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Level 9
99 Gawler Place
Adelaide SA 5000
Postal Address:
GPO Box 2010
Adelaide SA 5001
T 1300 858 724
F 08 8410 8545

Neville Henderson
Chair
Reliability Panel
PO Box A2449
Sydney South NSW 1235

Dear Mr Henderson

Review of the System Restart Standard: Issues Paper

The Australian Energy Market Operator (AEMO) welcomes the opportunity to contribute to the Reliability Panel's (Panel) review of the System Restart Standard (Standard).

Being responsible for procuring services to meet the Standard, AEMO relies on its clarity to guide the procurement of System Restart Ancillary Services (SRAS). It is important for the Standard to minimise the potential for different interpretations by AEMO, prospective SRAS providers and other stakeholders. It is also timely to update the Standard to ensure it is technically feasible to implement and reflects the physical characteristics of the power system. Ultimately, any updates need to be consistent with the objective of the SRAS Objective and the National Electricity Objective.

AEMO's submission on the Panel's Issues Paper notes some areas where there might be opportunities to improve the current Standard in relation to some of these factors. .

If you would like to discuss this submission further, please contact Murray Chapman, Group Manager Market Policy Development, AEMO's delegate on the Reliability Panel.

Yours sincerely

David Swift
Executive General Manager – Corporate Development

Attachments: AEMO submission – System Restart Standard Issues Paper

Given that the Issues Paper is focussed on scoping the Panel's proposed approach to assessing the Standard rather than working through details at this stage, AEMO's submission considers only high-level issues. As the review progresses, AEMO will provide more detailed, technical input where it can.

AEMO's comments are structured around three underlying principles that AEMO suggests the Standard should embody to support an effective procurement process: the Standard should be procurement focussed, clear and meet the objective.

The Standard should retain its focus on driving procurement

AEMO considers that the current form of the Standard, driving the procurement of services rather than setting operational obligations, is practical and appropriate. As the Panel clearly articulates,[1] events leading to the need to use SRAS are not only of very low probability but also potentially diverse in their characteristics and impact. The speed of restoration for the situation prevailing on any given day would be subject to many variables, and is indeterminate in advance. In this respect, the procurement of SRAS has parallels with purchasing a standard insurance policy. One can choose a level of cover that insures against specified events. The broader the number of events, the more expensive the policy. However, it is impractical for the coverage to be unlimited.

As the events that can lead to the need for SRAS are broad, AEMO relies on the Standard to provide a target timeframe and level of restoration for which to procure services.

The Standard should be clear

The Standard sets out the parameters that AEMO is required to meet. AEMO then procures the appropriate SRAS that would satisfy the Standard. In this respect it is critical that the Standard is clear in both the requirements and accountabilities.

The Issues Paper clearly explains the accountabilities, and that the Standard specifies a procurement outcome rather than an operational outcome. This same level of clarity needs to be apparent in the Standard around the time and level of restoration if they are part of any revised Standard. The review presents an opportunity to ensure the Standard is consistently explicit about being a procurement target. The Panel could also consider adding a level of specification around the role of modelling or testing in qualifying a SRAS, and the power system conditions to be assumed by AEMO in the procurement process. Improvements such as these would support a common interpretation of the Standard by AEMO and potential SRAS providers.

AEMO is required to meet the SRAS Procurement Objective which is to use reasonable endeavours to acquire SRAS to meet the Standard at the lowest cost.[2] This obligation is clear, however, when this obligation is qualified by expectations on diversity or redundancy, it risks losing its clarity, and will increase the cost of procuring SRAS. In particular any requirement of redundancy will likely increase costs substantially while the additional services will have a lower marginal value. For these reasons, it is paramount that the Standard is clear in its requirements as these change the base objective of minimising the cost of procurement.

