

## Solar Energy South Africa

# Energy storage system quality and safety indicators



## Overview

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How will grid scale electricity storage improve health and safety standards?

The deployment of grid scale electricity storage is expected to increase. This guidance aims to improve the navigability of existing health and safety standards and provide a clearer understanding of relevant standards that the industry for grid scale electrical energy storage systems can apply to its own process (es).

What's new in energy storage safety?

Since the publication of the first Energy Storage Safety Strategic Plan in 2014, there have been introductions of new technologies, new use cases, and new codes, standards, regulations, and testing methods. Additionally, failures in deployed energy storage systems (ESS) have led to new emergency response best practices.

Can energy storage systems be scaled up?

The energy storage system can be scaled up by adding more flywheels. Flywheels are not generally attractive for large-scale grid support services that require many kWh or MWh of energy storage because of the cost, safety, and space requirements. The most prominent safety issue in flywheels is failure of the rotor while it is rotating.

Does industry need energy storage standards?

As cited in the DOE OE ES Program Plan, "Industry requires specifications of standards for characterizing the performance of energy storage under grid conditions and for modeling behavior. Discussions with industry professionals indicate a significant need for standards. " [1, p. 30].

What are the safety requirements for electrical energy storage systems?

Electrical energy storage (EES) systems - Part 5-3. Safety requirements for electrochemical based EES systems considering initially non-anticipated

modifications, partial replacement, changing application, relocation and loading reused battery.

What are the gaps in energy storage safety assessments?

One gap in current safety assessments is that validation tests are performed on new products under laboratory conditions, and do not reflect changes that can occur in service or as the product ages. Figure 4. Increasing safety certainty earlier in the energy storage development cycle. 8. Summary of Gaps

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### Review of Codes and Standards for Energy Storage Systems

This work describes an improved risk assessment approach for analyzing safety designs in the battery energy storage system incorporated in large-scale solar to improve accident prevention and mitigation, via ...

### Improve the safety, availability & performance of energy storage

system experiences a State of Charge (SoC) imbalance of 15% within half of all strings, EUOver the entire lifetime of the asset. Cell imbalances can occur because battery energy storage ...



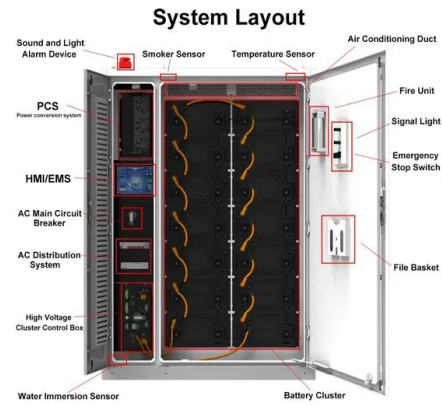
### Battery Hazards for Large Energy Storage Systems

As the size and energy storage capacity of the battery systems increase, new safety concerns appear. To reduce the safety risk associated with large battery systems, it is imperative to consider and test the safety at all ...

### Design, optimization and safety assessment of energy ...

Previous studies largely focused on PV system to

grid integration that highlighted the challenges of intermittency and inability to meet peak demands. 10-12, 48 Some of the studies examined the energy storage performance independently ...



## Best Practices for Operation and Maintenance of Photovoltaic and Energy

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