



Response to the  
**Essential System Services Review**

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## Question 1

**(a) Are there other context or developments relevant to the review that the Design Development Team should take into consideration?**

The report flags the potential development of a large-scale battery for the DKIS system; it is assumed that this is in reference to the battery that will ostensibly be developed by Territory Generation. Sun Cable encourages the consideration of our proposed Middle Arm Battery development, which is a concept that has been available to government and system operators since before the Territory Generation announcement, and is likely to have a higher capacity than the system proposed by Territory Generation.

Additionally, Sun Cable wishes to highlight the significant infrastructure investment represented by our ongoing developments in the NT. Specifically, the Australia-ASEAN Power Link (AAPL) project will see the construction of a 10 GW PV farm with ~26 GWh of battery storage close to Elliott, a 3 GW high-voltage transmission line to Darwin, and 2 GW HVDC submarine cables linking the system to Singapore. This system is intended to deliver up to 1 GW of constant capacity to the DKIS system (approximately four times the current total capacity of the DKIS). The connection of the AAPL project to the DKIS will represent a paradigm shift in the ability of NT consumers and offtakers to procure essential system services. The AAPL project will be able to unilaterally provide consistent black-start capacity to the DKIS via a voltage source converter (VSC) station in Darwin. Additionally, the VSC and battery backup subsystems will provide an opportunity to deliver additional frequency control essential services.

Designing the AAPL system to be capable of delivering up to 1 GW to the DKIS is indicative of our medium to long term vision for the growth of the DKIS and electricity demand in the NT. Emerging industries such as hyperscale data centres, metals and chemical processing facilities, as well as LNG expansion, will mean that demand (and therefore supply) will grow considerably over the coming decades. Sun Cable urges the NT government to consider this significant growth in the future planning of DKIS regulation, so as to ensure that energy delivery objectives can be achieved by the efficient leveraging of private infrastructure investment.

**(b) Is the approach to the review, which ties ESS market design principles back to the National Electricity Objective, appropriate?**

We are supportive of the alignment of the goals of the ESS market design and the National Electricity Objective. However, the NEO has been criticised for missing goals around the sustainability of electricity supply, especially with regard to climate externalities. Sun Cable therefore suggests that the phrasing be extended to read:

*“ to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to....price, quality, safety, reliability, security and **carbon intensity** of supply of electricity”*

It is Sun Cable’s view that this inclusion is important, as it helps to de-politicise strategies to decarbonise the electricity supply system. If management of climate externalities is a key principle of the electricity market system, these principles can be taken into account during ongoing mechanism and system design, independent of external political pressures. Further, the inclusion of a carbon intensity goal into the electricity system objectives would allow both system operators and government to commit to the incorporation of climate externalities into the cost of electricity supply in the NT as well as enabling long term funding to reduce carbon intensity to zero.

**(c) Are there other relevant matters which should be considered?**

Sun Cable would like to flag a considerable dichotomy in the implementation of a future market for ESS procurement. NT Power and Water, in response to the potential grid impacts of new solar PV installations across the DKIS and other grids, has introduced the Generator Performance Standards (GPS), which effectively require generators to manage their own potential externalities in terms of short and medium-term dispatch. Sun Cable recognises the context and principles which have driven this reform and suggests that the GPS be expanded in parallel to the implementation of ESS markets. Importantly, the GPS in its current form is a location-specific regulation, which precludes the streamlined provision of system services, as well as energy storage, from a facility that is not co-located at the source of generation. If generators are not able to procure essential system services to offset their impacts on the grid, it is unlikely that any market mechanism proposed in the Essential System Services review will work; after all, what point is a market mechanism if a large proportion of customers are prevented from effectively participating?

