

# Batteries caught and exploded

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Picture this: you're cruising down the Great Ocean Road in your brand new electric vehicle (EV), the ocean to your left and the wind in your hair. But what if I told you this idyllic drive could turn into a nightmare, with the faint smell of something burning?

This month we have had at least two large lithium-ion battery fires in Australia - one in the Sydney airport car park and another one more recently at the Bouldercombe battery storage site in Queensland.

Most electric vehicles humming along Australian roads are packed with lithium-ion batteries. They're the same powerhouses that fuel our smartphones and laptops - celebrated for their ability to store heaps of energy in a small space.

The reality is lithium-ion batteries in electric vehicles are very safe. In fact, from 2010 to June 2023, only four electric vehicle battery fires had been recorded in Australia. A recent paper forecasts a possible total of around 900 EV fires between 2023 and 2050. This is, for all intents and purposes, a small amount.

Nonetheless, when EV batteries do overheat, they're susceptible to something called "thermal runaway". This chemical reaction can be triggered from faults in the battery - whether that's an internal failure (such as an internal short circuit) or some kind of external damage. In extreme cases, it causes the battery to catch fire or explode.

Then there are even larger batteries, such as Megapacks, which are what recently caught fire at Bouldercombe. Megapacks are large lithium-based batteries, designed by Tesla. They are intended to function as energy storage and to help "stabilise the grid and prevent outages".

The Megapack that caught fire on Tuesday is one of 40 lithium-ion Megapack 2.0 units on-site. A Megapack fire is daunting for obvious reasons. These have a capacity of 3 megawatt hours, which equals 3,000 kilowatts of electricity generated per hour.

If a fire bursts out in an EV or battery storage facility, the first instinct may be to grab the nearest hose. However, getting too close to the fire could spell disaster as you may be injured by jet-like flames or projectiles.

In the case of up-and-coming solid-state batteries with a lithium metal anode (instead of the more common

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graphite anode), these have a rather unwelcome talent for chemical reactions when they come into contact with water.

While firefighters have used water on lithium-battery fires in the past (as it can help with cooling the battery itself), they have at times needed up to 40 times as much as a normal car fire requires.

Globally, numerous solutions have been proposed for extinguishing lithium-ion battery fires. However, as of now, neither Australian standards, nor any other internationally-recognised guidelines adequately address fire extinguishing requirements for this purpose.

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