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Australian Energy Market Commission  
Level 15  
60 Castlereagh Street  
Sydney NSW 2000

Lodged via: [www.aemc.gov.au/contact-us/lodge-submission](http://www.aemc.gov.au/contact-us/lodge-submission)

## **RE: Integration of storage into the NEM**

ERM Power Retail Pty Ltd (ERM Power) welcomes the opportunity to respond to the Australian Energy Market Commission's (AEMC) Consultation Paper (the Paper) to AEMO's rule change request for Integration of energy storage into the National Electricity Market (NEM).

### **About ERM Power**

ERM Power (ERM) is a subsidiary of Shell Energy Australia Pty Ltd (Shell Energy). ERM is one of Australia's leading commercial and industrial electricity retailers, providing large businesses with end to end energy management, from electricity retailing to integrated solutions that improve energy productivity. Market-leading customer satisfaction has fueled ERM Power's growth, and today the Company is the second largest electricity provider to commercial businesses and industrials in Australia by load<sup>1</sup>. ERM also operates 662 megawatts of low emission, gas-fired peaking power stations in Western Australia and Queensland, supporting the industry's transition to renewables.

<http://www.ermpower.com.au>

<https://www.shell.com.au/business-customers/shell-energy-australia.html>

### **General comments**

Energy storage will be a vital component in delivering electricity supply at optimal cost. The current market was not designed with significant levels of storage in mind and this rule change request is important and timely. However, not all issues identified by AEMO in their rule change request are material.

An update to Transmission Use of System (TUOS) pricing for storage is the most important component of AEMO's proposed changes and we believe the change would further the National Energy Objective (NEO). Efficient investment and operation occur when the marginal cost of a service equals the marginal benefit. Current TUOS pricing structures impose marginal costs on energy storage far in excess of the marginal cost of providing those services. The transmission infrastructure to deliver energy from ESS to consumers already exists and additional marginal transmission investment to date has not and will not be required to facilitate recharging. Battery Energy Storage Systems in particular, are therefore unable to offer their services to consumers at an efficient cost and are under-provided as a result. As energy storages are highly sensitive to price (more so than most electricity demands), the increased costs storage systems result in large deadweight economic losses.

We do not agree with AEMO that a bi-directional asset classification is preferable to the status quo of dual scheduled load/generation registration. We are also unsure which issues the bi-directional facility registration category (i.e. the proposed hybrid facility classification) is trying to solve.

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<sup>1</sup> Based on ERM Power analysis of latest published information.



## TUOS

ERM supports AEMO's proposal to exempt utility-scale storage from TUOS charges as an important and urgent measure to promote economic efficiency by facilitating an efficient usage of the existing network by energy storage.

We support AEMO's view that as scheduled storage can be constrained off at any time, network service providers are not obligated to increase the capacity of the shared network to provide unrestricted access to energy storage. Energy storages have not required the provision of additional transmission infrastructure to enable energy charging. It is highly unlikely that network expansions will be required to support charging in the future given that existing market signals strongly incentivize storage to charge at times of low demand. Existing TUOS charges send reasonably efficient locational price signals to new or expanding loads, but this is not true for energy storages. Therefore, it is inefficient to levy TUOS charges on energy storage, at least under the current TUOS pricing structures. It is also worth noting that exempting storage from TUOS, will not increase TUOS charges for others.

TUOS pricing structures are currently impeding;

- i. an efficient level of investment in storages, especially battery storage
- ii. efficient locational decisions in storage investment
- iii. efficient charging operations at storage sites

Therefore, the current method of applying TUOS charges to storages is inconsistent with the NEO "to promote efficient investment in, and efficient operation and use of, electricity services". TUOS pricing structures are also inconsistent with the current energy rules, specifically;

6A.23.4 Principles for the recovery of the Annual Service Revenue Requirement as prices  
(b) Prices for recovering the prescribed TUOS services - adjusted locational component:

**(1) must be based on demand at times of greatest utilisation of the transmission network** by Transmission Customers and for which network investment is most likely to be contemplated;

6A.25.2 Contents of pricing methodology guidelines

The pricing methodology guidelines must specify or clarify:

(b) permitted pricing structures for recovery of the locational component of providing prescribed TUOS services under clause 6A.23.4(e), having regard to:

(1) the desirability of consistent pricing structures across the NEM; and

**(2) the role of pricing structures in signaling efficient investment decisions and network utilisation decisions;**

(c) in relation to prices set on a postage-stamp basis, permissible postage stamping structures for the prices for prescribed common transmission services and the recovery of the adjusted non-locational component of providing prescribed TUOS services having regard to:

(1) the desirability of a consistent approach across the NEM, particularly for Transmission Customers that have operations in multiple participating jurisdictions; and