Sun Cable therefore recommends that the NT government work with NT Power and Water to expand the Generator Performance Standards to account for ‘net’ rather than locationally specific ‘gross’ grid impacts. It is Sun Cable’s view that a *Net Generator Performance Standard* which takes into account the *overall* impact of multiple, geographically disperse but technically coordinated assets across the DKIS, may provide the initial basis for simple provision and contracting of essential system services in the NT. If prospective generators are able to contract their obligations under a future net GPS to third parties such as Sun Cable or T-Gen’s proposed battery system, these contracts may form the basis upon which an effective and competitive ESS market may develop.

## Question 2

**(a) The Design Development Team is seeking initial stakeholder views on appropriate ESS categories and definitions for the Territory's regulated electricity systems, to inform a draft proposal to be presented in the review draft report.**

Sun Cable recognises and supports the report's breaking down of essential system services into the three broad categories of frequency management, voltage management and restart services.

**(b) Is there a need to apply different ESS categories for Alice Springs and Tennant Creek than for the Darwin-Katherine system?**

Sun Cable does not see a need for different categorisations, however different market and regulatory principles may need to be applied in these grids, taking into account the availability of competitive offers and third-party supply of services. In all cases, Sun Cable does however recommend that mechanisms are established such that ESS can be provisioned from third-parties in an open market.

**(c) Should the Territory's ESS framework require and empower the System Controller to develop and publish detailed specification/descriptions for each category of ESS? What, if any, regulatory prescription or oversight should apply?**

The System Controller is well placed to understand the needs of individual electricity networks within the NT. However, the incentives of System Controllers may not be in line with the other principles of the expanded NEO, especially those around facilitating efficient procurement of services, due to the considerable pressures of running a series of complex, interconnected systems.

Sun Cable recommends that specifications and descriptions for each category of ESS be initially drafted by the System Controller, and submitted to the Utilities Commission (or other regulatory bodies in the NT) for an open consultation and review process. The final decision on these matters should be made by the Utilities Commission after taking into account stakeholder feedback and system controller input, in a manner similar to the rule change process utilised by the AEMC.

This should be the first application of an open rule and specification-change process that will allow any party to submit potential rule changes to the oversight body.

**(d) Should the ESS framework provide for flexibility for the System Controller to procure other undefined categories of ESS? What, if any, regulatory prescription or oversight should apply?**

The ESS framework should provide for any party, including the System Controller, to request rule changes from the Utilities Commission (or other regulatory bodies in the NT) that would

allow such provision via the addition of new categories of ESS. Such proposals should be put through a public consultation and review process, with the final decision being committed to by the Utilities Commission (or another independent body). Key to this process should be the consideration that provision of newly defined services be open to competition in order to bring price, efficiency and environmental outcomes in line with the expanded NEO.

**(e) What mechanisms are most appropriate for the Territory to preserve inertia and system strength? Should these be defined as ESS? Where would responsibility for their provision more appropriately reside – the Network Operator or the System Controller?**

Inertia and system strength should be considered as ESS. The mechanisms most appropriate for the Territory to preserve inertia and system strength should be, as with other essential system services, those which are in line with the expanded electricity objective, which requires efficient investment and operation with respect to price, quality, safety, reliability, security and carbon intensity of supply of electricity.

It is our view that the System Controller is better placed to understand and proactively manage the dynamic properties of these essential services. The procurement of these services should be an open process that facilitates competition, and this process should be developed in collaboration with a third party such as the Utilities Commission in a public consultative process.

### Question 3

**(a) What issues or concerns do current arrangements for the determination of system service requirements raise? How do these influence investment decisions made by power system participants and is reform warranted?**

Sun Cable does not currently hold a position on this issue.

**(b) Should the ESS framework incorporate service standards, in addition to system standards? Should ESS standards be applied in a regulatory instrument, or in a System Controller instrument?**

Sun Cable does not currently hold a position on this issue.

**(c) Should the System Controller's determination of service requirements be subject to transparency and oversight mechanisms? If so, what arrangements are appropriate?**

Sun Cable does not currently hold a position on this issue.