[1] Section 2.1.1
[2] Clause 3.11.7(a1) of the National Electricity Rules (NER)

An example of an area that would benefit from clarity is the diversity requirements specified in Section 7, which requires AEMO to consider electrical, technological, geographical and fuel diversity in the procurement of SRAS.[3]

As part of the 2015 SRAS procurement process, AEMO engaged an external consultant to undertake an independent review of the process.[4] The report recommended that the diversity requirements either be clarified or dropped, with a further suggestion that fuel diversity concerns can be addressed through excluding generators that lack 12-hour local fuel storage from SRAS eligibility. The reasoning for these were:

- Electrical diversity if taken literally would preclude all SRAS, as only one element at a time would be energised, and these could all be subject to a single point of failure throughout the process.
- While technological diversity makes sense in principle, practically it is difficult to implement as electrical sub-networks may be dominated by one or two technologies, while in Tasmania they are all hydroelectric.
- Geographic diversity automatically comes under consideration during the procurement process for operational reasons when procuring more than one SRAS. However, the consideration of geographic diversity to minimise the impact of natural disasters blurs the intent of the Standard which is to procure services to restart the power system after an electrical sub-network blackout, and not for all possible scenarios.
- Fuel diversity is likely to become difficult to realise in some electrical sub-networks that are dominated by a single fuel source. If proponents of SRAS could demonstrate 12-hour local fuel storage, then this would remove the concern of reliance on fuel supply chains.

Additional to the need for clarity in the individual diversity factors, the requirement for diversity itself is subject to interpretation. The Standard states that *AEMO shall consider diversity of the services*. AEMO considers the diversity of SRAS that is required to meet the Standard but does not procure a set number of services to specifically meet a diversity target. If the Panel wanted diversity and/or redundancy in SRAS, then clarity is needed in relation to this requirement rather than a requirement to "consider" it, which is clearly open to different interpretations. In this case, clarity in the requirements would help align the procurement outcomes to the SRAS Procurement Objective.

AEMO recommends that the Panel ensure that the Standard clearly articulates to all parties what the requirement for AEMO to *consider* diversity in its procurement means.

The Standard should pursue the objective function

The Standard needs to reflect the objective by setting out cost-effective requirements. There is value for the Panel to pursue the thinking outlined in Section 3 of the Paper that considers the SRAS Objective underpinning the Standard and its consistency with the National Electricity Objective.

AEMO agrees that it is hard to quantify both the probability and economic impact of events that would result in the need for restart services. The exact nature of the extreme system

[3] System Restart Standard, Section 7
[4] http://www.aemo.com.au/Electricity/Market-Operations/Ancillary-Services/Process-Documentation/~/media/Files/Electricity/Market%20Operations/SRAS/2015/Independent%20Review%20of%20System%20Restart%20Ancillary%20Services%20Process%20Improvem.ashx

failures that would produce such an event are both highly unlikely and uncertain. Despite the difficulties with quantification, an assessment within a logical, quasi-probabilistic framework could be useful, especially in assessing relative benefits between alternatives being considered. While the value of some level of SRAS procurement is recognised, the additional costs of higher levels or more onerous conditions in the Standard should be considered against their benefits in light of the economic objective.

In its review of the Standard and setting parameters and requirements for the time and level of restoration, number of services and regional variation, the Panel needs to consider the incremental technical and economic benefits provided compared to the additional costs.

Time and level of restoration:

If the Standard sets parameters for the time and level of restoration, it is important that these be consistent with the attributes of the power system and the intention of the Standard. For example, it is preferable that restoration be focused on outcomes rather than intermediate steps. Having a Standard with temporal targets for both the intermediate step of restoring auxiliaries of generating units and the availability of sufficient generating capacity does not provide any benefits in the procurement process.

The rate that capacity from a power station becomes available is determined by the characteristics of the individual power station and its restart process. The availability of additional SRAS will not necessarily assist in increasing the rate of restoration of auxiliaries, and the requirement for the intermediate 90 minute timeframe may inadvertently exclude potential proponents of SRAS, and affect the cost of procurement.

