

# **ELECTRIC VEHICLE *BATTERY FIRES & ROAD RESCUE***

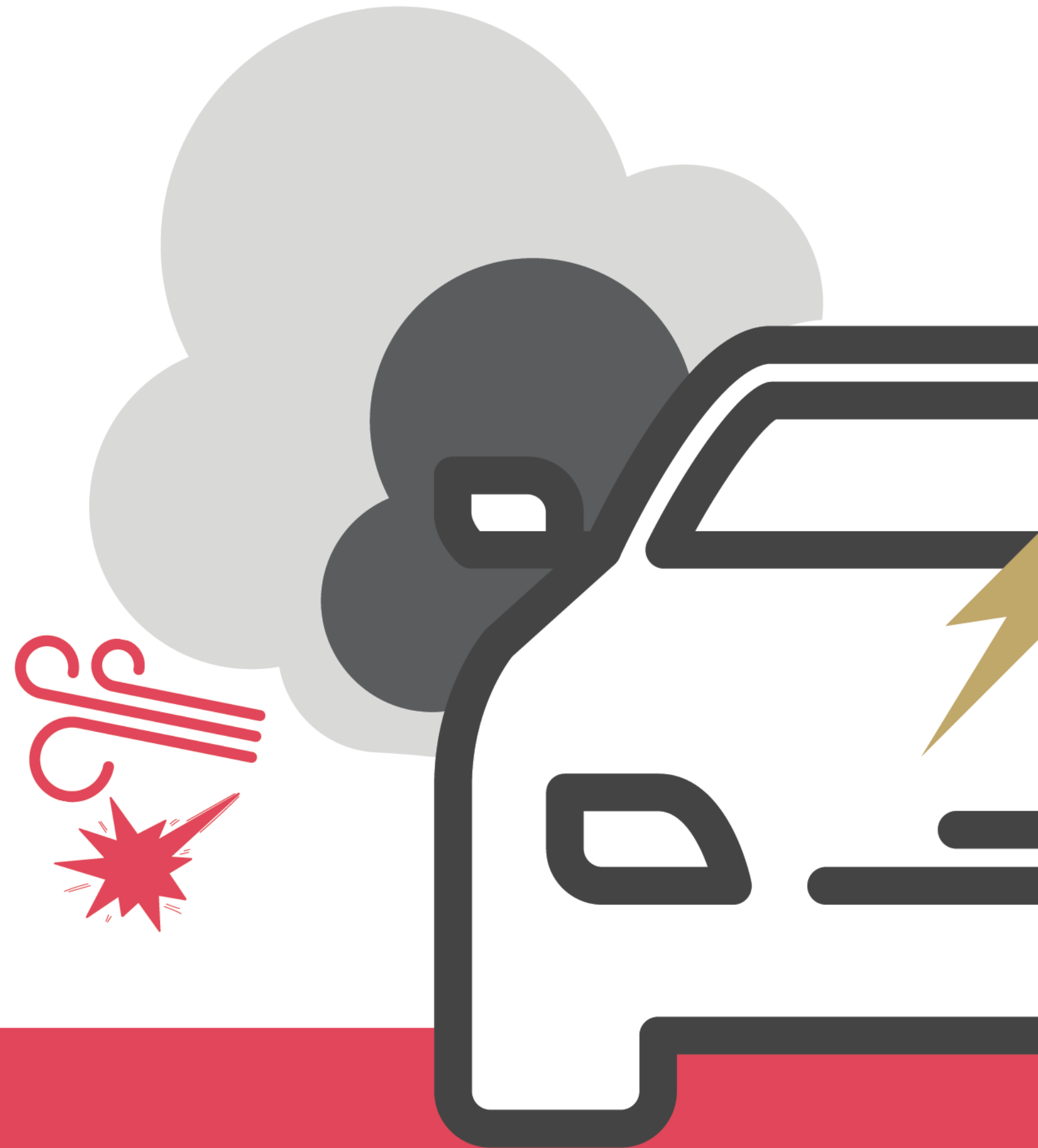
Response to CCEEW Parliamentary Inquiry  
into the transition to electric vehicles