## Question 4

**(a) What types of ESS are most suitable for market provision and in which systems? Are there certain categories of ESS which would benefit from continued Territory Generation delivery and why?**

All types of ESS should be open for market provision; many may benefit from continued delivery via Territory Generation, but the core principle should be that this is in the context of these services being *open to competition* in order to satisfy the goals of the NEO.

Note that this does not necessarily mean via a spot market mechanism, there are many mechanisms by which lowest-cost open procurement may be facilitated.

**(b) What are the likely costs and benefits of spot market procurement of certain types of ESS in any of the Territory's electricity systems?**

It is Sun Cable's view that opening up the NT electricity networks to competition is an essential step in developing a resilient future grid, however it is our recommendation that a real-time spot market mechanism is not suited to any grid currently in the NT, and that the potential anti-competitive outcomes of such a mechanism in a small system may in fact hinder the lowest-cost procurement of essential services.

Spot markets are effective mechanisms for settling prices and volumes *at the margins* in scenarios where there are many participants competing to deliver the marginal unit of dispatch. Market theory suggests that in a competitive market, competition will erode margins and bring down prices in the long-term. There does not however appear to be any prospective scenario in the medium-term where there would be enough participants in the DKIS essential services market to enable such a mechanism to deliver this outcome; a spot market built on a monopoly (featuring only Territory Generation) or an oligopoly (featuring, for example, Territory Generation, Sun Cable, and one or two other participants) may enable the exercise of extreme market power, which would be to the detriment of both consumers and generators including Sun Cable (given the split of prospective costs in such a mechanism). Price regulation, a common approach to such a problem, would likely erode prospective investment signals. Regulators will be caught between preventing market power to save consumers from high ongoing costs, and eroding potential margins and therefore long-term investment opportunities, as in the 'missing money' problem observed in many such markets globally.

Spot market mechanisms also do not solve the problem that the NT ESS review seems to set out to solve, which is one of long-term investment. Large-scale capital investments are rarely made on a spot market merchant basis; in the context of a prospective spot market for ESS,

such contracts would likely be derivatives, signed with multiple counterparties on the long-term, to hedge against spot market movements. These hedges would be considered a financial protection from potential exercise of market power, which must be a commercial reality for such a contract to be signed in the first instance. Additionally, it is likely that many over-the-counter hedges will be opaque to the market operator, meaning that the true cost of energy will be unknown to regulators and consumers.

In a market based on a nominal spot market, with most participants near-fully hedged, the function of the market will be to provision services for unhedged volumes (if such volumes exist) and price these unhedged volumes. In the DKIS, unhedged volumes can be expected to be small enough that the time, effort and cost of operating a real-time market does not appear to be value for money, especially if these marginal units are delivered in the context of the exercise of market power and are therefore overvalued.

There are many other more open and competitive mechanisms by which long-term contracts and marginal services could be provisioned to facilitate efficient infrastructure investment and operational decision-making.

**(c) What service provision framework would deliver the most appropriate balance between costs and benefits for each category of ESS in each regulated electricity system?**

### **Frequency Control**

The NT government should commit to the creation of a market for the medium or long-term procurement of frequency control essential services via bilateral contracts. These contracts could be signed between counterparties which have regulatory exposure and obligations under a minimally modified set of standards, reducing the overhead on the system operator in terms of regulatory and operational commitments. Expected counterparties for these contracts are generators (who may have general contingency raise and causer-pays obligations) and retailers (who may have contingency lower and causer-pays obligations).

These contracts may be negotiated on an individual or over-the-counter bilateral basis, or if policymakers prefer, be administered via a regulated market mechanism, such as a reverse-auction mechanism (for an example of one such mechanism, used for energy procurement, see the ACT's reverse auction renewable procurement process).

Under such an arrangement, generators and consumers may be expected to have a 'net-zero' impact on the operation of the electricity network, as measured at their point of connection. Any impact on system frequency must be effectively mitigated by the delivery of coordinated ancillary services, which can be contracted to a third-party and delivered elsewhere in the grid. If these impacts are not mitigated, the participant should be liable to pay a fee that should exceed the maximum expected marginal cost of delivering such services (ie. a multiple of the

highest estimated or known contracted delivery price for essential system services). Obligations to manage frequency control externalities in relation to a grid connection therefore fall on the generators and offtakers who connect to the grid.

