

June 15th 2016

Ms. Jessica Curtis
National Sector Manager
Standards Australia
Level 10, 20 Bridge St
SYDNEY NSW 2000

Submission to Standards Australia – Energy Storage Roadmap Consultation Paper

Dear Jessica

Thank you for the opportunity for the Energy Networks Association (ENA) to provide a submission to Standards Australia in relation to your first consultation paper by Standards Australia regarding your proposed Energy Storage Roadmap.

As you know, the ENA is the peak national body representing gas and electricity transmission and distribution businesses throughout Australia, with member businesses providing energy to virtually every household and business in Australia.

ENA is supportive of the need for, and proposed approach to, Standards Australia's Energy Storage work program as we recognise the significant role that energy storage will play in the future of Australia's energy mix. Standards are recognised as one of the critical enablers that will allow the diverse participants in the electricity supply chain to efficiently participate in a more innovative, distributed electricity system. It is important therefore to identify a clear plan that will ensure the timely development of fit-for-purpose standards to support and facilitate energy storage integration into the energy system.

However, ENA does have comments in relation to the specific questions within the consultation paper which are found in Attachment 1.

In considering the content of this submission, ENA would like to formally acknowledge the contributions of its members. Several recommendations put forward by ENA in this submission are the result of direct input from these businesses and have been considered appropriate for inclusion by the broader ENA membership as a representative industry view.

ENA would welcome the opportunity to consult further with the Standards Australia in relation to this submission.

If you have any questions or wish to discuss this matter further, please contact Stuart Johnston on 02 6272 1513 or email sjohnston@ena.asn.au

Yours sincerely,



John Bradley
Chief Executive Officer

Attachment 1

General Comments on the Scope:

The basis of the maximum/minimum capacity demarcation is currently unclear within the proposed Energy Storage Roadmap. ENA suggests that Standards Australia consider having no minimum capacity and potentially reduce the maximum capacity being considered by the proposed roadmap. The current scope of the proposed roadmap is targeted more at the smaller scale systems; however, the scope then identifies a maximum inverter capacity of 200kWh which is considered as significant even for small scale commercial systems.

Standards Australia may want to also consider extending the current scope to cover or at least clarify existing commercial products, such as commercial scale UPS 'installations' and residential UPS 'appliances'.

Finally, consideration should be given to providing high level comment on hybrid systems and any decision to either include or segregate them from the roadmap (e.g. Fossil Fuel/Battery combination, rotary uninterruptable power supply (RUPS) etc...).

Consultation Questions

1. Are there any stationary electricity storage technologies currently or soon to be developed which are not listed below?

- **Lead acid**
- **Lithium ion**
- **Nickel-based**
- **Flow (Zinc-bromide)**
- **Sodium-ion**

Other stationary electricity storage technologies that may need to be considered include:

- Vanadium redox is considered under the Flow battery category;
- Zebra and SoNiCl batteries (not just nickel cadmium);
- Sodium sulphur – which is different from sodium ion, running at high temperature;
- Aquion Energy, saltwater electrolyte battery;
- Flywheel storage;
- It is also unclear if gel electrolyte is considered under one of the categories above.

In relation to current Australian Standards, ENA members consider that as part of the roadmap, consideration should be given to reviewing AS4029 (*Stationary batteries - lead acid*) to ensure it appropriately covers all types of lead acid batteries including gel, glass mat, and lead crystal.

2. Is the below summary of the state of standards for each technology accurate?

- **Lead acid – Well established standards**
- **Lithium ion – In need of relevant standards**
- **Nickel-based – Well established standards**
- **Flow (Zinc-bromide) – In need of relevant standards**

ENA considers that the summary above is generally correct, however the following gaps or clarifications should be contemplated by Standards Australia within the Energy Storage Roadmap. In terms of the Standards listed above:

- Lead acid – while ENA agrees that there are already well established standards currently in place, we consider that large arrays of batteries are not appropriately covered within the scope of this project. This issue is significant for networks, as a large array can alter the operational and risk management considerations that will require to be addressed for the integration of systems.
- Lithium ion – ENA agrees that relevant standards are required to be developed for Lithium ion.
- Nickel-based – ENA considers that the statement above is not completely accurate as there are currently no standards in place that adequately cover high temperature SoNiCl batteries and Zebra batteries
- Flow (Zinc-bromide) - ENA concurs that relevant standards are required to be developed for Lithium ion.

