Position Statement

Battery Energy Storage Systems (BESS)

The installation of battery energy storage systems (BESS) presents a number of risks and safety concerns for the South Australian Metropolitan Fire Service (MFS) with regards to firefighter intervention.

The MFS are seeing rapidly growing interest and uptake in BESS installations at commercial premises and acknowledges the role such technology plays in moving towards a more sustainable energy future. BESS present a unique risk profile within the built environment which may not be fully catered for in current prescriptive requirements of the National Construction Code (NCC) or Australian Standards. The MFS encourages careful consideration of the specific risks and appropriate safety and mitigation measures when planning to introduce such installations.

BESS installations comprise large numbers of energy fuel cells (batteries), consisting primarily of a variety of lithium chemistry technologies.

A failure event within a lithium chemistry battery (overcharge, equipment failure, physical impact, etc.) has the potential to lead to a thermal runaway event within the BESS, which may pose the following significant risks and challenges for firefighters in the management of an incident:

- Toxic smoke production
- Rapid rate of fire spread
- Vapour cloud explosion or deflagration
- Exothermic chemical reaction fire that cannot be extinguished
- Significant incident duration (in the order of days)
- High voltage electricity (stranded energy)
- Potential for re-ignition
- Contaminated cooling water runoff

Based on discussions with and advice from an international expert in the field, sufficient ventilation is critical during and for the management of incidents involving battery fires, coupled with ongoing water cooling. As such, the MFS currently strongly recommends that BESS installations be located outside of a building structure in an area where there will be minimal impact on any adjacent structures or properties.

<u>BESS and Buildings</u>

When considering Development Applications, the MFS requests the certifying authority consider the following items in relation to BESS installations against the relevant NCC Performance Requirements. Clause E1.10 and/or Clause E2.3 of the NCC may be appropriate mechanisms by which to document and address associated Performance Solutions:

- Appropriate fire resistance levels (FRLs) for structure surrounding and in proximity to the BESS installation, considering the risks of prolonged fire exposure and the potential for a vapour cloud explosion;
- Appropriate detection for fire and flammable gasses (including hydrogen);
- Automatic shutdown of BESS installations on fire alarm or detection of elevated flammable gas levels;
- Appropriate ventilation to keep flammable gasses below their Lower Flammability Limits (LFL);
- Ability to monitor the concentrations of potential flammable gasses within enclosed spaces;

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- Provision of effective automatic fire sprinkler system protection for a prolonged period;
- Provisions for the containment and/or management of water runoff;
- Block plans for the building to include location of BESS installations;
- Battery manufacturer's emergency contact details;
- Signage, information and precis to be provided at the main building entry point and at any other appropriate locations on site;
- Provision of technical and visual data to enable monitoring of the conditions;
- Provision of a strobe with signage at the entry door to the BESS area to indicate when any gas detection system within the space has activated;
- Emergency Plan Requirements for BESS installations at a premises. Please refer to the MFS website for the complete list of Emergency Plan requirements: https://www.mfs.sa.gov.au/community/building-and-commercial-fire-safety/hazardous-chemicals-and-emergency-planning.

Based on expert advice, the MFS currently has reservations regarding the efficacy of gaseous suppression systems for BESS at this time. These systems will not prevent thermal runaway and may potentially result in more dangerous atmospheric conditions and delay or exacerbate the risk of deflagration (explosion). The provision of such systems should be carefully considered.

It should be noted that where a BESS installation is proposed internally within a building, the MFS may not enter the area or room where the BESS is installed and will be reliant on the FRL of the surrounding structure and installed systems to contain a fire and prevent the possibility of explosion.

The MFS does not have the expertise to assess the adequacy of a design solution in terms of FRLs or the level of sprinkler protection or ventilation required for BESS. The MFS will review design solutions in terms of MFS operational response requirements relating to expected emergency response activities and the ability to satisfactorily interact with the installed systems. The MFS would encourage that design solutions be peer reviewed by a third party having appropriate qualifications and technical knowledge of the risks presented by BESS.

The MFS continues to seek and consider available information on BESS and is in contact with international experts in the field to inform our preparedness and response to incidents involving these systems.

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