MADISON COUNTY 911 VIA FACEBOOK

Missouri Fire Highlights Unique Dangers of Battery Recycling

By Angelo Verzoni
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On Wednesday, residents of a town in southeastern Missouri had to evacuate their homes after a massive fire broke out at a local facility where lithium-ion batteries were processed and recycled. The incident highlights the growing fire safety threat lithium-ion batteries pose as more of them are used and eventually enter the global waste stream.

What Happened in Missouri?

According to an article published by the *Missouri Independent*, the Fredericktown, Missouri, facility where the fire occurred is "one of the world's largest lithium-ion battery processing facilities." Photos posted on social media by Madison County emergency officials show dark gray smoke rising from the 225,000-square-foot structure and a partially caved-in roof.

Officials have not yet said what might have caused the fire or what fire protection systems were in place. But the company that operates the plant where the fire occurred, Critical Mineral Recovery, says on its website that the facility contained one of the "most sophisticated automated and remote supervised and controlled fire suppression systems in the world."

Although the facility appears to have sustained significant damage in the blaze, there have been no reports of any deaths or injuries from the event.

What Causes Lithium-Ion Batteries to Catch Fire?

Lithium-ion battery fires happen for a variety of reasons, such as physical damage from force, electrical damage from overcharging, exposure to extreme temperatures, and manufacturer defects.

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More specifically, lithium-ion battery fires often involve a chemical process known as thermal runaway, in which the battery essentially continuously overheats and over-pressurizes and is prone to fires, off-gassing and sometimes explosions.

'A Higher Level of Hazard'

Recycling lithium-ion batteries is a complex and inherently risky process, explains NFPA® Senior Technical Services Engineer Brian O'Connor. A number of factors contribute to this, including:

- **Batteries arriving at facilities damaged.** "These batteries can arrive in less-than-perfect condition," O'Connor says of the lithium-ion batteries that might come to a processing and recycling facility from an old, discarded cellphone or a totaled electric vehicle. Batteries in this condition likely have an "increased chance of failure," he says, and that can translate to thermal runaway, fires, and explosions.

- **Stranded energy.** When a battery is damaged, it also becomes difficult to determine how much charge it is still holding. This residual energy—commonly known as "stranded energy"—presents a fire and shock hazard, particularly to emergency responders, according to research conducted by the Fire Protection Research Foundation.

- **The recycling process involves shredding.** Although many processes used to recycle lithium-ion batteries are proprietary and therefore not publicly known, the typical process involves shredding the batteries in order to extract the metals inside them, so they can be reused. "When you shred a lithium-ion battery, it catches on fire," O'Connor says. "There are some processes where you do it underwater, so it does create this failure, but the failure is contained. In general, these facilities are going to have a higher level of hazard."

Safety Measures

O'Connor says there are a number of steps facilities and workers can take to help them stay safer while carrying out this dangerous work.

"First and foremost," he says, "always follow the applicable fire and life safety codes." NFPA codes and standards such as NFPA 1, *Fire Code*; NFPA 101®, *Life Safety Code®*; NFPA 13, *Standard for the Installation of Sprinkler Systems*; and others could apply to the types of industrial occupancies where battery recycling might take place.

Additionally, O'Connor says, it is critical for companies to build and maintain a culture of safety, where employees are aware of and properly trained on the various risks and emergency procedures in question.

What Does the Future Look Like?

With battery use increasing every year, experts predict the number of fires involving these batteries will increase as well. But there is hope.

"Some batteries are getting smarter, more innovative, so they're getting more difficult to go into thermal runaway," O'Connor says. Likewise, in an interview with Recharge News in 2023, a battery industry expert predicted that only battery manufacturers that are implementing the "best practices to manage thermal runaway will survive and succeed in this market."

To help complement and further these efforts to produce safer batteries, regulations have also been introduced. Underwriters Laboratories (UL), for example, published a standard specific to e-bikes, UL 2849, in 2020. The 2024 edition of NFPA 1 also includes requirements for charging more than five e-bikes or other micromobility devices indoors or within 10 feet of a building. (Fires involving lithium-ion battery–powered e-bikes and e-scooters have been a particular problem in large cities like New York, where hundreds of such fires have killed dozens of people in recent years.)

In the coming years, NFPA 800, *Battery Safety Code*, could become another tool used in the regulation of batteries. The proposed code is expected to include requirements to help prevent fires and explosions involving batteries, from the "raw materials and

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