

First responder utility safety bulletin

Winter 2023



Response tactics for battery energy storage incidents

Lithium-ion (Li-ion) batteries are the leading technology for residential and commercial battery storage. Under normal conditions, Li-ion battery energy storage systems are stable and safe. However, as these systems grow more prevalent and are relied on for more uses, incidents involving Li-ion batteries have become more frequent. Use the tips below to learn how to prevent ignition of compromised Li-ion batteries and respond to battery fires.



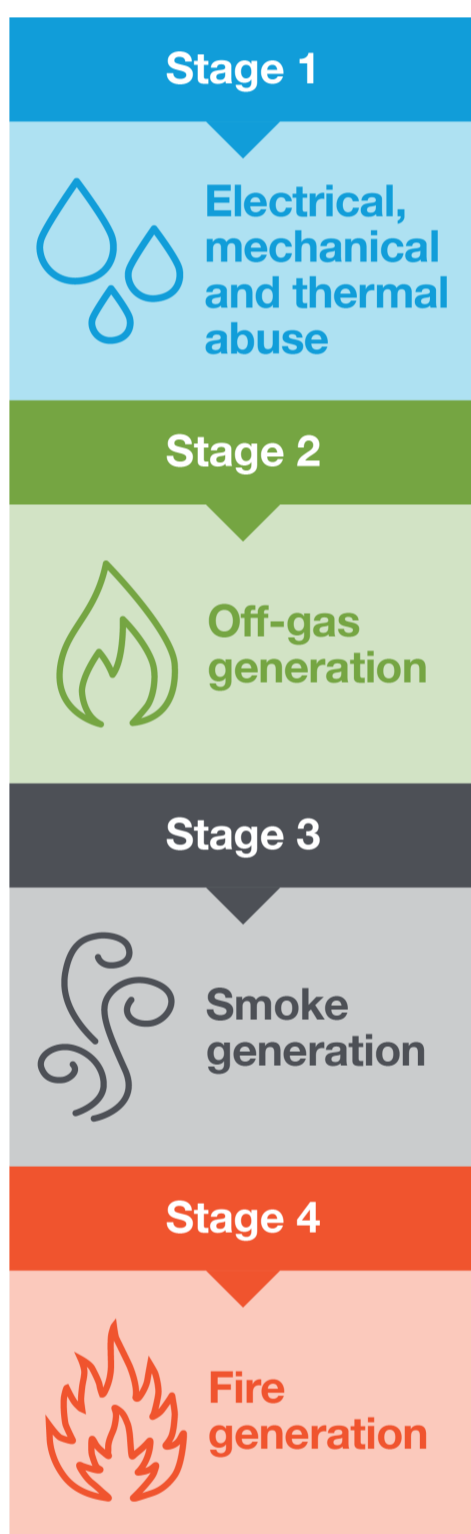
Potential battery hazards

Li-ion batteries that are damaged or subjected to intense heat present a unique combination of electrochemical hazards that increase the danger and complexity of fire service operations.

- **Electrolyte**, a hazardous material within batteries, has explosive potential when heated. An internal short-circuit or external event can cause the electrolyte to vaporize, build internal pressure and release a mixture of toxic and flammable gases.
- **Thermal runaway** – when batteries overheat to the point of compromise – can generate extremely toxic and explosive gases.
- **Burning batteries** retain stored energy and have been known to reignite hours or even days after an event.

The stages of battery failure

Learning to recognize the four main stages of battery failure will help you identify opportunities to safely initiate offensive tactics and prevent further incident escalation. Cautious de-escalation tactics are acceptable until you observe smoke. When off-gassing gives way to smoke generation, you are at the tipping point, and you must transition to an operational safety and containment strategy.



Stages 1 and 2: De-escalation tactics

- Electrically isolate the system and work with National Grid personnel to verify grid disconnect.
- Cool compromised battery cells with water.
- Monitor off-gassing. The off-gassing phase is considered the best time to act. If possible, use positive pressure ventilation from a shielded position to reduce gas accumulation.
- Consider where the gas is venting and may accumulate. Evacuate accordingly.
- Consider the potential for ignition and explosion and establish defensive operations as the incident progresses from off-gassing (Stage 2) to smoke generation (Stage 3).
- Remember that conventional gas detection such as multi-gas meters cannot provide sufficient warning of the transition to smoke generation.

Stages 3 and 4: Operational safety and containment

When off-gassing gives way to smoke generation, you are at the tipping point. You must transition to a containment strategy and defensive operations. Prepare for a long-term incident with high-volume toxic and explosive gas production, persistent shock hazards, the potential for re-ignition hours or even days after initial extinguishing, and the need for a sustained high-volume water supply. Pursue slow and methodical containment actions.

Fighting a battery fire

- **Confirm with your dispatcher that National Grid has been notified** and is responding. Work with National Grid personnel to isolate the system.
- **Always wear full protective clothing** and self-contained breathing apparatus (SCBA).
- **Always assume batteries and related system components are energized and contain stranded energy even when disconnected from the grid.** Work with National Grid to isolate all components and shut down the system.
- **Establish a high-volume water supply.**
- **Never utilize a straight stream or foam when extinguishing a fire involving Li-ion batteries.** Contain small fires with Class C extinguishing agents. Where it is impractical to use Class C agents or when the fire is large, apply water in a 30-degree fog pattern at 100 psi. Avoid water discharges into storm drains or water bodies (wetlands, streams, etc.) to avoid spreading any potential contamination. Always remain at least 30 feet from the battery when extinguishing the fire.
- **Consider the products of combustion to be highly toxic and volatile.** Conduct thorough decontamination after any exposure to the products of combustion or electrolytes generated by storage batteries.
- **Prepare for deflagration:** rapid burning that may create a significant pressure wave, similar to an explosion. Take a defensive position at the corners of the structure.
- **Treat electrolyte release as a hazmat event** and follow your department's SOPs for metering, monitoring, containment and decontamination. Ensure appropriate cleanup per health and safety requirements before the structure is reoccupied.
- **Seek advice from the manufacturer** via a technical assistance phone number or manual.
- **Use the Emergency Response Guidebook (ERG)** Guide 111, *Mixed Load/Unidentified Cargo*, and Guide 147, *Lithium-Ion Batteries* for evacuation and shelter-in-place guidance.

Keep yourself, your team and the public safe this winter. Visit firstresponder.ngridsafety.com today to register and complete your utility safety training.

To report emergencies, **call 911** and **National Grid** immediately. Always **call 911** if you suspect a gas leak!



Know what's below.
811 before you dig.

In case of gas emergencies:

Long Island and the Rockaways:
911 and 1-800-490-0045

Metro New York:
911 and 1-718-643-4050

Upstate New York:
911 and 1-800-892-2345

Massachusetts:
911 and 1-800-233-5325

In case of electric emergencies:

Upstate New York:
911 and 1-800-867-5222

Massachusetts:
911 and 1-800-465-1212

IMPORTANT TERMS AND CONDITIONS – PLEASE READ PRIOR TO USE.