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South Australian Council of Social Service

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Mr Neville Henderson
Chairman
NEM Reliability Panel
Australian Energy Markets Commission
PO Box A2449
Sydney South NSW 1235

Lodged Online

26 December 2015

Dear Mr Henderson,

RE: Reliability Panel Issues Paper - System Restart Standard (Ref: REL0057)

SACOSS thanks the Panel for the opportunity to comment on the System Restart Standard Issues Paper.

As the peak body for the community services sector in South Australia, SACOSS has a long– standing interest in the delivery of essential services. Our advocacy is informed by our members; organisations and individuals who witness the impact when a basic necessity like electricity is not present, hence our interest in this issue.

The current transformation in the energy market, especially in South Australia, make this review one of the most important reviews in recent times despite, thankfully, no requirement for a full power system restart across the NEM for generations. Whilst it has been pleasing to see an enhanced focus by the AEMC and AEMO over the past 5 years, further work and attention is still required across the industry to prevent the entire program of works associated with power system restarts falling away to a mere 'procurement' or 'tick-the-box' process. We are certain the power industries in Turkey and India have significantly different perspectives before and after their 2015 and 2012 events respectively.

We understand this Issues Paper deals in risks and consequences that are very technical in nature and complex. However, we believe the underlying principles discussed in the Issues Paper, especially around the SRAS Objective, will have a critical bearing on the outcomes of subsequent SRAS tender periods and ultimately, the success or otherwise of an actual power system restart event.

We wish to note the following important points raised in the Panel's consultation paper:

- Although we agree these events are low probability, high impact, perhaps the greatest responsibility of AEMO (hence the Reliability Panel who set their standards and guidelines), is to ensure we avoid these events wherever reasonably possible, and when they do occur, to limit the impact to consumers;
- We completely agree that there is a need to balance the cost of procuring SRAS services against the expected benefit from increased aggregate reliability;
- It is not enough to have a procurement standard for AEMO: AEMO must be incentivised throughout the system restart standard to ensure that not only is their procurement standard met, but that the TNSP and generator local black start plans, the exercising of those plans, maintenance and performance standards all occur to minimise total restoration time to a particular standard;

- It is appropriate to consider sub-network/region specific issue associated with system restart, especially given the unique mix of generating plant in SA compared to other NEM regions; and
- All actions, standards and performance metrics should be geared towards minimising the time to complete restoration.

SACOSS wishes to move the discussion from a seemingly compliance-based perspective that appears to permeate recent documentation with this issue, towards an outcomes-based perspective, as noted by the Panel in the discussion on the SRAS Objective[1]. The SRAS Objective is to minimise the cost of the major supply disruption, not just the procurement of the SRAS services.

Whilst we note that annual SRAS costs across the market have dropped from approx. $55m to $21m between 2014/15 and 2015/16 (just as AEMO had predicated in January 2013[2] despite the option to supply from the adjacent region being removed), SACOSS remains concerned there has been substantial changes in the level of system restart capability just at a critical transition time in the power system when things could 'slip through the cracks'. Given all the other issues and events that are impacting the price paid by consumers for electricity, it is possible this small benefit (a few dollars per customer annually) may have created a significant number of other, far more costly issues.

With so many separate organisations involved in this issue across the public and private divide, regulated and non-regulated incentives, profit-focussed and not-for-profit commercial drivers, SACOSS believes this particular low risk - high consequence area requires continued and determined focus to ensure that South Australians in particular, as consumers in the State leading the energy transformation, are not used as a case study for future SRAS discussions.

SACOSS affirms the sentiments expressed in the SRAS report to the MCE in 2005 around SRAS having a *public good* characteristic and likely to be region specific[3], hence the responses to the questions posed by the Panel will concentrate on South Australia, although may equally apply to other regions. SACOSS looks forward to continuing to work with the Reliability Panel, AEMC and other bodies going forward to ensure this entire piece of work does not lose sight of the fact it is more than a compliance/procurement activity for all parties involved.

