Frequently Asked Questions: Battery Safety

As utility-scale Battery Energy Storage System (BESS) installations expand across Indiana, residents and local officials may have questions about their safety. This FAQ provides additional information about the risks involved and the systems in place to protect citizens and property.

Does Indiana specifically regulate BESS safety?

Yes. On July 1, 2023, Indiana enacted House Enrolled Act (HEA) 1173 (Indiana Code § 22-14-8-6) establishing safety requirements for new and expanded utility-scale BESS in Indiana. Key provisions include:

- Adoption of National Fire Protection Association (NFPA) 855 standards for fire safety, which specify fire protection, installation, spacing, and emergency response requirements.
- Delegation of safety evaluation and enforcement to the Indiana Department of Homeland Security (IDHS), which reviews and approves safety and commissioning plans.
- Requirements for developers to implement emergency response plans and offer annual training to local fire departments.

What causes BESS to fail?

BESS can fail due to various conditions:

Failure Mode	Example
Thermal Abuse	Battery overheating from poor ventilation
Electrical Abuse	Battery overcharging, external short circuits
Mechanical Abuse	Puncturing or crushing a battery
Internal Faults	Manufacturing defects in a battery
Environmental Impacts	Extreme temperature exposure, flooding, pests, and other natural disruptions

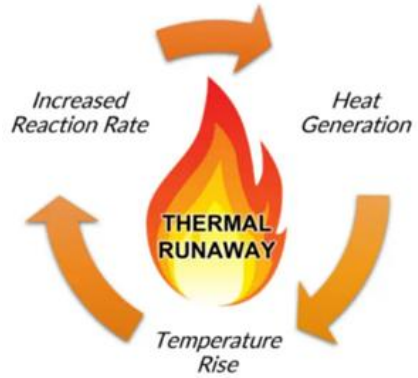
How often do BESS installations fail?

BESS failures are rare. According to data from the Energy Information Administration (EIA) and the Electric Power Research Institute (EPRI), the failure rate of BESS installations is approximately 0.32%.[1]

What risks are there when a BESS fails?

Hazards associated with BESS installations include:

- Stranded energy: Damaged batteries may still contain stored energy. This poses the risk of delayed fires and electrical shock.
- Off-gassing: Damaged batteries may emit flammable/toxic gases. These gases pose potential health, fire, and explosion hazards, particularly in enclosed spaces.
- Deep-seated fires: Fires contained in protective casings and enclosures can be particularly difficult to extinguish. Emergency responders may decide to handle such fires using non-intervention strategies (e.g., letting the fire burn itself out) to avoid personnel risk.
- Thermal runaway: Occurs when internal heat build-up exceeds the battery's ability to release heat, resulting in a rapid rise in temperature. Thermal runaway can cause a battery to rupture, catch fire, and, in some cases, explode.



Who is responsible for BESS safety and preventing failures?

BESS safety is a shared responsibility among multiple entities and individuals. These include:

Stakeholder	Responsibilities
Manufacturers	Design and produce batteries that meet safety standards
Operators	Maintain systems, train staff and first responders
Local planning authorities	Approve siting, zoning, and decommissioning plans
IDHS	Enforces NFPA 855 standards and reviews site plans
Regional grid operators	Oversee grid-level reliability and integration
Emergency responders	Respond to BESS safety incidents and undertake training

How are BESS designed to detect early signs of failure?

BESS incorporate multiple hazard detection and protection systems to preemptively identify failures:

- Battery Management System: Continuously monitors conditions (e.g., voltage, temperature).
- Smoke and heat detectors: Conventional and very early smoke detection apparatus (VESDA) are used to detect smoke before flames arise.
- Off-gas detection systems: Identify volatile gases released during early cell degradation, helping operators intervene before a failure escalates.
- Thermal imaging and flame detectors: Allow external monitoring of multiple BESS enclosures.
- Internal camera systems: Provide real-time visual confirmation without risk to personnel.

How are BESS designed to address failure?

Fire suppression in BESS combines design features and extinguishment systems:

System/Feature	Description
Continuous ventilation systems	Remove flammable gases before they reach dangerous levels
Deflagration vents / blast panels	Release built-up pressure and prevent enclosure ruptures
Water-based systems	When appropriately targeted (e.g., in-rack nozzles), water can prevent fire propagation. Water must be used with caution to avoid electrical short circuits and adverse chemical reactions
Dry-pipe systems	Allow firefighters to inject water without opening the enclosure
Gaseous suppression agents	These agents (e.g., FM-200 or Novec 1230) extinguish fires by starving them of oxygen

Can fires involving thermal runaway be extinguished?

Not always. Once thermal runaway begins, suppression agents may be ineffective and could even increase explosion risk by displacing oxygen while flammable gases accumulate. Best practice is a containment strategy that focuses on preventing a fire from spreading to nearby enclosures, letting the fire burn itself out, and using water only as a last resort.

How are firefighters trained to handle a BESS failure?

Under Indiana Code §22-14-8-6, BESS operators must provide annual training to local fire departments. Firefighting strategies increasingly emphasize containment over extinguishment, especially during a thermal runaway event. Emergency response plans, provided by the operator of the BESS, also play a critical role by providing emergency responders with detailed site-specific information about potential hazards, system layouts, battery chemistries, and recommended tactics.

For additional information, see Hoyt, M., Kuykendall, O., Cotton, W. et al. (2025). *Utility-Scale Battery Energy Storage System Applications and Impacts in Indiana*. Indiana Office of Energy Development.

[1] storagewiki.epri.com/index.php/BESS_Failure_Incident_Database.

Thermal Runaway Picture: MoviTHERM. movitherm.com/blog/battery-thermal-runaway-risk-prevention/.