

5 November 2015

Chantelle Bramley
Senior Director
Australian Energy Market Commission
PO Box A2449
SYDNEY SOUTH NSW 1235

Dear Ms Bramley

Integration of Energy Storage – Regulatory Implications Discussion Paper

The recent emergence of relatively low cost energy storage devices is an exciting development in the electricity industry – offering opportunities both for customers who wish to better manage their own use and generation of electricity and for Distribution Network Service Providers (**DNSPs**) who must deliver network services to all network-connected customers safely, reliably and efficiently.

The Australian Energy Market Commission (**AEMC**) Discussion Paper is a comprehensive contribution to discussing the potential regulatory impacts of integrating storage technology into the National Electricity Market (**NEM**). SA Power Networks commends the AEMC on developing its Paper to promote the industry's thinking on these issues. However, SA Power Networks believes the Discussion Paper is deficient in several important respects. In particular:

1. The Discussion Paper does not adequately recognise the value of network technical standards such as AS4777 in reducing the long-term cost to consumers of the transition to a 'two-way' network with widespread embedded generation.
2. The Paper appears to advocate for increasing regulation of DNSPs to constrain their ability to participate in the emerging market for storage, before the market has even developed. Such a pre-emptive approach to regulation goes against the AEMC's own principle that regulation should be considered only when there is evidence of a market failure, and is likely to stifle innovation and prevent efficient outcomes.

These aspects are discussed in further detail below.

Maintaining network technical and safety standards in a more dynamic environment

The Discussion Paper does not adequately recognise the importance of network technical standards and that these requirements are in place to protect customer and generator installations and the wider community. Nor does it acknowledge the network challenges now being experienced with the connection of significant amounts of distributed energy resources (**DER**).

Today's electricity system was largely designed and built to deliver electricity from centralised generation sources to geographically dispersed customers, with power generally flowing in one

direction to supply customers' loads. In recent years, widespread embedded generation, particularly solar photovoltaic (PV) generation, has led to radical changes in the nature of network power flows, creating new challenges.

In South Australia a quarter of homes now have solar panels. On some sunny days, residential suburbs with high levels of PV generation have, for the first time, become net exporters of electricity into the grid during the day, while still consuming electricity from the grid in the evenings and overnight. These changing generation/usage patterns create 'two-way' flows on the network that challenge traditional approaches to voltage regulation, requiring either network augmentation or more active monitoring and control. AEMO's most recent forecasts show that solar penetration will continue to rise in South Australia in the coming years, increasing by approximately 70% compared to 2015 levels by 2020¹.

Increasing levels of energy storage devices connected to the network have the potential to ameliorate some of the network issues that arise from very high levels of embedded solar generation, by enabling consumers to store, rather than only export, their excess solar energy, and utilising the voltage regulation capabilities of future AS4777 inverters. However, without proper controls, they can also significantly exacerbate network issues, as every storage device is also another potential 'generator' on the network.

In its Discussion Paper, the AEMC has noted the review of standard AS4777, 'Grid connection of energy systems via inverters – Installation requirements'. Control arrangements are a key consideration in this review. To meet our safety and technical obligations - which have been developed in the long-term interest of all consumers and generally only after extensive consultation processes - it is essential that DNSPs have the ability to exercise adequate control over any customer energy imported/exported into the grid at times when the network is under stress.

We are very concerned that the AEMC already appears predisposed against DNSPs owning and/or controlling storage devices 'behind the meter' and states that networks could gain implicit control of storage devices through "onerous connection regimes". In its Discussion Paper, the AEMC has not properly considered the long-term cost to consumers if networks cannot rely on appropriate connection standards and capabilities to manage the impact on the distribution network of distributed energy resources. It should also be noted that DNSPs' basic conditions of connection are already regulated in most jurisdictions, including South Australia, under the National Energy Customer Framework (NECF). All PV generation in South Australia has been connected under regulator-approved conditions of connection. Prior to the implementation of NECF in South Australia on 1 February 2013, the Essential Services Commission of South Australia (ESCoSA) established the conditions of connection and post 1 February 2013, under NECF, the conditions of connection were approved by the AER.

Similarly, the Paper also does not recognise the extensive obligations on DNSPs to manage the safety and security of the network and how doing so is in the long-term interest of customers. DNSPs only exist to serve customers and generators. We are obligated to build, maintain and operate our networks safely and securely - and at least cost. The specific parameters to do this are documented in jurisdictional legislation, regulations, codes and in the National Electricity Rules (NER).