Liabile generators and offtakers would contract with ESS suppliers to mitigate their frequency externalities. In the case that ESS suppliers fail to provide these services, unmitigated externalities would expose the generator or offtaker to fees, which would be passed on under these contracts to the ESS supplier. The 'marginal' remaining ESS requirements (from the unmitigated volume) could be delivered by a contingency ESS supplier of last resort, which would likely be a nominated facility that receives a higher rate for such services, recovered via the exceedance fees from generators and offtakers.

### **Voltage Control**

Sun Cable does not currently have a developed view on the way that voltage control services should be procured in the NT. Sun Cable recommends however that these services are procured in such a way that allows the participation of third parties, noting that emerging technologies such as battery energy storage may significantly reduce the long-term costs of delivering these services to electricity consumers.

### **System Restart Services**

System Restart Services should be open to procurement from third parties. Sun Cable recommends that a capacity mechanism be put in place, which may assign the responsibility for system restart to the party that can deliver this essential service at the lowest cost. Because the availability of these services, especially from emerging technologies, can be delivered to a greater or lesser extent on a time-variant basis, it is important that these services are procured in a manner that allows participants to bid for supply of system restart services at specific times of the day.

One solution to this may be a version of a long-term forward capacity market for system restart services. Sun Cable encourages mechanism designers to consider however that such a mechanism should provide relatively long-term contracting so as to assist in investment decisions and therefore lower barriers to entry for cheaper suppliers. A single-buyer real-time or near-real time market does not provide derivative counterparties and therefore provides very little ability for investors to gain assurances on medium-term market risk.

## **Question 5**

**(a) What changes should be made to the current administered pricing arrangements for the provision of ESS provided by Territory Generation?**



The administered pricing arrangements are useful in that they provide an estimated upper bound for market outcomes, and could be used either as a market cap or a regulatory guide to examine whether market power is being exercised over the long term.

However, Sun Cable does recommend that the administered pricing arrangements be replaced with market mechanisms that can leverage the benefits of price competition between firms, and lower the barriers to entry for new technologies that may deliver services at lower costs.

**(1) What methodology should be used to determine prices for each of the ESS categories?**

The general principle recommended by Sun Cable is that under constrained competition, open tender or bilateral negotiation processes will produce more efficient outcomes than open spot market pricing mechanisms.

In a tender process, Sun Cable's preferred mechanism is the reverse auction. In oligopolistic competition scenarios, a first-price auction is preferred, but it should be noted that such mechanisms are not strictly incentive compatible and may lead to a considerable amount of 'shadowing' of more expensive bids. There may be other mechanisms, such as second-price auctions, that may lead to more efficient outcomes if the market has enough bidders to produce competitive conditions.

**(2) What processes should be put in place to ensure the administered prices remain up to date?**

Sun Cable recommends that the administered price be calculated based on the hypothetical marginal unit of supply to the system. However, these prices should be used as a regulatory guide or cap only, and all pricing for essential system services should be performed via competitive mechanisms.

**(b) What market power mitigation measures would be appropriate for the provision of different ESS by Territory Generation under a market provision framework?**

By avoiding the procurement of services through a real-time spot market with limited competition, operators will remove many of the more serious potential opportunities for the exercise of market power.

Market power can still however be exercised in bilateral negotiations or under various tender processes. Regulators can utilise an administered price cap or price monitoring to ensure that such prices are not pushed above expected levels in the long-term; such mechanisms are more suited to long-term contracting markets which do not rely on 'peak pricing' exercises of market power to produce market entry signals.

In a reverse auction or tender process, reduction of market power can be achieved through careful application mechanism design principles. In such a system, different rules may be employed (ie. first versus second-price auctions) depending on the number of participants.