Submitted by Emma Sutcliffe, EV FireSafe Director

*EV FireSafe is proudly supported by:*



**Australian Government**  
**Department of Defence**



Research at [evfiresafe.com](https://evfiresafe.com)  
Learn at [evfiresafe.training](https://evfiresafe.training)



# EV FIRESAFE INTRODUCTION

EV FireSafe is an Australian, female-led company funded by the Department of Defence to research electric vehicle battery fires and emergency response.

Since commencing our research in 2018 with two people, we have grown to a team of nine, all with unique expertise in firefighting, research, technical skills, risk analysis, fire investigation, incident management and electrification. We work closely with Professor Paul Christensen who is a recognised world leader in lithium-ion battery fire (known as thermal runaway).

Recognising the global gap in data-driven knowledge, we established EV FireSafe for Business in late 2023, which provides training and consulting to both emergency agencies and private businesses. Since then, we've worked across airports, shipping, salvage, roads and tunnels for DHL Global, AirBP, Strait Link, Country Fire Authority (Vic), Department of Fire and Emergency Services (WA), Junheinrich, CHEP, Cox Automotive and many other companies to raise their awareness of risk and provide sensible mitigations.

In 2023 we were commissioned by the Australian Building Code Board to develop guidance for EV charging in buildings to enhance emergency responder safety, a document that has been widely referenced globally.

Members of our team have been invited to work with and visit electric vehicle manufacturers Tesla at their Lathrop Megapack and Fremont EV gigafactories in California, US, and Stellantis, at their Opal manufacturing plant in Munich, Germany.

**EV FireSafe holds a wealth of information on the mitigation, management & training of electric vehicle battery fires and emergency response, and are recognised world leaders in this space.**

We have split this submission into three parts:

- An introduction to EV FireSafe & our research
- Our response to the Terms of Reference
- Where we're heading & sample tools/resources we've developed

We appreciate the opportunity to make this submission to the Standing Committee on Climate Change, Energy, Environment and Water Inquiry into the transition to electric vehicles.



## **EV FireSafe** **evfiresafe.com**

EV FireSafe is an Australian company funded by the Department of Defence to research electric vehicle battery fires & emergency response globally, particularly where the vehicle was connected to energised charging.

We developed the world's first database of electric vehicle battery fires, from which we draw learnings to assist emergency agencies build incident management strategies.



## **EV FireSafe for Business** **evfiresafe.training**

Leveraging our data-driven learnings, EV FireSafe for Business was established in early 2023 to provide consulting & training for both the emergency & non-emergency sectors.