We thank you in advance for your consideration of our comments. If you have any questions relating to the above, please contact SACOSS Senior Policy Officer, Jo De Silva on 8305 4211 or via jo@sacoss.org.au.

Yours sincerely,

Ross Womersley
Executive Director

1 Review of System Restart Standard, Reliability Panel, p14
2 SRAS Issues and Options Paper, p 4, 25 January 2013
3 Proposed NEMMCO Rule for System Restart Ancillary Services, Firecone, p 5

General Response

SACOSS is extremely keen for the Reliability to explore the speed of restoration issue and likely impacts for each region, and offers the following initial information.

Economic Impacts

SACOSS has and will continue to be a strong advocate[4] for the Value of Customer Reliability (VCR) measure determined by AEMO for planning purposes[5]. However, SACOSS also considers relevant a contemporary example in Victoria following a major interruption in January 2007[6], where the direct AND indirect economic impacts were assessed at a value of $600m in today's dollars for a partial impact to the Victorian system (herein referred to as the 'Vic Event').

For the purposes of this assessment, we have used the following assumptions:

- Median SA Operational demand[7] for the last 4 years is approx. 1500MW (see Annex 1);
- Northern Power Station is not available for generation or SRAS (as will be the case from April 2016);
- Torrens Island has 3 B units and 1 A unit that are warm enough for immediate generation;
- Pelican Point is only capable of half-load as indicated through recent running profiles and in recent AEMO announcements[8];
- SRAS sources (Dry Creek and Quarantine[9]) work as expected and all SA synchronous generation (except Snuggery, Port Lincoln and Ladbroke Grove – all due to remote location) are supplied power for safe shut-down, auxiliary loads (approx. 100MW) and commenced export of energy within 4 hours with 600MW of load restored; and
- All demand is restored within 8 hours[10] at an eventual rate of 200MW/hr given the load blocks that would be able to be handled by the smaller sized generating units in SA.

Table 1 shows the possible economic impacts using both methodologies with the length of the event shown at various points.

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[4] SACOSS has expressed this view several times to the AEMC (eg. SACOSS response to AEMC Strategic Priorities for Energy Market Development 2013)

[5] Factsheet Value of Customer Reliability, AEMO, November 2015. Given Residential Customer value is $26,880/MWh and Business Customer value is approx. $44,000, this assessment used a 50:50 share between residential and business customer types to give a weighted SA VCR of $35,800/MWh

[6] In this event, 2300MW was shed (2200 initially and 100MW of smelter load shortly thereafter) and was not fully restored until over 4 hours later (unserved energy was 7100MWh), with the economic effect estimated at approx. $500m ($600m in today's terms) with indirect costs as much as the direct costs http://www.energyandresources.vic.gov.au/energy/safety-and-emergencies/energy-supply-emergencies/january-supply-interruptions-executive-summary

[7] Operational Demand is used (as opposed to total demand) as AEMO has stated it will not allow wind generation to be used until the system rebuild is greater than approx. 40% or the Heywood interconnector is available.

[8] AEMO ESSO Update, October 2015

[9] The 2015 Independent Review of SRAS Process Improvements by DGA Consulting identified Quarantine and Northern Power Station as the 2015/16 SRAS sources (p 27). It is assumed when Northern shuts down in April 2016, Dry Creek units will be enabled for SRAS but this is yet to be confirmed.

[10] Most demand in the March 2015 blackout in Turkey was able to be restored within 8-10 hours although Turkey have a high level of hydro generation capability (which had effectively pushed thermal-gas generation offline) during high running periods.

Table 1: Economic Impact to SA using a Desired Scenario

Time (in hrs)	Demand (MW)	Unserved Energy (MWh)	Accumulated Impact to SA Economy ($m)	
			SA Res/Bus VCR: $35.8k/MWh	Vic Event: $84.5k/MWh
Just prior to event	1500	0	0	0
End 1st Hour	0	1,500	53.7	126.8
End 2nd Hour	250	2,750	98.5	232.4
End 4th Hour	700	4,550	162.9	384.5
End 6th Hour	1100	5,550	198.7	469.0
End 8th Hour	1500	5,750	205.9	485.9

If the above scenario is delayed by just 4 hours with a slower than expected restoration rate, the impacts are even more significant.

