

## **WRITTEN STATEMENT FOR THE RECORD**

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Subcommittee on Emergency Management and Technology  
United States House of Representatives

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### **Introduction**

Good morning, Chairman D’Esposito, Ranking Member Carter and other members of the subcommittee. I am Steve Kerber, Executive Director of the Fire Safety Research Institute, part of UL Research Institutes. The Fire Safety Research Institute (FSRI) advances fire safety knowledge to address the world’s unresolved fire safety risks and emerging dangers. Along with our colleagues in the Electrochemical Safety Research Institute (ESRI), we take on the safety challenges associated with energy technologies. As part of UL Research Institutes, we are committed to sharing our safety insights with everyone to advance UL’s public safety mission of providing safe living and working environments for people everywhere. Personally, I have been studying fire safety, with a focus on firefighter health and safety for more than 20 years. I am a 3<sup>rd</sup> generation volunteer firefighter having served more than a decade in the College Park Fire Department in Prince George’s County, Maryland.

### **Fire is Fast – And Getting Faster**

So far this year, just 6 weeks in (1/1-2/9), we have lost more than 348 people in home fires. At least 50 of those deaths are children, many under the age of five (5). All these deaths are preventable. Americans should be the safest in their homes, but that is simply not the case when it comes to fire safety. Research conducted by FSRI has shown that, during a fire today, you have the least amount of time to safely exit your home than at any time in history.

This is partially because of the synthetic materials used in our furnishings and interior finishes today. It is possible that a fire starting in a bedroom or living room could go from a small flame to flashover – which is when the room becomes fully engulfed with fire – in just three (3) to five (5) minutes. The heat and smoke generated by flashover make conditions unsurvivable in the room where the fire starts and in adjacent

rooms or hallways that are open to the fire room. This has contributed to fire deaths steadily increasing over the last decade in the United States. USFA data estimates this increase to be almost 25% since 2012.

The other items, or the fuels, that we bring inside our homes continue to change as well – lithium-ion batteries for example. Lithium-ion batteries have brought essential innovation to our vehicles, our grids, our communities, and everyday products that we rely on. And they are being deployed at a massive scale to drive a reduction in emissions and to improve the resilience of our national electrical grid. But they can overheat, catch fire, and cause explosions with disturbing intensity while emitting toxic smoke. From the first sign of a problem, there could be less than a minute to escape a battery fire.

Fire keeps getting faster as most of the nation's fire departments are ill-equipped to face the threats lithium-ion battery fires pose. That's why we must act now to address escalating fire dangers posed by modern materials and new technologies.

## **Research is Essential**

Despite ongoing safety improvements such as smoke alarms and sprinklers, fires involving lithium-ion battery-powered products are increasing at an alarming rate and have resulted in injuries, fatalities, and property loss. Even when the initial cause of a fire is not the lithium-ion device, the involvement of lithium-ion batteries can increase the intensity and magnitude of any incident. FSRI is honored to support the U.S. Fire Administration and our Fire Service One Voice partners by developing actionable insights through collaborative research on this subject; however, additional research is imperative to reverse the mounting risks presented by this technology.

Experiments and fire investigations have shown that, if damaged or misused, a lithium-ion battery can transition from smoking to explosive fire growth within a matter of seconds. In 2022, a high-profile fire in New York involving lithium-ion batteries injured almost 40 people. The fire was one of hundreds of documented incidents caused by lithium-ion batteries in the United States since 2021. The actual number is likely higher because lithium-ion battery fires are not yet captured by the national fire incident reporting system. These incidents drive the need to better understand the physical phenomena of thermal runaway and the associated hazards.

As Dr. Moore-Merrell described, thermal runaway is one of the primary risks related to lithium-ion batteries. It is a phenomenon in which the lithium-ion cell enters an uncontrollable, self-heating state. We know through our research that thermal runaway can occur undetected until the situation becomes dire and there is an immediate danger of fire. This ultimately translates into shorter escape times and unknown hazards for consumers and first responders.

