. This meets the objectives of improving reliability in terms of longer duration interruptions because you no longer have transient faults blowing fuses which requires the line crews to go to the field searching for a problem that is no longer there. However, when you take fuses out and use sectionalisers together with up-line breakers or reclosers, momentaries increase significantly, because all customers on the main feeders are now affected. Such technologies worked well in the conventional energy system, but aren't well suited to the modern grid.

Unacknowledged impact of Momentary Outages

Impact on Demand customers

We do not support the AER's decision to increase the definition of a momentary outage to an outage lasting 3 minutes or less. The argument that for most customers and outage of 3 minutes is no more annoying than an outage of 1 minutes, ignores the impact that momentary outages have on industrial processes and electronic equipment. There is also an unacknowledged issue with the impact of momentary outages on Distributed Generation (DG), particularly small-scale generation, which is likely to disconnect as a result of outages of less than a minute.

While the cost to the average domestic customer of moving from 1 to 3 minutes appears to justify this decision, the cost of managing momentary interruptions (including those that result from poor power quality) will move from the network, who levies to cost on the customer, direct to the customer who will then have to make their own arrangements for ensuring a secure supply. This is particularly the case for industrial and commercial customers. So the cost is still borne by the customer, but removed from the network and becomes another hidden cost, like the cost of all outages of any definition, that is borne by the end user.

Any outage of any duration is likely to drive customers towards a solution that is less network reliant and more self-determined and independent. This may reduce the size of the cost base and is not helpful to the continued operation of our networks. It also penalises those less able to invest in appropriate solutions to ensure a reliable electricity supply.

Impact on Distributed Generation (DG)

Even a short duration interruption of, say, 30 seconds can trip generation on the distribution feeders and lead to Distributed Generation (DG) being off for several minutes or longer. This has several consequences:

- the renewable resource is unable to export;
- a proportion of demand on the distribution network which was previously met by distributed generation now needs to be met through additional spinning reserve from conventional generators;
- The NEM already has an issue with frequency control, which will not be helped by short-term, intermittent losses of DG.

Momentaries have a major impact when large amounts of DG are connected to distribution feeders as they will knock the DG offline. Generation connections have a direct financial loss associated with such outages. Further, when all the DG is knocked offline on a feeder, typically they are off for several minutes or longer before they can restart. For this window, the DNSP needs to fully support power to that feeder,

141 Osborne Street
South Yarra VIC 3141
Australia

which previously had a lower apparent load because the DG was offsetting some demand. This means the DNSP still needs to provide capacity for peak demand with no DG support, even though that capacity is only called on for minutes at a time, which is in clearly inefficient.

The tolerance for such short interruptions as increasing volumes of DG penetrate the distribution feeders will become less and less over time.

It is still our view that momentary outages should remain defined as outages of a minute or less, since outages of a few seconds will have negative impacts on customers, large and small, and distributed generation, large and small, with consequential negative impacts on network operation.

Ratio of SAIFI and SAIDI

We are concerned that the attempt to rework the ratio (change to 60/40) to ensure that not only SAIFI improves, but that SAIDI also improves, is a mathematical "fudge factor" that may well not have the intended outcome, just as the original 50/50 ratio had unintended consequences.

It would be preferable to incentivise explicitly each performance metric that is deemed to be critically important, rather than combining a number of metrics (e.g. SAIFI, SAIDI and CAIDI) in a complex calculation and hope that the desired improvements result.

The AER is focused on the CAIDI measure in assessing performance and the outcomes, which drives the calculation approach. The following measures, which improve reliability, may actually increase CAIDI because of the way it's measured:

- Automating feeder restoration
- Improving coordination between protection devices
- Adding more protection/sectionalizing devices
- Preventing transient faults from causing sustained outages

These approaches may result in interruptions that do not involve repairs becoming momentaries, leaving the longer duration interruptions which involve repairs within the CAIDI statistics.

AER characterises 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.

It's true that improvements in SAIFI tend to be capex dominated although some opex will be relevant. However, improvements in supply restoration time could be driven by a range of strategies including both opex approaches such as improved deployment of field crews, greater numbers of field crew, and capex strategies such automating feeder restoration, auto-reclosing, greater sectionalisation. The latter improve restoration times and SAIDI, but may actually increase the CAIDI metric if the approaches used drive the interruptions below the current 1-minute or proposed 3-minute threshold for momentary outages.