Table 2: Economic Impact to SA using a 4-hour Delay Scenario

Time (in hrs)	Demand (MW)	Unserved Energy (MWh)	Accumulated Impact to SA Economy ($m)	
			SA VCR: $35.8k/MWh	Vic Event: $84.5k/MWh
Just prior to event	1500	0	0	0
End 1st Hour	0	1,500	53.7	126.8
End 2nd Hour	50	2,950	105.6	249.3
End 4th Hour	250	5,550	198.7	469.0
End 6th Hour	450	7,750	277.5	654.9
End 8th Hour	850	9,250	331.2	781.6
End 10th Hour	1250	9,950	356.2	840.8
End 12th Hour	1500	10,000	358.0	845.0

If the likelihood of an event was say 1 in 30 years, the economic impacts would be somewhere between $6m and $28m annually using the above two table's outcomes. AEMO is currently procuring SRAS in SA worth $2.3m annually (which still includes Northern Power Station), which effectively implies a probability of an approx. 1 in 90 year event using Table 1's SA Res/Bus VCR impact assessment.

Therefore, although AEMO has met its procurement standard, SACOSS is not convinced the best outcome for SA consumers has necessarily occurred as per the SRAS Objective.

RESPONSES TO SPECIFIC QUESTIONS

Question 1 Time and level of restoration

1. Are the existing timeframes for restoration appropriate (ie, 1.5 hours for restoration of station auxiliaries of generating units that can supply 40 per cent of peak demand in the sub-network and 4 hours for generation capacity equivalent to 40 per cent of peak demand)? If the timeframes are not appropriate, how should they be amended?

2. Do stakeholders consider that the restoration level be maintained at 40 per cent of peak load? If not, what other restoration level should be considered, and why (eg, a different percentage rate, or average demand instead of peak demand)?

3. Is the powering of auxiliaries as an intermediate step a necessary part of the definition of the Standard? What are the costs and benefits of removing the intermediate step and moving to a single timeframe for power system restoration (eg, restore 40 per cent of peak demand within 4 hours)?

SACOSS notes the times suggested above and although reasonable, we are concerned that even if these targets were achieved, the total restoration time may still be unnecessarily delayed because the metrics for performance that are being used are only part of the equation.

The SRAS objective is to minimise the expected costs of a major supply disruption: SACOSS considers that the only way to do this may be to talk in total restoration time, not just the initial 90-minute and 4-hour stages. While SACOSS appreciates that the exact nature of the power systems collapse will be different each time in nature and location, the industry should continue work to a number of likely planning scenarios AND not include reliance on the Heywood interconnector[11].

SACOSS agrees with the general industry sentiment that if SA where ever to experience a major power system failure, it is likely due to a significant failure of the interconnector (irrespective of the reason), hence reliance on this interconnector does not make good sense. SACOSS notes and appreciates that if the interconnector is available and capable of transfers and was simply a natural break-point as anticipated by AEMO, the likely restoration period will be far shorter than had it not been available, but SACOSS is willing to support a system restart regime that would result in SA being able to restore the power system as quickly as possible irrespective of the Heywood interconnector status[12]. Given it took 40+ minutes to resynchronise SA to the eastern states on 1 November 2015 without any power system restart or generation issues, we are comfortable this is a reasonable position.

Therefore, SACOSS would recommend that the Panel considers that the time and level of restoration be more prescriptive and to also include desired restoration targets given typical power system

[11] SA SRAS Presentation, AEMO SRAS 2013 Consultation Process, July 2013 noted two distinct options (supply to Torrens Island area and use of/from the Northern area generation) with reliance on the Heywood interconnector. In July 2015, AEMO noted 2 SRAS sources for SA not including the interconnector.