**(2) the desirability of signaling to actual and potential Transmission Network Users efficient investment decisions and network utilisation decisions;**



AEMO's proposal to exempt storage from TUOS charges may be unnecessary if the Australian Energy Regulator (AER) were to urgently review their transmission pricing methodology guideline and assess whether the guidelines still comply with (NER) 6A.25.2 in the context of storage investment. The AER could also prioritise review of Transmission Network Service Providers' (TNSP) pricing structures with a view to assessing how changes in storage economics and investment appetite interact with NER 6A.23.4(b)(1). Once TNSP pricing structures are aligned to the existing rules 6A.23.4(b)(1) and 6A.25.2, AEMO's proposed TUOS exemption may not actually be required.

We note, however, that the AER's pricing methodology guideline has not been updated since 2014. Therefore, it may be better to proceed with AEMO's rule change to implement a blanket exemption for TUOS charges for ESS rather than to wait for the AER and TNSPs to update pricing structures as required under the rules.

The AEMC have misidentified one of the problems with TUOS charges. The issue is not that "there is no clear agreement between the AER and NSPs on how TUOS and DUOS should apply to battery storage units"<sup>2</sup>, as the AER have no requirement under the rules to agree with NSPs. The AER are required to enforce National Energy Rule 6A.23.4(b)(1) and to satisfy their obligations regarding the content of the pricing methodology guidelines under 6A.25.2 (b) and (c). By not enforcing these requirements, Transmission pricing structures have lagged trends in technology cost and investment appetite and are now detracting from the NEO.

AEMO's argument that a shared network asset would not be upgraded to provide additional network capacity for battery charging is broadly correct and a rule change to exempt utility-scale storage from TUOS charges is likely to deliver material benefits sooner than updating all TNSP's pricing structures. Especially given that the current pricing structures reviews are already overdue and are usually only updated on a five-year cycle at best.

In the long term, the proposal to exempt batteries from TUOS may become inefficient. For example, a substation supplying a flat load such as an aluminium smelter may have little spare capacity, even at 4am or 2pm when a battery might want to charge. A battery installed at such a substation could increase maximum demand on local network assets when that battery is charging. There should be some price incentive or regulatory control to prevent such outcomes. To control for such edge cases, we recommend that either;

1. Utility scale storage loads are excluded from RIT-T assessments. Also, as scheduled loads, utility-scale storages can be constrained in the event of network capacity limitations. With those limitations, utility-scale storage will never drive transmission upgrades; or
2. TUOS pricing structures are appropriately calculated according to *local* peak network utilization and take into account that batteries are able to avoid charging at the times that would drive network investment. In the case of an aluminum smelter substation, the TUOS charge for that substation should apply at all times, while at a residential substation, TUOS charges might only apply 3-8pm during heatwaves.

We agree with AEMO that the current pricing environment is highly opaque to investors. Several utility-scale storages including Wivenhoe and Shoalhaven have managed to receive an exemption from TUOS charges. However, there are no guidelines for when and why an exemption might be granted. Choosing locations for utility-scale storage and evaluating economics of storage versus other peaking assets is therefore unnecessarily uncertain.

In summary, the energy rules already clearly state that TUOS charges should only be levied at times of high network utilization and should not impede efficient network utilization. Those rules are not currently being applied and an exemption for storage is needed at least until such time as efficient TUOS pricing structures exist. The current blunt application of locational pricing to battery charging detracts from the NEO by distorting locational investment decisions, temporal charging decisions and the decision on whether to invest at all.

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<sup>2</sup> [https://www.aemc.gov.au/sites/default/files/documents/consultation\\_paper\\_-\\_integrating\\_ess\\_into\\_the\\_nem\\_17082020\\_for\\_upload.pdf](https://www.aemc.gov.au/sites/default/files/documents/consultation_paper_-_integrating_ess_into_the_nem_17082020_for_upload.pdf) (p75)



## DUOS

ERM Power does not support AEMO's proposal that DUOS charges should be levied on utility scale energy storages. It is unclear from AEMO's rule change request why AEMO has recommended an inconsistent approach between DUOS and TUOS charges for utility scale storages. We agree with AEMO's view that the rules would benefit from clarity with regards to the payment of DUOS charges by ESS. Scheduled utility-scale storage should be exempt from DUOS charges provided that no additional distribution network assets are required to facilitate ESS energy charging. Where additional distribution network investment is required to facilitate scheduled utility-scale ESS energy charging, then this infrastructure should be funded by the ESS proponent as an unregulated distribution network augmentation.