FSRI is actively investigating multiple facets of battery fires, including:

- Fire service considerations with lithium-ion battery Energy Storage Systems (ESS)<sup>1</sup>
- The potential impacts when lithium-ion battery storage systems fail in homes<sup>2</sup>.

- The hazards posed when e-mobility devices (such as e-bikes and scooters) go into thermal runaway<sup>3</sup>.
- The fire dynamics and suppression challenges of electric vehicle fires<sup>4</sup>.

While this research is already underway, knowledge gaps remain in determining how hazards develop during lithium-ion battery incidents and creating strategies to mitigate the associated risks for Americans and first responders. Further study of materials, construction methods, and computational tools will improve our understanding of the fire dynamics in buildings so that building systems can provide increased protection from lithium-ion battery fires. Experiments focused on lithium-ion battery incidents will characterize risks and advance emergency response protocols. We can't do it alone.

The federal government must collaborate with fire service stakeholders to direct lithium-ion battery research efforts toward the highest priority safety needs. Increased federal funding is imperative to drive research in improving battery safety as technologies advance, ensuring safe functionality of battery systems across electric vehicles, energy storage and other uses of lithium-ion batteries, and equipping fire departments to respond to battery incidents through refined tactics, specialized tools, and reduced chemical exposure risk. Targeted research initiatives and funding in these domains will provide vital progress toward comprehensive lithium-ion battery safety for both the public and first responders.

### **Safeguarding Fire Responders is Fundamental**

Lithium-ion batteries present a dynamic challenge to the fire and emergency services. As use of these devices accelerates through communities, emergency responses will expose first responders to explosive thermal events and toxic emissions beyond traditional protocols. Bravery alone cannot sufficiently protect our fire service. We must have the support of the nation's leaders to ensure the safety of America's communities and fire service personnel. Addressing these challenges will require a multi-faceted process working with a variety of partners (governmental and non-governmental) across many issue areas.

Congress must urgently deliver specialized resources that match the novel threats proliferating. This includes funding:

- Targeted research to equip departments with advanced tactics for battery incidents and integrating the latest science into customized training.
- Modern protective equipment and tools designed specifically to shield against exposure risks distinct to lithium-ion battery chemistry and future chemistries.
- Additional personal protective equipment and tools otherwise out of budgetary reach for resource-starved departments.

It is within your power to direct vital funding so first responders have every chance to prevail over the ever-evolving risks confronting communities across this country. Renewing support for programs like the Assistance to Firefighters Grant (AFG) and Staffing for Adequate Fire and Emergency Response (SAFER)



Grant Programs – as well as the U.S. Fire Administration – will provide access and accountability nationwide. The safety of Americans begins with securing the safety of our emergency services.

## **Education is Critical**

Both public awareness and first responder training are insufficient regarding lithium-ion battery hazards. Most Americans do not realize the fire risks the ubiquitous devices present if damaged or overcharged. And most fire teams lack the specific protocols needed when battery storage or electric vehicle fire occur.

Leaders must work with fire service stakeholders to prioritize national outreach to address these knowledge gaps. Impactful education includes:

- Mass campaigns conveying battery fire prevention through departments uniquely positioned to connect local constituencies.
- Turnkey campaigns like FRSI's Take C.H.A.R.G.E. of Battery Safety<sup>4</sup> initiative designed to promote best practice consumer behaviors and potentially life-saving emergency planning through memorable guidelines.
- Accessible training materials for fire service instruction covering lithium-ion fire dynamics distinct from “traditional” fires and tailored suppression methods that integrate containment, suppression, scene turnover requirements, PPE needs, disposal, and more.

Effective messaging requires distilling cutting-edge research for public comprehension and fire service training customization. We urge officials at all jurisdictional levels to commit resources allowing departments to inform, instruction, and intervene against preventable high-risk battery incidents in the communities they serve. Hazard mitigation begins with awareness.