In addition to the above, ENA would identify the following relevant issues:

- Appropriate standards are yet to be developed for Sodium sulphur systems
- Relevant standards for the *installation* of energy storage systems are currently lacking and are required across all technology types; and
- Electrical Safety Standards such as AS3010 (still in Draft) are deemed to be critical in ensuring installation electrical safety.

3. Standards Australia intend for the development of energy storage standards to be as 'technology neutral' as possible. Is there a particular technology listed above, or additional technologies identified by yourself, which will likely require technology-specific Standards?

ENA and our members support the position that energy storage standards be technology neutral. We propose that standards should be output specific and should try and avoid technology issues. However, where a standard has specific requirements regarding different technologies, that it include a section that outlines the requirements as a generic minimum for manufacturers to comply with. It can subsequently be updated with a technology specific section if it becomes warranted and available.

4. An Australian Standard for 'Safety of battery systems for use in inverter energy systems' (AS/NZS 5139) is currently being drafted separately to this Roadmap process. The 5139 standard outlines the hazards that are associated with battery energy systems and defines installations methods that eliminate or minimise these risks.

Some of the hazards covered are:

- Electric shock hazard
- Energy hazard
- Fire hazard
- Chemical hazard
- Explosion hazard

The installation requirements also cover topics including:

- Earthing requirements
- Location of battery
- Signage and labelling
- Testing and commissioning

Are there any topic areas or issues relating to safety of battery installation by AS/NZS 5139, or similar, which should be addressed through the proposed Standards Roadmap?

ENA agrees with the issues outlined above, however we have also identified a number of other issues that should be considered in the proposed Energy Storage Standards Roadmap. They include:

- Electrical arc hazards – This is important for many types of battery systems as they are often capable of significant fault energy.
- The safe mechanical mounting of batteries should be covered by AS/NZS 5139. Some battery products are quite heavy so good mechanical mounting to the floor or wall to prevent tipping or falling is recommended.
- Battery temperature (and battery inverter temperature) is a very important operational parameter and should be addressed through the "Location" topic as well as a specific "ventilation & cooling" topic.
- Galvanic isolation which is also covered in AS4777 for grid connection but might also need to be covered within the installation (floating or grounded).
- General safety hazards such as their weight, seismic hazards, access, safe working voltages, gasses emitted, temperature management, charge and discharge management; and
- General issues for consideration such as; system connection between the battery and the PCE, monitoring and management of battery life, and naming conventions.

5. Results from Standards Australia consultations to date have identified performance measurement and ability to deal with Australian-unique conditions (such as temperature) as the two most pressing topics. At this stage in technology development, do you believe performance measurement standardisation possible?

If yes, would such standardisation require a technology-specific standard?

ENAs considers the standards for defining performance (e.g. cycle life, rated charge/discharge rates, peak charge/discharge rates etc.) are possible, and are advisable in order to allow the industry to gain credibility, facilitate design optimisation and allow different storage products and chemistries to compete evenly.

It is our understanding that performance measurement standards are currently being developed internationally, in addition to standardised methodologies for providing data from batteries – e.g.

State of Charge and End of Life. For example, some battery management software quotes at any time 2 different States of Charge – one that is based on the battery's total capacity, and one based on the usable capacity. These variants can often be quoted interchangeably in different environments which can be confusing and misleading.

That said, ENA considers that any international standard being considered would require modification to address Australian conditions before it is adopted (i.e. operation in high temperatures).

Some examples of parameters that have been used previously, and could be considered for any future standardisation of performance measures include:

- Specific energy (Wh/kg)
- Constant charging rate
- Cycle ability (DOD %)
- Safety (cell and battery system)
- Sustainability/environment compatibility
- Life / Temperature range
- Material & manufacturing costs (\$/kWh or \$/kW)

6. Besides performance measurement and resilience to environmental conditions, are there any other high priority topics which should be addressed by this Standards Roadmap?