As a longer term measure, we recommend that DNSPs and the AER introduce a separate tariff class for energy storages under NER 6.18.3(d)(1) "*A tariff class must be constituted with regard to: (1) the need to group retail customers together on an economically efficient basis*". Once a separate tariff class is defined, NER 6.18.5(a) declares that tariffs should be set with an objective to "*reflect the Distribution Network Service Provider's efficient costs of providing those services*". We anticipate that a properly constituted tariff class for energy storage would contribute to locational, allocative and operational efficiency. However, changes to tariff classes can take 5-10 years to roll through the AER regulatory cycle, so until such time as storage tariff classes are introduced, we recommend that utility-scale storages be exempt from DUOS charges.

For utility-scale storages, many of the same economic arguments apply to DUOS charges as TUOS charges, however different sections of the National Energy Rules apply, and additional consideration is warranted.

Although we see that DUOS exemptions should apply to utility-scale storage in the short term, a blanket exemption from DUOS charges for all storage technology is not appropriate. Issues with bi-directional flows from small (non-scheduled) systems located behind-the-meter (BTM) at residential connection points should be distinguished from the operation of utility scale storage operating at high voltage in the transmission and distribution networks which are scheduled by AEMO. AEMO/NSPs already have significant visibility and control of utility scale storage in the network. The 'two-sided market' issues relevant to non-scheduled small scale residential storage systems can also be considered separately within the post 2025 market redesign program.

In some distribution areas, DUOS charges have already undergone significant reform and the resulting tariff structures are reasonably efficient. For example, Ausgrid sub-transmission capacity charges apply only 2-8pm workdays, leaving batteries plenty of flexibility to charge in periods of low local network utilization. By levying demand charges only at the times of greatest network utilization, Ausgrid allows batteries to supply morning peaks if needed and recharge during cheap midday prices before the afternoon/evening peak. The pricing structure adequately incentivizes batteries to charge at times outside of high local network utilization.

Meanwhile, Powercor still levies demand charges on the maximum demand regardless of the time of use and whether that coincides with higher local network demand. The Powercor tariff is currently forcing inefficient battery charging operations as outlined in the Gannawarra battery knowledge sharing report<sup>3</sup>.

Therefore, we recommend a DUOS exemption for schedule grid scale energy storage until such time as explicit storage tariffs are introduced and the AER assesses tariff efficiency for the specific use case of utility scale energy storage.

## Bi-directional facilities and registration categories in NEMDE

We do not consider the requirement for storages to register as both load and generation to be a material impediment to efficient investment. Commercially available software packages can manage automated bidding within the load/generation framework and the small costs of such software packages are not a major determinant of

<sup>3</sup> *Gannawarra Energy Storage System: Operational Report #1 and #2*  
<https://arena.gov.au/assets/2020/09/gannawarra-battery-energy-storage-system-operational-report.pdf>



overall storage project costs. The complexity of managing dual DUIDs for charging and generation is no different to managing a portfolio of units with separate DUIDs. We do not consider that an additional bi-directional unit resource definition in NEMDE will create additional spot market efficiencies and if implemented as proposed by AEMO may lead to spot market inefficiency

In the event that the AEMC decides to proceed with AEMO's proposal for a scheduled bi-directional unit registration category, we would recommend that a scheduled bi-directional unit be allowed to use 20 bid/offer bands and be allowed to set charge availability and discharge availability levels separately to maintain consistency with the current operational flexibility possible under the current load/generation registration framework. Already registered storages with an existing scheduled load/generation registration should be allowed to maintain their current registration category.

The AEMC's consultation paper notes the additional time effort and resources required by new entrants in determining how the Rules are applied for critical items such as Generator Performance Standards (GPS) to hybrid facilities, which may require installation of additional plant or constraints on operation in the NEM. It is currently unclear to ERM Power from the details provided by AEMO in their rule change request how the new bi-directional unit resource category would simplify the GPS negotiation and commissioning processes.

### **Storage in the rules**

Due to the future importance of storage in the NEM, it does make sense for language used in the rules to recognize storage as distinct from pure load and pure generation. We re-iterate that the main issue for utility scale storage is inefficient TUOS and DUOS pricing and that the Rules already require (but have not delivered) efficient pricing structures for storages.

### **Registering utility scale batteries for FCAS**

ERM supports a clear and level playing field for utility scale storage proponents. Currently, individual storage facilities have been approved to provide FCAS at various levels with varying droop rates that appear to be inconsistent with AEMO's published policies. Also, greenfield utility scale storage projects cannot determine the volumes of ancillary service they will be registered to provide in NEM FCAS markets until they complete their commissioning process, which may be more than a year after an investment decision. AEMO's proposal for a new scheduled bi-directional unit registration category does not resolve these critical issues.

