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## Emerging Risks: Lithium Ion Batteries

**Abstract:** The expansion in the use of Lithium Ion batteries has become a challenge for attending Fire Fighters. Battery Systems have been introduced into the Building Code of Australia (BCA) 2019 as a defined term with provisions based on a minimum size of system. However, based on the large-scale testing of Energy Storage Systems (ESS) undertaken by FM Global consideration should still be given to ESS containing banks of Lithium Ion batteries in the form of spacing, compartmentation and sprinkler operation. A holistic performance-based fire safety approach is warranted taking into consideration Building Code of Australia (BCA), Dangerous Goods Storage & Handling and Special Fire Hazard requirements.

**Full article:** FM Global shares new fire protection and installation guidance for lithium-ion energy storage systems

Publicly available research to inform building and fire codes for safe installation practices

**JOHNSTON, R.I., USA**—Lithium-ion battery-based energy storage systems (ESS), in high demand for supplying energy to buildings and power grids but under scrutiny for recent fires and explosions, are the focus of new fire protection and installation guidance from FM Global, one of the world’s largest commercial property insurers.

The complete scientific research findings, the first of their kind to be shared publicly, are available in a downloadable technical report, Development of Sprinkler Protection Guidance for Lithium Ion-Based Energy Storage Systems, at [www.fmglobal.com/researchreports](http://www.fmglobal.com/researchreports).

FM Global recently conducted small- to large-scale fire tests on ESS sized for commercial applications such as manufacturing, office-building power generation and utility use. Lithium-ion batteries are vulnerable to “thermal runaway,” leakage of ignitable gases and subsequent combustion.

“These systems hold enormous promise for clean energy while raising new protection challenges,” said Benjamin Ditch, senior lead research engineer at FM Global. “Our research shows that ESS deployments can be made safe through the combination of automatic sprinklers and careful ESS rack spacing.”

The research report is useful to inform fire codes and authorities having jurisdiction (AHJ). It yields specific recommendations for safe separation between full-scale ESS racks and other objects, providing a fundamental basis for evaluating hazards in other lithium-ion ESS configurations.

Among the key findings:

- Sprinklers are effective in delaying or preventing fire spreading to adjacent racks.
- Separation between ESS and other combustibles is essential to effective fire protection.

- A fire watch should be present until all potentially damaged ESS equipment containing lithium-ion batteries is removed from the area following a fire. Fires involving lithium-ion batteries are known to reignite any time from minutes to days after the initial event.

The tests were conducted at the FM Global Research Campus in West Glocester, R.I. The USA campus is home to the largest fire technology lab in the world at 108,000 square feet (10,000 square meters) and six stories.

The work builds on FM Global research reported in May 2013 and December 2016, which, like this latest phase, was conducted in partnership with the nonprofit Property Insurance Research Group (PIRG) and in collaboration with the National Fire Protection Association's Fire Protection Research Foundation (FPRF).

The findings will inform FM Global Property Loss Prevention Data Sheets, which provide engineering guidelines that risk managers, property owners and code authorities can use to protect their facilities. Videos of the lithium-ion battery tests will soon be available on YouTube.