

Electric vehicle fires are rare—the risk for petrol and diesel vehicles is at least 20 times higher, says researcher

September 15 2023, by Hussein Dia



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Two electric vehicle fires have been reported in Australia this week. Five cars were destroyed after a lithium battery [ignited](#) in a car parked at Sydney Airport on Monday. [Firefighters believed](#) the battery had been detached from the car because it was damaged.

On the same day, another vehicle [caught fire](#) after it hit debris on a road near Penrose in the New South Wales southern highlands. It's believed the [debris](#) pierced the [battery pack](#), starting a fire.

Despite these incidents, electric vehicle battery fires are rare. Indeed, the available data indicate the fire risk is between 20 and 80 times greater for petrol and [diesel vehicles](#). Fire risks are also greater for [electric scooters](#) and [electric bikes](#).

However, battery fires do pose particular problems, which I'll discuss later.

How common are these fires?

Australian firm [EV FireSafe](#) tracks passenger electric vehicle battery fires worldwide. From 2010 to June 2023, its database records only [393](#) verified fires globally, out of some 30 million [electric vehicles on the road](#).

Australia recorded only [four](#) electric vehicle battery fires over the same period. One was linked to arson. The other three vehicles were parked in structures that burned down and destroyed the vehicles. So it appears these fires didn't start in the batteries.

But electric vehicle numbers in Australia were low during this 13-year period.

Are the risks higher than for petrol or diesel cars?

As electric vehicle numbers grow, this week's reports might lead some people to fear fire risks will increase. However, data for the past 13 years suggest quite the opposite is true as electric vehicles replace petrol and diesel vehicles.

A [May 2023 report](#) by the Swedish Civil Contingencies Agency found vehicles powered by [internal combustion engines](#) were [20 times more likely](#) to catch fire than electric vehicles in Sweden.

Sweden recorded 106 fires in various electrified modes of transport in 2022. More than half were in e-scooters (38) and e-bikes (20). Out of Sweden's 611,000 electric vehicles, 23 fires (0.004%) were reported. The fleet of 4.4 million petrol and diesel vehicles recorded 3,400 fires (0.08%).

Globally, [EV FireSafe](#) found about 0.0012% of electric passenger vehicles caught fire from 2010 to 2023. While it was difficult to find similar global statistics for petrol and diesel vehicles, EV Firesafe used a range of country reports and found a much higher 0.1% risk of catching fire. That's more than 80 times the rate EV Firesafe found for electric vehicles.

As well as 393 verified fires worldwide, the EV Firesafe [database](#) includes 74 incidents that are being investigated and 21 that have not been verified.

A 2020 [Tesla](#) internal report (not verified independently) suggested there was one [Tesla](#) fire for every 205 million miles (330 million kilometers) traveled. The Tesla report notes National Fire Protection Association data for the United States showed a much higher rate of one fire for every 19 million miles (30.6 million kilometers).

We still have limited data on [fire risk](#) in electric vehicles, most of which are relatively new. More statistically reliable comparisons require more data over much longer time frames.

What causes electric vehicle fires?

Electric vehicle battery packs store a lot of energy in a very small space. When damaged, an internal short circuit triggers a chain reaction called [thermal runaway](#). The [battery pack](#) then generates more heat than it can dissipate and catches fire.

About 95% of battery fires are classed as ignition fires, which produce jet-like directional flames. The other 5% involve a vapor cloud explosion.

A battery can catch fire for various reasons. It may be caused by [physical damage](#) from a collision, manufacturing defects, battery faults, workshop repairs, arson, external fires or overheating.

The [EV FireSafe database](#) shows about 18% of fires occurred when vehicles were charging, and 2% within an hour of disconnecting from the charger.

About 25% of incidents occurred in underground spaces, 31% while parked outside and 29% while driving (remaining 15% unknown). Of the vapor cloud explosion fires, 70% occurred in underground spaces and 30% in open-air conditions.

A battery fire is challenging

Electric vehicle fires do present new problems. Fires must be carefully managed to ensure the safety of firefighters and the public.

Once batteries are on fire, they can be hard to manage. Lithium battery fires burn at extremely high temperatures, can last for days and cause extensive damage. They often reignite just when the fire seems to have subsided.

If not managed properly, battery fires can emit highly toxic gases and

chemicals for many [hours](#). Properly [trained](#) firefighting crews are needed to handle these fires.

Methods to control a fire include cooling the battery with water, or using a crane to lift the vehicle and [submerge](#) it in a large water container.

Why are the risks higher in e-scooters and e-bikes?

Fire and road safety incident rates are higher for e-scooters and e-bikes. In the first half of 2023, EV Firesafe [data](#) show they accounted for more than 500 battery fires, 138 injuries and 36 deaths worldwide. Over the same six months, 35 electric vehicle battery fires resulted in eight injuries and four deaths.

The higher risk for e-scooters and e-bikes is mainly linked to poor-quality battery design and construction, and the use of [unapproved](#) chargers.

Electric cars and trucks use the same [battery](#) technology but have more sophisticated designs. Advanced cooling systems keep their batteries at optimal temperatures during everyday driving and recharging. This makes them much safer than batteries in e-scooters and e-bikes.

A national approach to electric vehicle fire safety

The recent National EV Strategy [considered](#) the risk of fires.

As part of the strategy, the [federal government](#) committed to [funding](#) the development of world-leading guidance on electric vehicles, road rescue demonstrations and fire safety training.

The [surge](#) in electric vehicle numbers means this funding is needed now to ensure [firefighters](#) can deal effectively with any fires that do happen.

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Citation: Electric vehicle fires are rare—the risk for petrol and diesel vehicles is at least 20 times higher, says researcher (2023, September 15) retrieved 28 April 2024 from <https://techxplore.com/news/2023-09-electric-vehicle-rarethe-petrol-diesel.html>

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