¹ Refer 'Medium growth' scenario in AEMO's National Electricity Forecasting Report (NEFR), June 2015. See also Appendix B for further details.



AEMC should promote the National Electricity Objective (NEO), not regulation

In addition to technical and safety requirements, the comprehensive regulatory framework that DNSPs already operate within ensures efficient operation of the networks in the long term interest of consumers. Key arrangements include:

- regulated connection arrangements as outlined in the NER;
- an incentive regime which includes rewarding expenditure outperformance by DNSPs where the majority (around 70%) of savings benefit consumers (through the Efficiency Benefit Sharing Scheme (EBSS) and the Capital Expenditure Sharing Scheme (CESS));
- ensuring network augmentations above certain thresholds are subject to regulatory investment (RIT-D) tests;
- cost allocation principles in the NER and Australian Energy Regulator (AER) guidelines to ensure economically efficient outcomes;
- unregulated revenues from shared regulated assets being subject to the AER's Shared Assets Guideline; and
- (soon-to-be revised) ring-fencing guidelines.

We expect to contribute to the AER's consultation on a new ring-fencing guideline when that process commences. We believe the other arrangements above are largely adequate to integrate energy storage and do not require fundamental change at this time.

SA Power Networks is most concerned that the AEMC appears focused on introducing more regulation, particularly on DNSPs, before the storage 'market' and various operating models associated with it have been developed. In previous papers the AEMC itself has advocated against such 'pre-emptive' regulation in an emerging market. Imposing additional regulation, particularly on the already heavily regulated DNSPs, risks inhibiting innovation and stifling competition in the embryonic storage market by:

- reducing incentives for DNSPs to seek out opportunities to implement innovative network solutions using storage devices;
- establishing a barrier to entry for DNSPs to compete to offer storage solutions for customers, potentially lessening competition in that market;
- preventing integration and efficiency across the energy supply chain; and
- introducing new and inefficient ring-fencing costs such as increased transactional costs and new costs associated with reporting and compliance.

It also appears that the AEMC's premise that "*the market-led installation of storage is most likely to lead to efficient outcomes*" is driving the Preliminary Finding in Section 4.2.1 that "*Storage is a contestable service and participation of network businesses in this market must be done on a level playing field with other market participants.*" This is despite the conflicting assessment on Page 32 of the Discussion Paper that some of the services provided by storage devices would be assessed by the AER as regulated services.

A number of instruments in the current regulatory arrangements noted above are designed to ensure there is no cross-subsidy between DNSPs' regulated and unregulated services. There is no evidence to suggest that these provisions will be inadequate in catering for the emerging energy storage market. We urge the AEMC not to take a heavy-handed approach and endeavour to regulate a problem that does not yet exist. Doing so could prohibit DNSPs offering otherwise legitimate storage options to customers – to the detriment of customers. Any further requirements on DNSPs should first be subject to appropriate assessment against the NEO, including a cost-benefit analysis



(noting that costs to DNSPs are ultimately passed on to their customers), and be commensurate with the level of DNSP activity in unregulated markets.

Please find attached further detailed comments from SA Power Networks. We have also reviewed and endorse the comments made by the Energy Networks Association in their submission to the AEMC's Discussion Paper.

Should the AEMC require further clarification of any of our comments, please contact Richard Sibly, Regulatory Development Manager, on (08) 8404 5613. Thank you for the opportunity to have input on these important reforms.

Yours faithfully



Sean Kelly
General Manager Corporate Strategy



SA POWER NETWORKS' FURTHER COMMENTS

For ease of reference, the following comments are structured under the Discussion Paper Chapter headings.

1. Introduction

SA Power Networks agrees that the AEMC's scope includes the NEL and the NER. In proposing policy positions, the AEMC should also be cognisant of relevant jurisdictional arrangements for licensing electricity entities both on and off-grid and jurisdictional arrangements for technical and safety regulation.

2. End users and aggregators using storage

Connection processes

SA Power Networks' connection processes are mature for current technologies and will be reviewed to consider the integration of storage devices.

The National Electricity Customer Framework commenced in South Australia on 1 February 2013 and is, therefore, now nearly three years old.