[12] In February 2009, the Vic-NSW interconnector was heavily affected by the Black Saturday bushfires around Kinglake. One line was out of service for nearly 5 days while towers were replaced. (http://collections.museumvictoria.com.au/items/1760268). The Vic-NSW interconnector is a 2 x 330kV transmission line that appears taller and of a single-circuit nature compared to the Heywood Interconnector (http://www.electranet.com.au/assets/Fact-Sheets/EC.10344-SA-VIC-Interconnector-Upgrade-Factsheet.pdf)

scenarios, thereby transforming this standard to an outputs-based measure rather than inputs-based.

Annex 1 includes information on nearly 4 years' worth of Operational demand in SA using monthly boxplots. SACOSS would like to explore the option with the Reliability Panel of setting a prescriptive restoration number that covers 75% of the typical operational demand (which is around 1700MW) by a set number of hours, say 8 or 12 hours. During periods when operational demand is higher, a greater number of generating plant would be expected to be online and available which should help to both prevent and restore the power system, particularly in SA. Other power system experts can comment on whether power system failures are more likely when the grid is heavily or lightly loaded.

With the inclusion of this information in the standard in SA such as 1700MW of demand in 8 hours, questions such as whether generating plant unit auxiliaries are in service become of function of meeting the overall target which becomes the responsibility of all key stakeholders, not just AEMO and its procurement standard by placing the responsibility on the industry, not just AEMO or the SRAS providers.

In this area, SACOSS would like to understand how much it would cost to have a solution for restoration in 4, 8, 12, 18 and 24 hours for example, given AEMO now has significantly more technical data available to it for 'what-if' analysis[13].

Similarly, we note that the standard measurement should address when the actual load is restored, and not just when AEMO issues the instruction for load to be restored, as these can often be several hours apart.

Question 2: Aggregate Reliability

1. What factors should the Panel consider in determining the level of aggregate reliability?
2. Would it be appropriate for the Standard to include a minimum number of SRAS services in each sub-region? What are the costs and benefits of doing so?

If the above objective to target a restoration level within a set period of time was adopted, items such as the minimum number per region would form an output, not input to the review process. It is possible, given the cost impact assessments above, that some additional money is spent on an annual basis in SA, to ensure a more likely and appropriate outcome. We would like to explore this in more detail with the Reliability Panel going forward as this issue develops over the next year or so and given the regional recovery methodology that will soon be adopted.

With respect to aggregate reliability, SACOSS would also like to explore further, in regions where SRAS supplier numbers have decreased, whether the capability (that has been paid for by generators and consumers in years past) remain in place or are completely removed from service (ie Dry Creek in SA was not selected in this current round, but has the capability effectively been lost?). Is it possible that once the initial capital expenditure has been made for SRAS capability, a much smaller ongoing maintenance fee regime is in place to cover on-going maintenance of the SRAS equipment and staff training, thereby increasing aggregate reliability as the power system changes?

[13] 2015 Independent Review of SRAS Process Improvements, DGA Consulting, p 30

Question 3. Regional variation

1. What types of technical matters or limitations are likely to impact on achieving the Standard?

2. Are there any sub-networks in regions of the NEM where specific technical matters or limitations may be relevant to the Panel's determination of the Standard, including any potential variations to the Standard for any specific sub networks?

3. What types of economic circumstances or considerations should the Panel be mindful of when determining the Standard? How do they relate to the Standard?

4. Are there any sub-networks with specific economic circumstances, such as the presence of sensitive loads that the Panel should consider when determining the Standard, including any potential variations to the Standard for any specific sub-networks?

The significance of wind within SA requires further rethinking from a system restart point of view. Whilst SACOSS recognises there are technical limitations associated with the use of non-synchronous plant as SRAS providers and in a power system that is being restored, the economic analysis above highlights the need to use all potential types of plant within a region to assist speed up the rebuild process(naturally, subject to genuine system security considerations). Lumping all wind at all times into a 'bad for system security' bucket seems counter-productive and not cognisant of the technological developments in the industry in the past 10 years. SACOSS is also interested to understand whether wind generation vendors around the world have the capability to provide more support for services such as SRAS (and FCAS for that matter), but have simply not been required to provide this service to date by market operators.