## **Governance is Essential**

Governance mechanisms around safety standards, trade enforcement measures, and legislative initiatives remain disconnected and outpaced by swiftly evolving technologies. Holistic implementation and enforcement of current codes and standards at federal, state, and local levels will provide the foundation required to properly ensure the fire and life safety ecosystem, especially as codes and standards continue to be updated in response to new and evolving knowledge about technologies, including lithium-ion batteries.

Commercial readiness should never undermine public safeguards. The federal government must look to existing codes and standards organizations like UL Standards & Engagement, the National Fire Protection Association (NFPA), and the International Code Council (ICC) to ensure that laws and regulations consider the work already being done in this space. Applicable codes and standards<sup>5</sup> exist: however, to remain effective, they must constantly integrate manufacturer insights with the latest fire safety research on battery hazards.



The federal government must work with fire service stakeholders to empower consumer regulators with product safety mandates. H.R. 1797/ S.1008, the Setting Consumer Standards for Lithium-Ion Batteries Act, would require the Consumer Product Safety Commission to set a mandatory safety standard for lithium-ion batteries in micro-mobility devices. Closing outdated loopholes that enable uncertified devices into communities is also paramount.

With coordinated governance, the promise of battery technologies can properly and safely accelerate. By infusing regulation with current competence, no innovation outpaces our ability to integrate it responsibly. We urge officials at all levels to partner with researchers and industry in establishing safety protocols.

## Conclusion

Public safety must become the top priority as innovations central to our 21st century lifestyles introduce increasing fire hazards. Technologies already promising to transform our vehicles, grids, and communities are now threatening them absent a new paradigm centered on safety.

But with deliberate governance, robust safety standards, and coordinated consumer education, lithium-ion batteries can fulfill their highest purpose responsibly. Implementing the necessary safeguards begins by acknowledging the urgent need for modern research, first responder resources, and public awareness reflective of contemporary risks.

Through immediate action centered on current codes, centralized funding, and community empowerment against preventable risks, we will pass to the next generation safer homes, infrastructure, and the emergency services relied upon to be ever vigilant against hazards both known and still obscure.

Thank you again for the opportunity to share my perspective and I am happy to help this committee address the critical issues it continues to address.

## Resources

1. Fire service considerations with lithium-ion battery ESS (<https://training.fsri.org/course/104/fire-service-considerations-with-lithium-ion-battery-energy-storage-systems>)
2. The Impact of Batteries on Fire Dynamics (<https://fsri.org/research/impact-batteries-fire-dynamics>)
3. Fire Safety Hazards of Lithium-Ion Battery Powered e-Mobility Devices (<https://fsri.org/research/examining-fire-safety-hazards-lithium-ion-battery-powered-emobility-devices-homes>)
4. Fire Safety of Batteries and Electric Vehicles (<https://fsri.org/research/fire-safety-batteries-and-electric-vehicles>)
5. Take C.H.A.R.G.E. of Battery Safety (<https://batteryfiresafety.org>; <https://vimeo.com/884565314>)
6. For e-mobility, the applicable standards are:
  - o UL 2054, Household and Commercial Batteries

- UL 2272, Electrical Systems for Personal E-Mobility Devices
- UL 2849, Electrical Systems for eBikes
- UL 2850, Outline of Investigation for Electrical Systems for Electric Scooters and Motorcycles
- UL 2271, Batteries for Use in Light Electric Vehicle (LEV) Applications
- UL 2580, Batteries for Use in Electric Vehicles.

Other important standards and codes include:

- UL 9540, Standard for Safety of Energy Storage Systems and Equipment
- NFPA 1, Fire Code
- NFPA 70, National Electrical Code
- NFPA 855, Standard for ESS and Lithium Battery Storage Safety
- International Fire Code, ICC
- International Residential Code, ICC.