

Lithium-ion battery storage system safety

20 October 2026

Increasing use and capacity of lithium-ion battery systems on offshore facilities requires operators to understand MAE hazards and ensure controls remain effective and fit for purpose.

Purpose

To inform operators that Lithium-ion battery energy storage systems are increasingly being adopted across the offshore industry and are expected to become more prevalent as decarbonisation initiatives progress. These installations are also increasing in capacity.

The purpose of this bulletin is to highlight the major accident event (MAE) hazards that may arise from lithium-ion battery storage systems and the need for operators to consider whether existing risk assessments, safety-critical control measures and safety case arrangements remain appropriate as these systems are introduced or modified.

Scope

This bulletin is relevant to offshore facilities where lithium-ion battery systems are installed, proposed, expanded or materially modified.

The systems are known by various names and acronyms including Battery Energy Storage Systems

(BESS), Energy Storage Systems (ESS) and Grid Stability Modules (GSM).

Lithium-ion batteries provide significant advantages over conventional battery technologies, including:

- higher energy density;
- smaller size and weight;
- longer shelf and cycle life; and
- fast charging.

These characteristics can make lithium-ion batteries an attractive and cost-effective energy storage solution. However, some of these same characteristics, particularly high energy density, can increase the potential consequences of battery failure including initiation of, or contribution to a MAE.

Hazard identification and controls

Lithium-ion battery systems can introduce hazards including:

- thermal runaway;

- toxic and flammable off-gassing;
- fire and explosion;
- prolonged fire events and re-ignition; and
- escalation to adjacent equipment, systems or areas of a facility.

Operators should ensure that these hazards and credible escalation pathways are appropriately identified and assessed.

Particular consideration should be given to whether existing safety-critical elements and control measures remain fit for purpose for the type, configuration and capacity of the battery energy storage system. This should include consideration of:

- detection and monitoring systems;
- ventilation and management of toxic or flammable gases;
- fire detection, suppression and firefighting arrangements;
- isolation and emergency shutdown arrangements;
- impacts of the physical location, separation and protection from escalation;
- impacts on emergency response arrangements, including escape and evacuation routes; and
- the potential for prolonged thermal events and re-ignition.

Importantly, controls originally designed for conventional electrical or fire hazards should not automatically be assumed to be adequate for lithium-ion battery hazards. Operators should be able to demonstrate that the controls relied upon are appropriate to the identified hazards and capable of achieving their required performance.

NOPSEMA's Safety case content and level of detail guidance states that the safety case must identify technical and other control measures that are critical to safety for identified MAEs, and that the

adopted control measures must collectively eliminate or reduce risks to health and safety to as low as reasonably practicable (ALARP).

The legislation

Under regulation 2.30 of the Offshore Petroleum and Greenhouse Gas Storage (Safety) Regulations 2024, an operator must submit a revised safety case to NOPSEMA as soon as practicable where the technical knowledge relied upon to formulate the safety case, including knowledge used to identify hazards and evaluate MAE risks, has become outdated such that the safety case no longer adequately addresses the required matters.

For lithium-ion battery systems and use offshore, operators are required to identify hazards, assess risks, identify appropriate controls and reduce risks to ALARP. Where new scientific or technical knowledge indicates that the basis used to assess risks is outdated, the operator must consider its obligation to revise and submit the safety case to NOPSEMA as soon as practicable.

Related documents

- IMCA M 250 [Introduction to hybrid battery systems for DP vessels](#)
- EMSA [Guidance on the Safety of Battery Energy Storage Systems \(BESS\)](#)
- IOGP [Battery Energy Storage System \(BESS\) integration into power generation systems](#)
- Havtil [Safe use of lithium-ion batteries in the petroleum industry](#)
- NOPSEMA [Safety case content and level of detail](#)

Contact

Enquiries should be directed to alerts@nopsema.gov.au