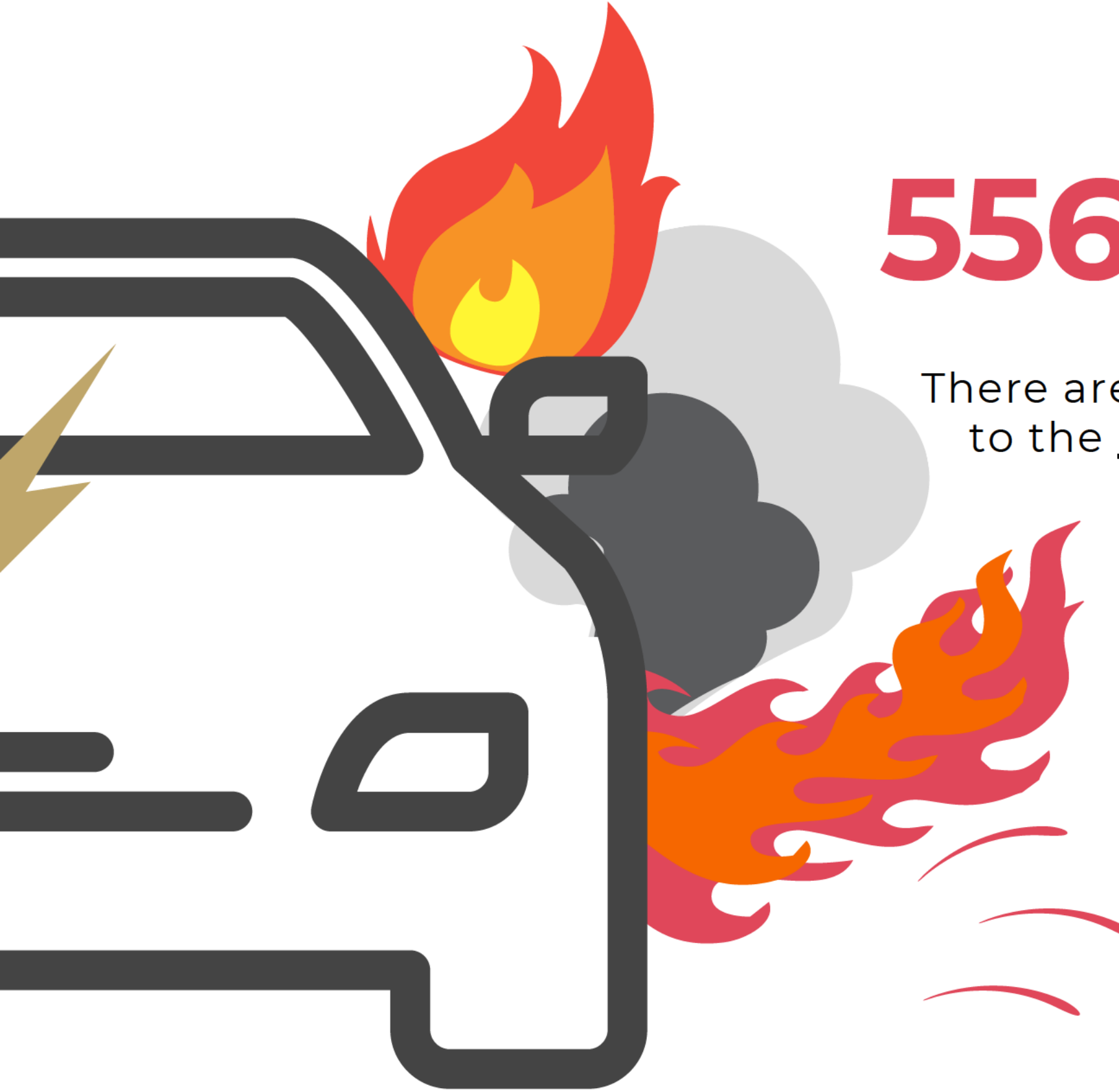
Our team are currently working with major clients in the fire, airports, military, shipping, property & automotive space, & have developed a dedicated online learning management platform to build specialist training.

# **ELECTRIC VEHICLE *BATTERY FIRES***

**GLOBAL DATA**



# BATTERY FIRES IN ELECTRIC CARS REMAIN RARE

An illustration of a dark grey electric car. A fire is shown erupting from the battery pack area, with bright orange and yellow flames and thick grey smoke. A yellow lightning bolt is visible on the left side of the car.

**556** incidents of thermal runaway in electric passenger vehicles (BEV and PHEV\*).

Since 2010, EV FireSafe has been able to verify:

There are approximately 40 million EVs on the road, according to the International Energy Agency EV Outlook Update 2024