In bilateral over-the-counter contracting, rules around open sharing of prices with regulators or anonymous mechanisms can help to reduce the exercise of market power among participants.

## Question 6

### **(a) What are the appropriate bases for the allocation of ESS costs?**

Ultimately, ESS costs are allocated to consumers (and the government if subsidies are in place) regardless of the mechanism of initial allocation. However, Sun Cable recognises that the initial allocation of costs is important in providing a consistent set of incentives for long-term efficient investment and operation of the electricity system.

### **(b) Are there alternatives to a causer pays approach for the recovery of the ESS costs?**

Sun Cable agrees with the sentiment of the ESS review, which suggests that alternatives to a causer pays approach would seem to involve the spreading of both costs and benefits across the electricity system, regardless of the extent of participant impact. This does not appear to be an economically efficient alternative.

Contingency raise and lower ESS appear to be sensibly delivered as in the NEM, with pro-rated cost recovery based on the proportion of total production or consumption. Similarly, Network support and System Restart costs can be recovered in this way, with in-principle total costs emerging from medium-term contracts via a competitive tender or reverse auction process.

Regulation ESS costs can be recovered through a causer-pays approach. For generators, Sun Cable recommends a hybrid causer-pays approach that expands upon the NT's existing Generator Performance Standards, making these 'net' standards that require a generator's total impact on the grid (across a number of locations) to be effectively non-existent. Generators can contract with third parties to enable this to be the case, for example a solar farm may contract to a central battery to correct for any frequency control impacts resulting from fluctuations in electrical output. It is expected that should these third parties fail to supply the required services, any fees or charges resulting from the overall impact on the grid are passed on to these suppliers. For loads and distributed energy resources (DERs), the concept of 'causer pays' should fall on the market participant (ie. the retailer or large industrial offtaker). Large generators and loads over a certain size threshold (ie. 100 kW) should be required to install metering on individual points of connection to monitor, measure and help to 'net off' grid impacts via the direct-contracting causer pays system. Loads and DERs with smaller capacities can be aggregated at the distribution level and grid impacts pro-rated across consumed / generated volumes across distribution sectors, with impacts offset by ESS suppliers contracted via the

market operator to supply 'marginal' services via an open tender or reverse auction process as previously discussed. As the DKIS and other territory systems transition to a 'smart grid', high-resolution monitoring can be subsequently deployed on smaller systems, or by aggregating smaller regions of the distribution network, which can then be put under ESS contract in a similar manner to existing larger generators and loads.

**(c) Are there any technical barriers to the adoption of a causer pays or alternative approaches to ESS cost recovery in the Territory?**

A hybrid causer-pays system as proposed by Sun Cable is an inherently dynamic and decentralised system that will require live monitoring of any participation generators or loads. It does not appear however that there are significant technological barriers to the implementation of such a system, and the required monitoring and management tools are available off-the-shelf.

**(d) What issues would the transition to a causer pays or alternative basis of ESS cost allocation present for system participants?**

System participants over a given capacity threshold would be required to install high-frequency SCADA monitoring equipment and enter into contracts with potential ESS providers, or install equipment to ensure a 'net zero' impact on the grid.

**(e) What oversight or regulatory arrangements should accompany any causer pays cost allocation or alternative arrangements?**

Meter data from any participant with high-resolution metering should be analysed to calculate any 'non-net-zero' impacts on the grid, and allocate fees or charges from the operator accordingly. It is suggested that this be initially performed by ESS suppliers, with strict reporting and transparency obligations to support billing of remaining aggregated systems and ensure that fair billing and settlements are facilitated.

**(a) What are the issues which need to be considered in determining which legislative and regulatory framework would best accommodate changes to the Territory's ESS framework?**

Sun Cable does not currently have a view on which legislative framework is most appropriate. We recognise that the NT's electricity networks have different scales and needs to other electricity systems in Australia (i.e the NEM and WEM).

**(b) What improvements can be made to the governance of the ESS framework?**

Sun Cable does not currently have specific recommendations around ESS governance frameworks.