ENERGY
www.csiro.au

Energy storage safety

Responsible installation, use and disposal of domestic and small commercial systems

Report for the Clean Energy Council

13 November 2015

CLEAN ENERGY COUNCIL

Clean Energy Council and CSIRO energy storage safety performance study executive summary

Extract from (http://fpdi.cleanenergycouncil.org.au/reports/storage-safety-study.html)

Key findings

1. There is a lack of knowledge on the variety of energy storage technologies, and thus on how to care for and operate them in a safe manner in the domestic and small commercial scale context.
Although battery storage is a low-risk technology, it is important that systems are installed and maintained by an accredited installer, and that industry best practice is developed.

2. There is currently no consensus on the appropriate method to extinguish a lithium battery storage fire in the event of an incident.
There are many suggestions for extinguishing a lithium fire, each of which has advantages and disadvantages. Research is needed into the appropriate method for dealing with such an incident.

3. There is insufficient accreditation and training to support and provide qualifications for designers and installers of energy storage systems.
The lack of accreditation and training is particularly relevant for the emerging lithium-ion battery technologies. The training and accreditation needs to cover safety protocols, and signage related to warnings and battery chemistry types.

4. Emergency response teams (fire brigade, police and ambulance) have limited education about the issues related to an energy storage technology in the event of an incident.
Relevant safety signage needs to be on display and the response team needs to take into account the location of the battery system.

5. There is a lack of standards for battery storage system disposal and recycling (except in the case of lead-acid battery system).
Battery storage systems can contain heavy or toxic metals that can be harmful to the environment if disposed of in a landfill. Consumers, designers and installers should be aware of and consider whole-of-life recycling practices.

6. Australian standards for battery energy storage and connection to the electricity network are incomplete.
For the domestic storage market especially, there is a need to develop standards that incorporate installation, smart communication, training and maintenance, transportation, safety and emergency guidelines, and requirements related to the environment and recycling.

7. Stationary energy storage installations and incidences are insufficiently reported.
Relatively few incidents have been reported, which may reflect the lack of records or reporting processes to capture such incidents, and the relatively low numbers of present installations.

Recommendations

1. Improve awareness of and access to information on the variety of battery energy storage technologies and their appropriate operation and care among consumers (general public), designers (engineers and electrical tradespeople) and installers (electrical tradespeople).
As the battery storage industry is relatively new, there is limited knowledge across the different technologies available – in particular for the emerging lithium-ion battery storage systems – and the number of safety considerations for each.

2. Research and identify the best methods for lithium-ion battery storage system recycling, and establish a lithium-ion battery recycling initiative.
Battery storage systems can contain heavy or toxic metals such as nickel, cobalt, cadmium and lead, which can be harmful to the environment if disposed of in landfill. In Australia, used rechargeable battery systems are classified as either a hazardous waste or a dangerous good, which means that they can create environmental (and safety) risks if disposed incorrectly.

3. Research and identify the best methods to safely (passively) extinguish domestic and small commercial scale lithium-ion battery storage fires.
Presently there is no clear agreement as to how to appropriately extinguish a lithium battery fire. There are many methods in literature and the most appropriate emergency response may also depend on the size and conditions of the incident.

4. Align Australian and international standards, and improve local regulatory and building codes relevant to energy storage systems.
A number of standards do exist for mature or established storage technologies and the connection of inverters to the electricity network. However, some of these standards are outdated and only consider specific cases, whereas modern use of these technologies has expanded to much broader applications.

5. Establish a set of best practices specific to the battery storage industry, including development and upkeep of an installation, maintenance and incident reporting database for energy storage systems in Australia.
Best practice around battery energy storage is performed in some industries for selected technology types, for example, transportation of lithium-ion batteries in the aviation sector. However, domestic and small commercial scale stationary energy storage lacks guidance and consistency for safe selection and management of batteries. There are presently no established reporting processes or formal record-keeping for energy storage installations and incidents and thus no way of assessing the scope or resources required to assist industry.

6. Develop training and nationally recognised accreditation pathways for designers and installers specific to energy storage in domestic and small commercial scales.
Present accreditation in the industry are established for Australia's solar PV systems, but emergent for battery energy storage systems. There is presently insufficient accreditation and training resources to support designer and installer qualifications to install energy storage systems only.

CONTACT US

t 1300 363 400
+61 3 9545 2176
e enquiries@csiro.au
w www.csiro.au

YOUR CSIRO

Australia is founding its future on science and innovation. Its national science agency, CSIRO, is a powerhouse of ideas, technologies and skills for building prosperity, growth, health and sustainability. It serves governments, industries, business and communities across the nation.

FOR FURTHER INFORMATION

Energy Flagship
Dr Sam Behrens
t +61 2 4960 6133
e Sam.Behrens@csiro.au
w http://people.csiro.au/B/S/Sam-Behrens

Energy Flagship
Ms Kate Cavanagh
t +61 2 4960 6208
e Kate.Cavanagh@csiro.au
w http://people.csiro.au/C/K/Kate-Cavanagh