In examples from the UK, Western Power Distribution (WPD) is heavily beating its Customer Minutes Lost (CML, SAIDI) targets by targeting using large numbers of operational staff to reduce restoration times

141 Osborne Street
South Yarra VIC 3141
Australia

under their "Target 60" approach. This strategy targets restoring 85% of HV supply interruptions within 60 minutes. By contrast, UK Power Networks (UKPN) is achieving a similar outcome with greater focus on distribution automation.

While a great deal of work is demonstrated in Appendix A, to better balance SAIFI and SAIDI it would be ideal to have the incentive scheme driven by what customers value as indicated by willingness to pay research or equivalent, rather than trying to pre-determine which strategies the DNSPs should be adopting, which is likely to have unintended consequences. That is, what is the value of avoiding an interruption rather than reducing the number of minutes lost? The current assumption that each SAIFI reduction will reduce SAIDI by 60 to 80 minutes isn't well demonstrated and, if the reductions in SAIFI occur through adopting reclosing strategies or, greater automation this may be skewed towards interruptions, that are shorter duration than average.

In example 3 (Appendix A), AER has assumed that introducing reclosers on a feeder could lengthen the average restoration times. There will be a distribution of interruption lengths across faults and feeders on a network. The investment to reduce SAIFI via reclosers, may address more of the shorter duration outages, turning them into momentaries, therefore driving the average CAIDI up as it leaves a greater proportion of the longer duration interruptions involving repairs within the statistics. Reclosers don't make restoration times worse, this is more an anomaly in the CAIDI calculation due to having separate momentary and sustained interruption metrics.

By restating the ratio of SAIDI to SAIFI and giving a higher weighting to SAIDI, the duration of outages may be addressed, most likely through capex approaches. In RIIO-ED1 (GB Scheme) we estimate that the balance is 73 % on SAIDI and 27 % on SAIFI and this has seen improvements in both SAIDI and SAIFI. Below is an example from Electricity North-West. During the period 2001-02 to 2016-17 they achieved a 51 % improvement in SAIFI and a 50 % improvement in SAIDI, however, CAIDI deteriorated by 1 % over the same period (essentially static), demonstrating the complexities of the relationships between the various metrics.

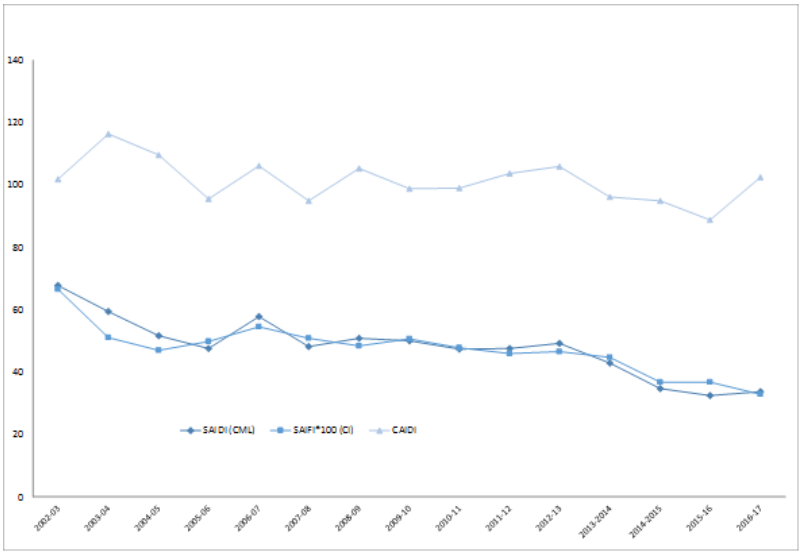


Figure 2: Trends in reliability performance for Electricity North-West from 2002/3.

141 Osborne Street
South Yarra VIC 3141
Australia

Summary

The proposed rebalancing is intended to drive performance improvements over the next determination period, which is likely to see a rapid shift in the environment DNSPs operate in and significant changes to the connectee profile, both demand and generation (AER Issues Paper, January 2017). Outages of any length with have an impact on all customers and the STPIS needs to deliver performances that support the rapidly changing environment. Are the AER convinced that the 60/40 SAIDI to SAIFI rebalancing will deliver the desired outcomes or will the metrics and calculations need further work in the future to resolve unintended consequences?