Safety is the most important priority that needs to be addressed in the proposed Energy Storage Roadmap. This is particularly required for Lithium Ion batteries which are likely to provide a significant proportion of the future residential storage fleet.

Other priorities that were identified by individual members included:

- The development of a common template for manufacturers to outline the performance warranty conditions and operation which would void a warranty and this could be related to the performance measurement standardisation; and
- DC electrical protection including BEMS (BMS) controls system signalling.

7. Standards Australia has identified that there is a need for development of Standards documents to support non-demand response enabling device (DRED) connection of energy storage to the grid.

Do you consider it possible that a technology-neutral, entirely performance based, technical specification Standard could be developed, or would several Standards be required to cover each non-DRED technology type?

If Standards Australia is just investigating non-demand response enabling device (DRED) standards specifically for batteries, then from a network perspective, this would be covered by the AS/ NZS 4777 suite of standards for grid connection of inverter energy systems as DRED enablement is in the inverter, not the battery.

If, however this roadmap is looking at the wider issues associated with energy storage then ENA considers that the development of a single performance based non-DRED standard could be very difficult to develop as there are a vast number of communication methods and associated protocols to communicate the required Demand Response or Control directions. However, there are currently no standards which cover DREDs. There is a proposal for the scope of AS4755.1 to cover the requirements and capabilities of DREDs. These standards are to use open rather than a proprietary communication method, that will specify minimum physical, functional and electrical requirements for an interface. It is our opinion that several standards will be required to cover each non-DRED technology type due to the application and network layers being vastly different between each type of technology.

For household customers demand response should be implemented at either:

- The AC/DC boundary; or
- Controlled at the customer connection point.

The customer should have the option to implement demand response where it is most feasible for them. This would ensure that DRED response is only required for inverters or for installation management systems.

8. Guiding stakeholders on what Standard(s) to refer to when working with such electrical energy storage technology, Standards Australia will develop a Handbook on grid connection of battery storage systems.

Besides the Standard for the interaction of DREDs and grid-connected electrical products (AS/NZS 4755.3.5) and Standard for grid connection of energy systems for via inverters (AS 4777.1) are the other documents or Standards which should be referenced in the proposed Handbook?

ENA considers that should consider referencing the following documents and standards within the proposed handbook on grid connection of battery storage systems:

- The framework of AS4755 and specifically the scope of the proposed AS/NZS4755.1;
- Basic electrical standards such as AS/NZS3000;
- Different configurations which are covered in AS5139;
- Interconnectivity which is covered by AS4777 parts 1 and 2;
- The connection of BESS with solar systems through AS5033;
- State-based Service and Installation Rules;
- Generator exemption obligations;
- DNSP technical requirements and their Connection Guides (including the proposed ENA/CEC Guideline);
- At a generic level, the technical requirements and limitations of the Connection Agreement; and
- Jurisdictional Regulatory obligations (Distribution Codes, etc.).

9. Handling, transport and recycling of battery storage technology has been identified as an important long-term consideration

However, is there any specific issue or element of these processes which need to be immediately considered in this Standards Roadmap?

ENA and our members would encourage consideration by Standards Australia for the inclusion of handling, transportation and recycling in the relevant standards as soon as possible. We propose that the standards be mindful of, and are consistent with the Dangerous Goods Code (i.e. https://infrastructure.gov.au/transport/australia/dangerous/dg_code_7e.aspx).

10. Training guidelines or accreditation programs for the installation of battery systems are currently being developed by the Clean Energy Council, Energy Storage Council and Australian Industry Standards.

How should Australian Standards documents best support the safe installation of storage? Should Standards Australia get involved in the initiatives of these groups listed above?

The direct involvement in developing training guidelines or accreditation programs and or initiatives has not been typically the space that is managed by Standards Australia, and is better managed by the groups listed. However, having Standards Australia engage as a key stakeholder in training/accreditation system development around these new and emerging technologies, would provide benefit in ensuring that the systems developed are consistent with current Australian Standards.

To ensure that this issue is administered correctly, it must also be dealt with consistently across all Australian jurisdictions. Therefore, members propose that consideration be given to having the installation of batteries and solar be included within the responsibilities of the State based Electrical Licensing Boards.