KEEPING IT REAL

Felipe Arrighi *explains why, when lithium-ion batteries fail, they behave differently – and that's where the risk starts to build*



IN A LIVE SITUATION, RESPONDERS TAKE IN MULTIPLE STREAMS OF INFORMATION AT ONCE

It usually doesn't begin with anything dramatic. A hiss. Maybe a sharp pop. Sometimes just a thin plume of grey-white smoke from something that, at first glance, doesn't seem capable of causing much trouble. Then the temperature climbs. Gases begin to build. And what you thought you were dealing with a moment earlier shifts into something else entirely, often before anyone has had time to take stock.

Lithium-ion batteries now sit behind a huge range of everyday systems, from handheld tools and consumer electronics through to e-bikes, e-scooters, vehicles and industrial infrastructure. Failures are still relatively rare, and that's worth saying, but when they do happen the speed and behaviour can catch people out. These are devices designed to store and release energy in a controlled way; when that control is lost, the release is anything but predictable.

A fire in the UK city of Glasgow, linked to a vape battery, brought some of this into focus. It wasn't just the ignition that raised concern. It was how the incident developed. Rapid heat release, dense smoke and the presence of hazardous gases meant that what may have looked like a fairly routine fire quickly became something more complex once crews were on scene. People still tend to frame these as 'just fires', but they're not. Once thermal runaway starts, you're dealing with gas release, pressure, sometimes re-ignition. It behaves differently and has a life of its own. If you haven't seen it before, it can throw you.

Battery failures introduce a chemical dimension that isn't always covered in standard fire or safety training. Gases such as hydrogen fluoride and carbon monoxide can be released, particularly in enclosed or poorly ventilated spaces. Without the right awareness or the ability to detect what's actually in the atmosphere, it's easy to misread what's happening, especially as conditions begin to escalate.

Regulation is starting to catch up. In the United States, guidance from organisations such as the US National Fire Protection Association increasingly reflects the need to understand hazardous atmospheres alongside fire. Standards such as NFPA 1010 now place greater emphasis on gas monitoring and detection as a core capability for firefighters, recognising that what's in the air can be as critical as what's burning. It's not a complete answer, but it does show where expectations are heading.

In many organisations, preparation still leans on classroom sessions, written procedures, and the occasional live exercise. All useful, necessary even, but they don't always translate into confident decisions when conditions change in real time. And lithium-ion incidents tend to do exactly that. They evolve quickly and aggressively. Watching a video is helpful, but it's

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passive. You're not making decisions, you're not reading your detectors, you're not dealing with the pressure of it, developing your sense of situational awareness or muscle memory. That's the bit that stays with you. And that's the training gap, really, knowing something in theory versus having had to act on it.

In a live situation, responders – whether fire crews, industrial safety teams or site personnel – are taking in multiple streams of information at once. Gas readings. Heat levels. Visual cues. All feeding into decisions that have to be made on the spot. Without prior exposure to something even remotely similar, experienced people can still hesitate. Just for a moment. Sometimes, that's all it takes.

This is where Argon Electronics has built its approach. The UK-based company has spent more than three decades working with responders and detector manufacturers developing training systems for CBRNe and hazardous environment response. The idea is simple: make training as realistic as possible without introducing actual risk. Instructors can easily implement a simulated hazardous environment within minutes in any location they choose to which the highly realistic training instruments respond.

That difference becomes clear in practice. Operators use the simulators just like their own detectors. They see readings change. They respond, communicate, reassess and sometimes get it wrong before correcting course. That repetition matters. It builds a level of familiarity that classroom learning on its own doesn't quite provide.

In the case of lithium-ion battery incidents, the same principle applies. Argon's Long Range Vapour Sources (LRVS) can simulate gas release and dispersion, helping teams train under evolving conditions in a safe, controlled environment. While no simulation can perfectly replicate real-world pressure, this approach comes much closer to the challenges responders face in the field. Some users have even enhanced lithium battery scenarios by integrating LRVS hazards into a battery leak simulation that produces a thermal imaging heat signature. Combined with Argon's Generic MultiGAS, this creates a highly realistic and memorable training experience. We see a lot of technically competent teams, but they haven't had the chance to apply that knowledge in a realistic environment. Once you introduce uncertainty, incomplete information, that's where the real learning starts.

There's also the question of how different teams operate together, which usually only becomes obvious when things don't quite line up. Incidents like these rarely sit with one group. Fire, medical, site teams, sometimes external agencies, all working at the same time, not always with the same picture in front of them. Training in isolation has its limits. And it shows.

Some organisations are moving quickly, updating training, building in training capability more formally, testing new methods. Others move more slowly. Not resistant, exactly, but balancing it against other priorities. Understandable, perhaps. Still a risk.

Argon Electronics sits in that space, focusing on bridging the gap between theory and practice. Its systems are used across defence, emergency services, and industrial sectors, with an emphasis on realism, repeatability and the safe delivery of complex scenarios. It reflects a broader shift across the industry, where training is starting to mirror the complexity of modern hazards – not just their presence.

Argon's proven approach centres on detection-led training and the simulation of hazardous environments. As battery technologies continue to spread and as incidents, however infrequent, continue to surface, that approach is likely to become more relevant. Lithium-ion batteries aren't going away. Their use will only increase, across more applications, in more places, often where failure carries wider consequences than expected. The benefits are clear enough. The risks are less visible, until they're not.

Training needs to feel real enough that when something goes wrong, the response isn't built on assumptions that don't quite hold up. Familiarity with the nature of the hazard and how quickly the situation can change, the ability to monitor and evaluate the operational environment is essential. Because when a lithium-ion battery fails, there isn't much time to think it through. By the time you realise what's happening, you're already making decisions that can save lives ●