If wind speeds are strong, and forecast to be strong through a rebuild process, the use of some semi-scheduled generation at a reduced capacity factor to ensure a reasonably stable, flat MW profile. Although not experts in the field, we are aware some wind turbines are able to feather output across wider bands (30%-100% of output) as opposed to some units that pause/un-pause wind turbines from approx. 60% output levels to achieve desired wind farm outputs. Clearly, wind turbines moving in and out of pause mode will create frequency deviations that a lightly loaded system will not be as capable of handling compared to a system normal condition.

Question 4: Sub-network guidelines

What factors should the Standard require AEMO to take into account when setting sub-network boundaries? How are they relevant?

With respect to South Australia, SACOSS is comfortable with the current sub-network boundaries, and as stated above, desire a system restart standard that is capable of a significant region restoration without the use of the Heywood Interconnector.

Question 5: Diversity Requirements

1. Do stakeholders consider the existing diversity requirements in the Standard for the procurement of SRAS by AEMO to be appropriate? 2. Do the existing diversity requirements in the Standard for the procurement of SRAS by AEMO adequately create independence between different SRAS providers in the same sub-network?

SACOSS notes this issue as an important issue that deserves adequate attention, particularly around fuel diversity should an event go for many hours or days. At a high level, with most SA generation having to source its gas from Moomba or Victoria (both over a 1000km away), the flow on effects of major power system events on gas system redundancy is paramount.

SACOSS would like to see new technologies considered in SRAS provision and for the standards to not be technology specific. A good example is the Murraylink interconnect, a 220MW DC link between South Australia and Victoria. It cannot provide SRAS services into/out of South Australia, but if these technological impediments could be resolved through active, innovative SRAS projects, links such as Murraylink could be used as genuine contributors to power system restoration. Similarly, given all the additional power electronics components being installed across the industry and utility-grade batteries about to enter service, understanding how these new technologies may be capable of providing some SRAS benefits in coming years would make sense.

SACOSS understands that several submissions from generation groups to this review will cover some of these issues and draws the Panel's attention to these accordingly.

Annex 1: Past 4 years of SA Operational Demand

Figure 1 below shows nearly 4 years of SA Operational Demand history (up to 15 December 2015) using half-hourly boxplots by month. Across this period, SA operational demand has averaged just over 1500MW, with up to 1700MW of demand present on the system 75% of the time.