If only one timeframe is specified in the Standard, then AEMO suggest that it be outcome focused, i.e. procurement of sufficient services such that the generating and transmission capacity to meet the specified load is restored in, currently, four hours. This remains consistent with the National Electricity Rules (NER) that specifies that the Standard only identify the maximum time within which SRAS are required to restore supply to a specified level.

In undertaking its review, the Panel may wish to assess whether the four-hour timeframe is still the most appropriate. The current specifications were determined a number of years ago, and the technical characteristics of the power system are now changing due to the continually changing generation mix. The Panel could assess whether the four hours, or another proposed restoration timeframe, provides sufficient operational time to not only energise generating capacity but to switch and prepare the network so that it is ready for reconnection and resupply. It may be instructive to consider a cost benefit analysis of the timeframe of restoration to determine the value of the four-hour target compared with a longer timeframe.

Similarly, the Panel should assess whether 40 per cent of peak demand is still the relevant metric for the level of restoration. As identified by the Panel, the difference between peak and average demand has increased steadily over the years, and so the requirement to meet a level of peak demand has implications on the procurement cost of SRAS. The average demand could be considered as an alternative. This would be consistent with the NER and would provide a general standard to support restoring the grid to all consumers.

It is also not realistic for the level of restoration to consider individual loads. Not only would doing so potentially result in higher costs of procurement for other customers but those costs may be inefficient because of the more limited opportunities to mitigate outage risks available to AEMO compared to the customer. An individual customer is also more likely to face power

interruptions in circumstances not related to region wide system black events. If an individual customer was concerned about the restoration process then they could undertake their own measures and the Panel could consider making a provision in the Rules to take these measures into account in the local black system procedures.

Number of services procured:

The paper discusses aggregate reliability and whether there is value in the Standard specifying a minimum number of SRAS in each electrical sub-network. AEMO observes that there is a tension between the objective of procuring SRAS to meet the Standard at minimum cost, and any requirement for redundancy as might be required if a minimum number of services was required to be procured. Clearly, any redundancy requirement that is imposed as part of the Standard has the potential to materially increase the overall cost of SRAS procured, and the benefits of the potential cost increase should be identifiable.

AEMO notes that redundancy might not always serve to improve the speed of restoration, but the Panel might identify some benefit in the aggregate reliability of SRAS, particularly if there is a desire for the Standard to still be met upon the assumed failure of an SRAS service.

Whatever outcome the Panel ultimately determines in relation to redundancy, AEMO seeks a high degree of clarity in the requirements set out in Standard, as the implications for cost are likely to be significant. It is important that the Standard is not open to different interpretation by different parties.

Regional variation:

There is no reason why the Standard could not be different in different regions, particularly as the recent Rule Change stipulates the recovery of costs to be on a regional basis[5].

As identified by the Panel,[6] the Standard should reflect the physical capabilities of the power system, and this will vary between electrical sub-networks. As the topology of the power system is continuously changing, it may be more appropriate to have regional variation in the Standard that is agreed upon in consultation with the Jurisdiction who can demonstrate the need. This will become increasingly important with the withdrawal of conventional generation and the current limitations in the ability of other technologies to provide SRAS.

This is likely to be experienced first in South Australia with the announced withdrawals of conventional generation, and a large penetration of renewable generation. Both the Panel and AEMO need to consider how the Standard will be met in each electrical sub-network if there are no, or insufficient, capable service providers. Currently the Rules require procurement to meet the Standard assuming no supply is available from neighbouring networks[7]. At this stage, there is no new technology on the horizon that can provide SRAS, so it is suggested the Panel consider whether the Standard gives adequate price signals for services to continue to be available in the medium to long-term.

[5] http://www.aemc.gov.au/Rule-Changes/System-Restart-Ancillary-Services
[6] Section 3.3.1
[7] Clause 8.8.3(a)(a)