The AEMC's consultation paper discusses a variety of registration and operational issues for storage assets, raising questions about how uncertainties can be removed from the various guidelines, fact sheets and procedures relating to energy storage. AEMO's policy for contingency FCAS registration- *Battery Energy Storage System Requirements for FCAS Registration*<sup>4</sup> appears to apply inconsistent and conservative limitations to the volume of ancillary service that can be offered by utility scale storage into the NEM. 'Value-stacking' different energy and ancillary services represents the only demonstrated path to support the investment case for utility scale storage in the NEM. Operation in ancillary services markets has been a critical source of revenue for projects- of the 5 operating utility scale battery projects in the NEM, 4 are registered to provide all 6 contingency FCAS products. Published in January 2019, AEMO's contingency FCAS requirements document appears to limit allowable frequency droop parameters for a battery asset to a minimum of: '1.7%, regardless of its capacity', unless an alternative droop limit is specified by AEMO. However, no criteria is contained within the document with regards to under what conditions AEMO will consider a lower droop setting.

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<sup>4</sup> *Battery Energy Storage System Requirements for FCAS Registration*:

[https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security\\_and\\_Reliability/Ancillary\\_Services/Battery-Energy-Storage-System-requirements-for-contingency-FCAS-registration.pdf](https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Ancillary_Services/Battery-Energy-Storage-System-requirements-for-contingency-FCAS-registration.pdf)



Based on the standard frequency ramp specified in FCAS registration documents, this minimum droop parameter will allow approximately 41% of an asset's nameplate capacity to be registered for FCAS purposes, and thus gain revenues from FCAS markets. (The document doesn't specify which FCAS product this limit applies, however it is assumed to apply to all service categories). Despite the precise wording in the AEMO policy, the document doesn't appear to be followed in the case of any of the currently operating utility-scale battery systems. Droop settings lower than 1.7% appear to have been allowed to be applied to 6 second FCAS registration of Ballarat BESS, Lake Bonney BESS and the recent upgrade to Hornsdale Power Reserve. FCAS has been a critical revenue stream for all utility scale batteries, which have added considerable supply to NEM FCAS markets, in our view it is critical that a consistent approach be applied by AEMO with regards to the registration process for the provision of FCAS.

On a separate but related topic, we note that the AEMC's final determination on *Mandatory Primary Frequency Response* (PFR) where the AEMC has indicated a commitment to developing a market mechanism for provision of this service by mid-2023. It is unclear how the new PFR framework may affect or complement existing FCAS markets- resolution of the future role and service types accessible to utility scale storage would give confidence to potential investors. ERM recommends that work to devise a PFR market mechanism be expedited to further assist participants looking to develop storage assets.

### **Non-Energy cost recovery**

The materiality of non-energy cost allocation is small. However, we believe that the NEO would be better served by either excluding utility scale storage loads from non-energy cost recovery, or levying charges only on round-trip losses. Storage loads are not "final" consumption, they are an intermediate step in serving final demand for electricity services.

The NEO seeks "to promote efficient investment in, and efficient operation and use of, electricity services". In general, charges are most economically efficient when levied on the least price sensitive participants. Energy storage operation depends on arbitraging price differences and hence are vastly more price sensitive than any other load type. Hence, consideration should be given to excluding utility scale energy storage loads from non-energy cost recovery.

### **Marginal Loss Factors**

We support the current arrangements whereby loss factors are calculated separately for scheduled load and generation at a storage facility. We note that if in the future, if dynamic loss factors are implemented, the distinction will become irrelevant.

### **Priority changes and timeframes**

We strongly caution against any proposal to wait for the implementation of the two-sided market reforms as part of the post 2025 market design framework before addressing the integration issues facing utility scale storage and hybrid facilities. These changes will not be targeted at utility scale storage and can be expected to take several years to design, agree, and implement, while an appropriate framework for utility scale storage and hybrid facilities is an immediate and pressing issue.

In this regard, we suggest the AEMC considers the following priority reform areas:

- Network charges – Network charges should not be applied to utility-scale storages until such time as use-of-system pricing structures are reviewed with a view to their efficiency impacts.
- FCAS registration – The current treatment of battery storage in relation to FCAS registration appears to be inconsistent and must be addressed.



- Ramp rate requirements – The current ramp rate limitation of 20 percent per minute of registered capacity imposed on battery ESS is in our view artificial and lacking in technical justification from a power system security perspective. If AEMO believes a maximum ramp rate technical limit is required, this should apply consistently to all generation.

If you would like to discuss this submission further, please contact Dr Kerry Burke, Senior Strategy Analyst; [kburke@ermpower.com.au](mailto:kburke@ermpower.com.au) on +61 7 3021 3263.

Yours sincerely,

[signed]

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