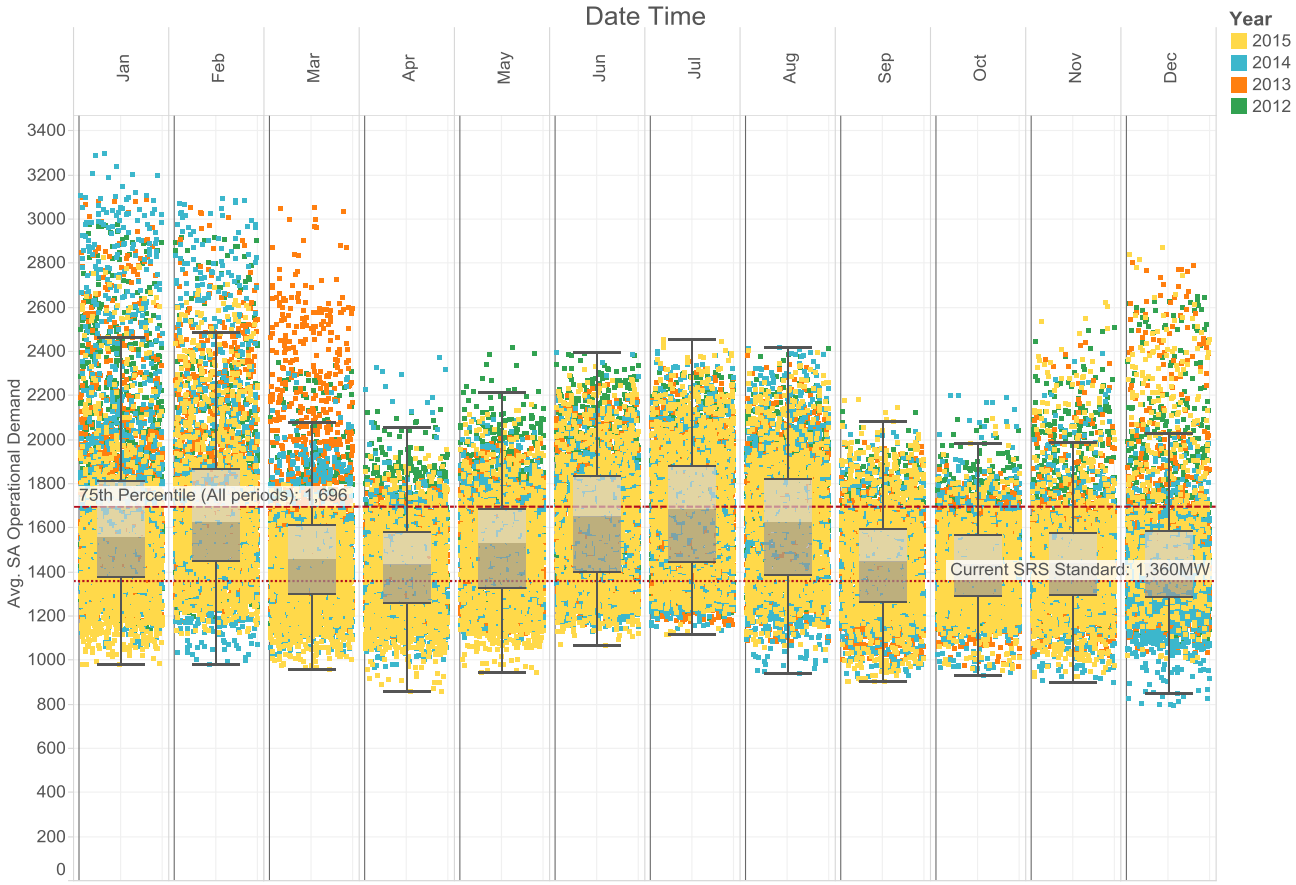

Figure 1: SA Operational Demand History compared to SRS

When compared to the System Restart Standard (which is 40% of maximum demand (approx. 3400MW for SA) or 1360MW), it can be seen that the SRS measure as it currently stands would be aiming to enable generation to meet a demand level that covers approx. 25% of typical SA load within whatever restoration period occurs (say somewhere between 4-12 hours).

This can be further understood through Table 3 below, which shows the likely generation levels within SA, without wind or interconnection. Note that, under restart conditions, generation is unlikely to be running at full load to ensure it can handle additional load blocks being added to the power system. For completeness, the assessment from an AEMO presentation in July 2013 is included, less Northern Power Station for reasons stated previously.

Although the analysis is simplistic in nature, it can be seen that without the inclusion of the interconnector, wind generation or significantly remote generation, the numbers only just meet the current SRS and that assumes that all transmission and generation plant respond as desired.

Table 3: Potential SA Generation Restart Sequence

	Registered Capacity	Likely MW Capacity*	Aux MW	AEMO Estimate (Jul 13 SA SRAS)
Quarantine	225	169	11	225
Dry Creek	156	117	8	135
Torrens Island	720	540	36	320
Mintaro	90	68	5	100
Angaston	58	44	3	50
Hallett	180	135	9	180
Osborne	180	135	9	190
Pelican Point	240	180	12	430
Total	**1849**	**~ 1387**	**~ 92**	**1630**

Assumptions[14]:

* Likely load factor	75% at most, allows for frequency deviation
^ Assumed Auxiliary load factor	5%

[14] Advice provided to SACOSS