Safety & Fire Risk Identification in the Emerging Lithium Battery Value Chain

Anna-Kaisa Viitanen[1], Mikko Poikkimäki[1], Maija Leppänen[1], Pasi Huuskonen[1], Mikko Auvinen[2], Juha Nikmo[2], Ilkka Kantasalmi[1], Kirsi Jussila[1], Pia Perttula[1]

[1]Finnish Institute of Occupational Health, Helsinki, Finland. [2]Finnish Meteorological Institute, Helsinki, Finland

Abstract

Intro: The green transition and carbon-neutrality targets have accelerated the adoption of various lithium-battery-based solutions. This has given rise to a new value chain encompassing everything from the extraction of metals to battery manufacturing, end-user applications, and recycling. However, the different stages of this value chain involve a range of occupational safety risks that must be identified to ensure worker safety, including chemical hazards, fire safety, and accidents.

Methods: We have identified the occupational safety risks through literature surveys and stakeholder interviews, as well as field experiments and observations. We have further modelled exposure to harmful agents (e.g., hydrogen fluoride) during lithium battery fires and developed practical recommendations to support risk management and fire preparedness at workplaces.

Results: Good risk management practices, especially at the beginning of the value chain, are evident. However, the increase in battery-operated forklifts and hand-held devices, including electric tools, is seen as a growing occupational hazard. The modelled exposure levels during battery fires can lead to harmful health effects, but exposure can be avoided through appropriate behaviour.

Outlook: The results emphasize the need for safety communication among the various actors in the battery value chain. In addition, close cooperation with fire and rescue authorities is needed to protect not only workers but also citizens.