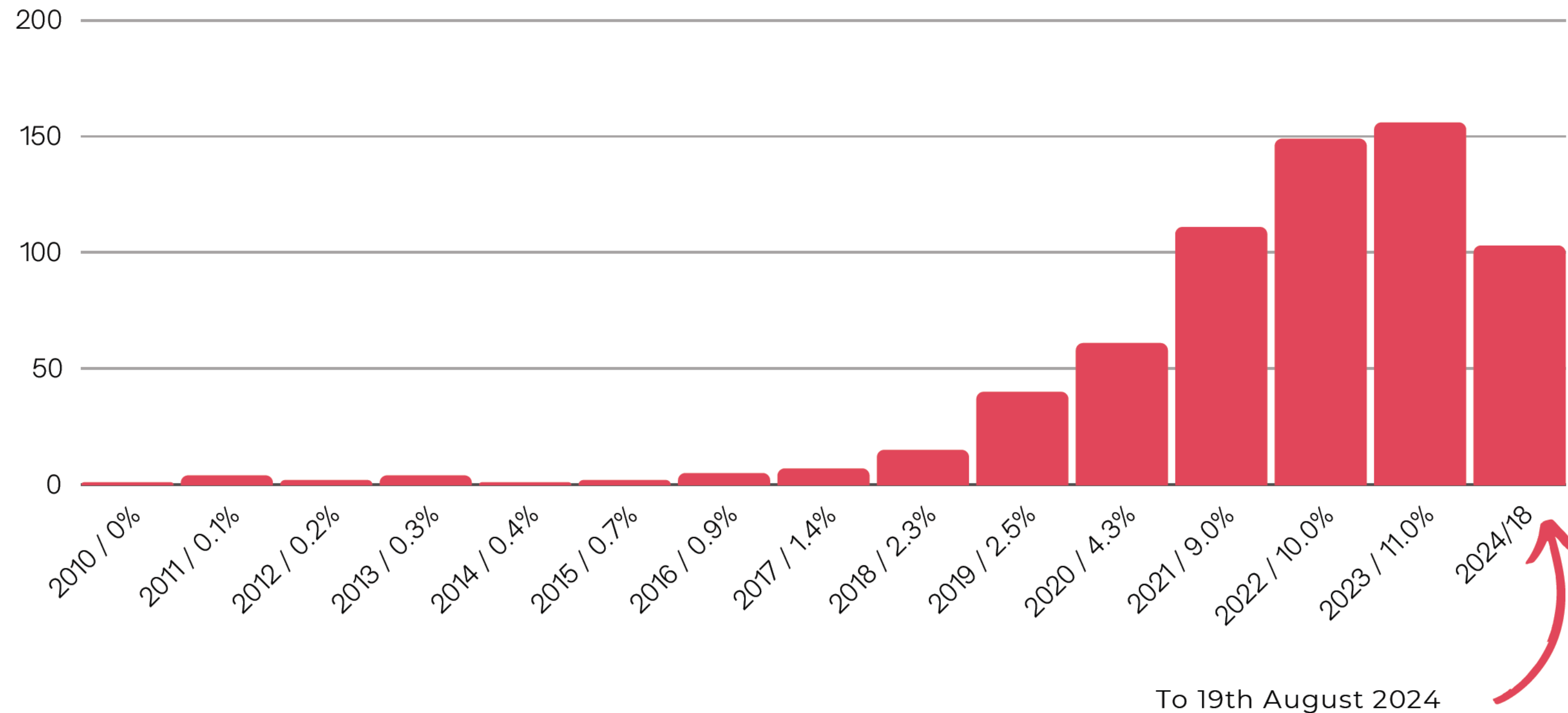
Learn more at  
[evfiresafe.com/ev-fire-what-is-thermal-runaway](https://evfiresafe.com/ev-fire-what-is-thermal-runaway)

\*BEV - Battery Electric Vehicle  
PHEV - Plug In Hybrid Electric Vehicle  
Data is not exhaustive and is still emerging globally



# EV BATTERY FIRE INCIDENTS YEAR ON YEAR

Incidents jumped in 2021 and 2022, primarily due to a fault during manufacturing of battery cells that were used in two major brands. The number of incidents dropped slightly in 2023 as those EVs were recalled and battery packs replaced.