SA Power Networks has established its Connection Policy in accordance with requirements of the NER (cl 6.7), and it has been approved by the AER. Under this policy SA Power Networks has established basic and negotiated connection services including catering for the connection of solar PV systems which are 'small embedded generators'. Our 'Small Embedded Generation Technical Guidelines' cater for the connection of systems that can generate up to 10kVA (single phase connections), 30kVA (three phase connections) and 5kVA (SWER connections) connected to the network via an approved inverter. Our Guidelines require generating systems to comply with AS4777 which includes, inter alia:

- self-disconnection of the inverter when high voltage conditions occur; and
- in the event of loss of grid-side supply, automatic disconnection of the inverter – to prevent customer installations generating into the grid which may be isolated and earthed by powerline workers undertaking maintenance.

Larger generation systems may also be connected to the network but may first require further investigation to ascertain the equipment capacity of the local network to receive higher levels of generation and/or whether network augmentation is necessary. Network augmentation will incur additional costs for the customer/generator.

Our connection processes, therefore, are relatively mature for current technologies. Consistent with the AEMC's view, our initial view is that energy storage devices, with or without PV or other generation systems, have the capability to discharge electricity into the grid and, therefore, we would look to treat these devices in the same way as other embedded generators and require associated inverters to comply with AS4777. Nevertheless, we will review wording and definitions in our policies and contracts to identify whether changes are required to more explicitly cater for storage devices.

As noted by the AEMC on Page 19, AS4777 is under review. It is proposed that the revised standard will cater for systems up to 200kVA in size and include provisions for DNSPs to control inverter operation in limited circumstances. AS4777 also requires inverters to self-disconnect when high voltage conditions occur. This can occur in areas of the network at times when there is substantially



more generation than demand. With the high penetration of PV in South Australia we are already experiencing inverter self-disconnection.

The ability for DNSPs to limit or increase inverter output at certain times is a key requirement to maintaining a safe and reliable network. The absence of these protections may have adverse consequences for a larger number of customers connected in the local network, as well as the operation of the network itself, and of course for the safety of powerline workers.

At this time, SA Power Networks believes existing connection arrangements, with a revised AS4777, are appropriate. We understand a new AS/NZS5139 is also under development to address safety of battery systems for use with inverter energy systems.

Control

The AEMC Preliminary Finding in section 4.1.1, Item 1 states, “*Control of storage devices should therefore, in all but a narrow band of circumstances related to system security and safety, be based on market-based price signals.*”

All DNSPs have stringent legislative obligations to operate and maintain safe networks. Failure to do so can result in significant financial penalties, or ultimately, the loss of distribution licence. DNSPs also retain the responsibility for network outages through the Service Target Performance Incentive Scheme (**STPIS**) and the Guaranteed Service Level (**GSL**) scheme.

It is important therefore that DNSPs retain the ability to control storage devices to maintain safe and reliable networks. If there is any proposal to diminish a DNSP’s ability to control storage devices for network safety and security purposes, then the DNSPs’ liability in these matters must be reduced accordingly and re-allocated to those parties exercising control.

Connection costs

Connection costs are dependent on whether augmentation of the network is required. In light of widespread embedded generation now connecting to networks, cost recovery arrangements should be reviewed.

For small systems up to 10kVA single phase or 30kVA three phase, there is no charge for the connection. A separate charge applies for an import/export meter. For larger systems, augmentation may be required and additional costs incurred. However, the current charging arrangements are premised on generators only being charged the cost of a ‘shallow’ connection. The costs of upstream, ‘deeper’, augmentation in the network are borne by customers. These arrangements were considered appropriate when relatively few large generators connected to the network and the network was seen as existing primarily to serve customers who consume electricity.

We are now seeing a future where there are significantly more distributed energy resources (**DER**) connecting to the grid and a more mature ‘two-way’ network will develop. This is shifting the paradigm of the network’s purpose, increasingly, to connect generation, not load. Consequently the broader policy question is whether deeper network augmentation costs should also start to be recovered (only) from DER customers who trigger the augmentation.

Aggregators

In line with the principle of maintaining technology neutrality, we believe that the current arrangements for generators and aggregators of generators should apply to storage devices. AEMO



could clarify this by amending its Generator Registration Guide to include appropriate storage examples in its generator classifications.

SA Power Networks' initial view is that overall costs to customers will be reduced by allowing new technology and aggregators to enter the Frequency Control Ancillary Services (**FCAS**) market. We would therefore support this option, subject to appropriate technical and data requirements being addressed.

