Energy Storage: Safety FAQs

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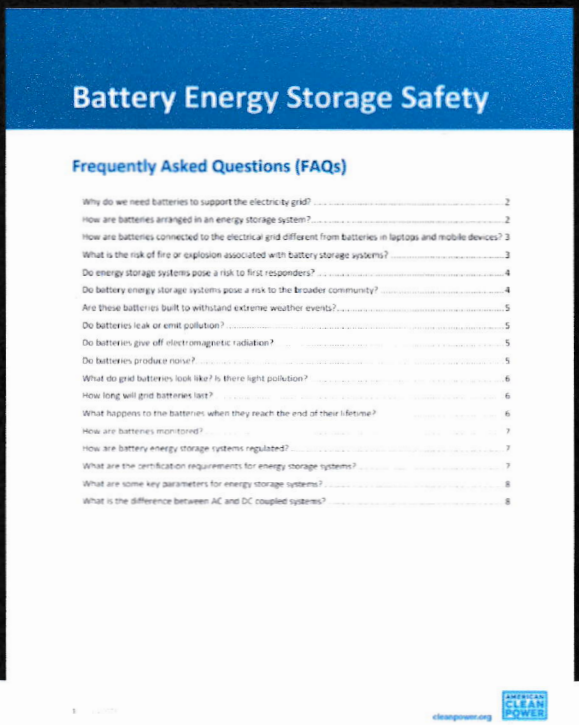

Energy storage is a resilience enabling and reliability enhancing technology. Across the country, states are choosing energy storage as the best and most cost-effective way to improve grid resilience and reliability.

ACP has compiled a comprehensive list of Battery Energy Storage Safety FAQs for your convenience.

Read ACP's FAQ document to learn more in detail.

Fact sheets *(PDF download)*

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The basics of battery energy storage safety

+ Why do we need batteries to support the electricity grid?
+ How are batteries arranged in an energy storage system?
+ How are batteries connected to the electrical grid different from batteries in laptops and mobile devices?
+ What is the risk of fire or explosion associated with battery storage systems?
+ Do energy storage systems pose a risk to first responders?

+ Do battery energy storage systems pose a risk to the broader community?

+ Are these batteries built to withstand extreme weather events?

- Do batteries leak or emit pollution?

In normal operation, energy storage facilities do not release pollutants to the air or waterways. Like all energy technologies, batteries can present chemistry-specific hazards under fault conditions. Batteries with free-flowing electrolytes could leak or spill chemicals, so these systems are normally equipped with spill containment. Batteries with aqueous electrolytes may emit small quantities of hydrogen gas in normal operation and larger amounts under fault conditions, but these emissions are handled by ventilation systems and are not considered polluting. As discussed previously, all batteries release toxic substances in a fire, and if water is used for firefighting, it can create contaminated runoff – another reason for manufacturers' recommendations to allow fires to burn themselves out.

+ Do batteries give off electromagnetic radiation?

+ Do batteries produce noise?

+ What do grid batteries look like? Is there light pollution?

+ How long will grid batteries last?

+ What happens to the batteries when they reach the end of their lifetime?

+ How are batteries monitored?

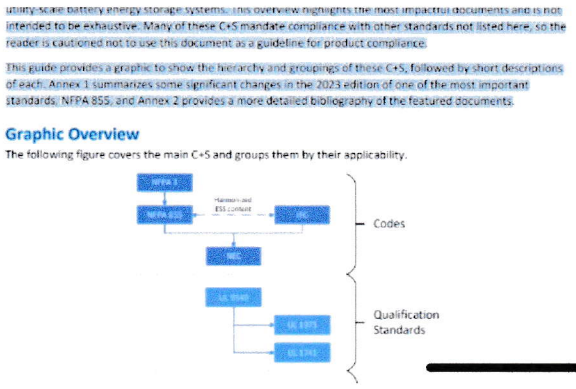
+ How are battery energy storage systems regulated?

+ What are the certification requirements for energy storage systems?

+ What are some key parameters for energy storage systems?

+ What is the difference between AC and DC coupled systems?

You may also be interested in:

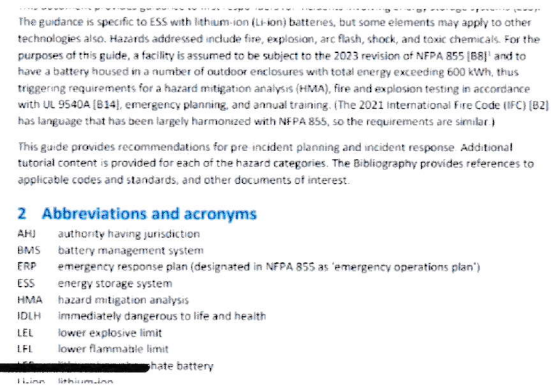


utility-scale battery energy storage systems. This overview highlights the most impactful documents and is not intended to be exhaustive. Many of these C+S mandate compliance with other standards not listed here, so the reader is cautioned not to use this document as a guideline for product compliance.

This guide provides a graphic to show the hierarchy and groupings of these C+S, followed by short descriptions of each. Annex 1 summarizes some significant changes in the 2023 edition of one of the most important standards, NFPA 855, and Annex 2 provides a more detailed bibliography of the featured documents.

Graphic Overview

The following figure covers the main C+S and groups them by their applicability.



The guidance is specific to ESS with lithium-ion (Li-ion) batteries, but some elements may apply to other technologies also. Hazards addressed include fire, explosion, arc flash, shock, and toxic chemicals. For the purposes of this guide, a facility is assumed to be subject to the 2023 revision of NFPA 855 [B8][1] and to have a battery housed in a number of outdoor enclosures with total energy exceeding 600 kWh, thus triggering requirements for a hazard mitigation analysis (HMA), fire and explosion testing in accordance with UL 9540A [B14], emergency planning, and annual training. (The 2021 International Fire Code (IFC) [B2] has language that has been largely harmonized with NFPA 855, so the requirements are similar.)

This guide provides recommendations for pre-incident planning and incident response. Additional tutorial content is provided for each of the hazard categories. The Bibliography provides references to applicable codes and standards, and other documents of interest.

2 Abbreviations and acronyms

AHJ	authority having jurisdiction
BMS	battery management system
ERP	emergency response plan (designated in NFPA 855 as 'emergency operations plan')
ESS	energy storage system
HMA	hazard mitigation analysis
IDLH	immediately dangerous to life and health
LEL	lower explosive limit
LFL	lower flammable limit
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