SA Power Networks supports the investigation of existing registration requirements for aggregators. This should be completed as a matter of priority and by no later than June 2016.

Other issues

On Page 25 of the Discussion Paper the AEMC correctly notes that there are likely to be a range of ways that functions enabled by storage would be provided. We are aware of some proponents contemplating operating models whereby customers with energy management systems may, at certain times, wish to trade excess energy to neighbours, utilising the distribution network. Concepts of 'virtual net metering' and point-to-point 'wheeling' charges are being considered for these models. However, it is difficult to see how such models can be integrated into the National Electricity Market under current registration, metering and network charging arrangements.

3. Network businesses integrating storage

Service classifications

Changing classifications: Service classifications for NSW and ACT DNSPs were set by the AER in April 2015, for Queensland and South Australian DNSPs in October 2015 and will be set in April 2016 for Victorian DNSPs. Under the existing NER, it is not possible to alter service classifications within a regulatory control period and therefore these classifications will be in place until the next determinations in 2019/2020. Our initial view is that the current definition of 'Standard Network Services' in our October 2015 Regulatory Determination can cater for the connection of storage devices. Definitions may be reviewed as part of the next Determination process and at that time it may be useful to explicitly clarify arrangements for storage device services.

Contestable services: We view provision of storage services to customers by DNSPs as contestable, unregulated services: that is, they are not subject to service classification under the NER (NER cl 6.2).

Standard control services: We view the potential procurement of storage services from customers and the installation of storage devices by SA Power Networks for network purposes (eg network support or quality of supply management) as providing 'Standard Network Services' as defined in our 2015-20 Regulatory Determination^[1] which are regulated as standard control. Services procured from customer(s) will likely be an operating cost negotiated with the customer(s). Storage devices installed by SA Power Networks for network purposes are likely to be a capital investment, eligible for inclusion in the regulated asset base (**RAB**), subject where appropriate to RIT-D public consultation processes being completed. To the extent that regulated storage assets are used for both regulated and unregulated services, the current shared asset and ring-fencing provisions would apply. The procurement of services and/or provision of grid-side storage services will be, depending on value, subject to RIT-D outcomes.

^[1] AER, *Final Decision SA Power Networks determination 2015/16 to 2019/20, October 2015*, Attachment 13, Appendix A



Existing rules and frameworks

The current rules allow for connection of ‘behind-the-meter’ storage by customers, to the grid. However, arrangements for the installation of grid-side devices need to clarify:

- metering requirements (if any); and
- the ability of DNSPs to charge and discharge storage to manage network issues without materially influencing outcomes in the wholesale market.

We agree with the AEMC’s comments in the Executive Summary to the Discussion Paper that:

An underlying principle of energy market regulation in Australia has been technology neutrality.

With this principle in mind, we do not see any reason to treat battery storage differently and that this technology should, as far as is practical, be accommodated within existing frameworks and not afforded any different treatment. Doing so could lead to unintended consequences and otherwise disadvantage other technologies and/or distort the wholesale market.

As per our earlier comments, we note that some battery storage proponents may be contemplating unconventional operating models which do not fit within current registration, metering or network charging arrangements. For more conventional systems, we do not see any problems with current regulatory processes/timelines acting as a barrier to storage technology.

Incentives

SA Power Networks notes the Discussion Paper’s comments on innovation incentives on networks. We would point out that the Demand Management Incentive Scheme (**DMIS**) and the Demand Management Allowance (**DMIA**) essentially only provide a funding allowance for networks to undertake demand management activities that, if successful, may lead in the future to a reduction in demand and the possible deferral of augmentation, potentially reducing network costs. This incentive is therefore relatively weak, generally limited to being useful to undertake small-scale trials rather than promote any significant uptake of storage technology by networks (noting the approved AER allowance for SA Power Networks is \$600,000 per annum). We note the range of other incentive mechanisms now applying to DNSPs including CESS, EBSS and STPIS. To maximise the benefit from any storage solution services procured or installed, DNSPs will optimise overall outcomes in the context of these mechanisms.

Ring-fencing

The AEMC should promote the NEO, not regulation, and not pre-empt outcomes from the AER’s consultation on ring-fencing guidelines.

Ring-fencing guidelines should be drafted to promote effective competition and competitive market conduct and prevent the use or abuse of market power. This will ensure customers benefit. To maximise the benefits of storage, the guidelines should recognise that storage services that are provided to customers are ‘contestable services’, and storage services used to operate the network - either provided directly by DNSPs or procured from third parties and customers - are standard control services.

Rather than focusing on “minimising a network business’s ability to unduly impact a contestable market” the AEMC should endeavour to maximise the opportunities for competition and not inhibit DNSPs from being a valid part of that mix.



We are concerned with the AEMC's preliminary view (Page 59) that *"Networks should not be able to install storage behind the meter unless they do so through a ring-fenced business. Where storage behind the meter would be useful for providing network support, these services must be contracted from a third party or ring-fenced business"*. This implies that DNSPs can only offer 'behind-the-meter' services through a legally separate business. We contend this is inefficient, imposes further burden and cost on DNSPs (which in-turn are borne by customers) and creates a disincentive for DNSPs to offer innovative solutions to customers (to the detriment of those customers). There is no basis for advocating onerous constraints on networks beyond the existing strong regulatory regime when there is no evidence of market failure, and no cost-benefit analysis to indicate that consumers, who will ultimately bear the cost of network compliance to any new requirements, will be better off. Further, the AEMC's view is pre-empting the outcomes that may arise from the AER's consultation on ring-fencing guidelines.

We are disappointed at the AEMC's apparent focus to introduce "strict" DNSP ring-fencing provisions and that "strong enforcement and compliance obligations will also be required" for this emergent technology. While some level of regulation on monopoly businesses will be needed to provide confidence in the contestable services market, heavy-handed regulation on DNSPs risks their non participation in this developing market. As a result, additional value from DNSPs' specialised knowledge of network issues in storage solution options would fail to be realised. This is not in the long-term interests of all customers.

Cost allocation

Existing cost allocation arrangements can accommodate integration of energy storage devices.

We agree that the existing NER Cost Allocation Principles applying to DNSPs, and the AER's Cost Allocation Guidelines, would appear to accommodate providing and/or receiving storage-related services. Similarly, our initial view is that our existing Cost Allocation Method (**CAM**), which allocates both 'directly attributable' costs and overhead costs between standard control, alternative control, negotiated and unregulated services, is sufficiently broad to accommodate storage-related services as currently envisaged. If this view changes and we need to revise the CAM as new technology options or other factors emerge, we will revise our CAM at that time for AER approval as required.

Energy trading arrangements for grid-side devices

The energy trading arrangements, particularly for grid-side devices, requires further consideration.

SA Power Networks notes the Oncor Case Study included in the 'Shared asset mechanisms' section of the Discussion Paper. Oncor, is a network service provide (**NSP**) in Texas, where (like Australia), NSPs cannot participate in the wholesale market. The Case Study discusses proposed regulatory arrangements which would support NSPs installing grid-side battery storage and auctioning off wholesale market dispatch of storage, with proceeds used to offset NSP costs, providing wider societal benefits. We agree that such arrangements could potentially work in Australia and allow NSPs to "exploit all revenue streams of energy storage systems, which provide benefits to the grid as well as to the wholesale market".

We would support further analysis of such options being developed for the Australian regulatory framework, noting that existing ESCoSA ring-fencing obligations, enacted through our distribution licence, only allow us to operate generating plant for network support purposes and not to derive revenue.



Shared assets

With reference to the consultation questions regarding shared asset arrangements, we agree there does not appear to be any issues at this time in relation to shared assets.

4. Ownership and control

Our previous comments note the paramount importance of maintaining safety and security of the network.

This is in the interest of all grid-connected customers. We therefore support control arrangements, expected to be implemented through a revised standard AS4777, which ensure the network is operated in a safe manner. Only within this safe and secure framework should customers then be free to exercise their options with storage devices. The AEMC's discussions about trade-offs between optimisation and control, retailer-controlled or network controlled devices then becomes a second order matter. Customers should be free to choose how to optimise the operation of their systems, but these must always be subject to not compromising the safety and security of the network or of powerline workers.

We support AEMO being tasked to investigate the potential system operation effects of a prevalence of distributed energy devices and to report on their investigation no later than June 2016. It would be useful if AEMO and AEMC could also consider and address 'unconventional' operating models such as those looking to utilise virtual net metering and point-to-point trading through the network, as noted earlier in this submission.