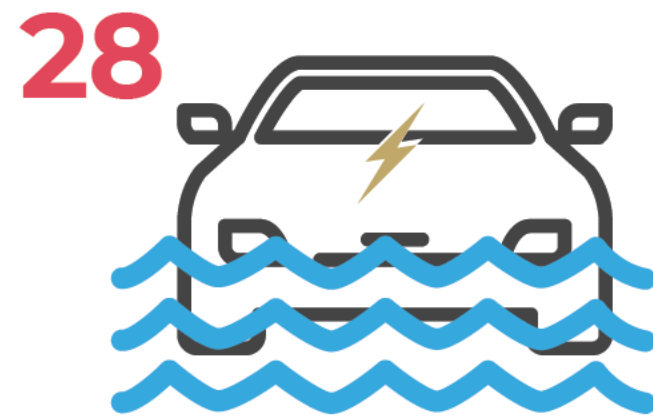


# LEADING CAUSES OF EV BATTERY FIRE

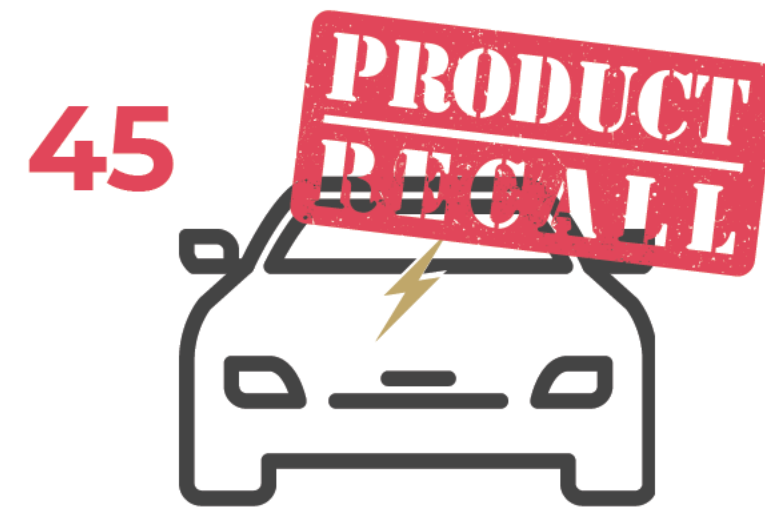
The four leading causes of EV battery fire haven't changed in the past 12 months. They are:



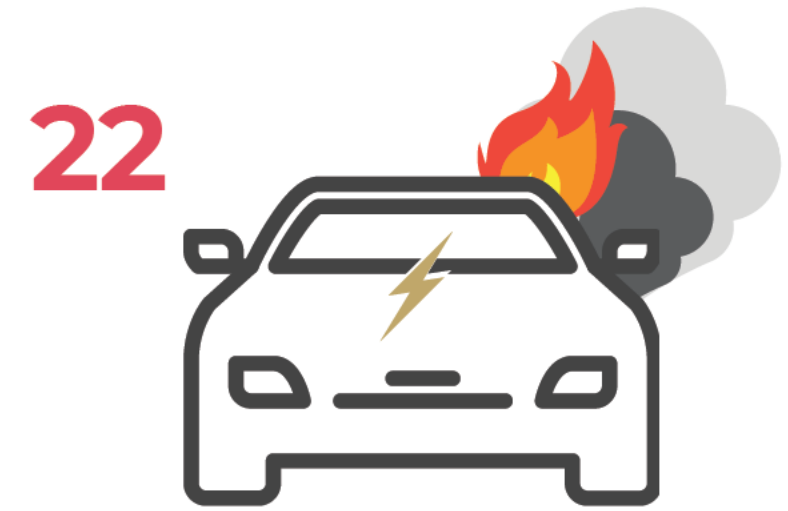
Road traffic collision or impact with road debris



Submersion in a body of water



A battery fault during manufacture



External fire spreading to the EV

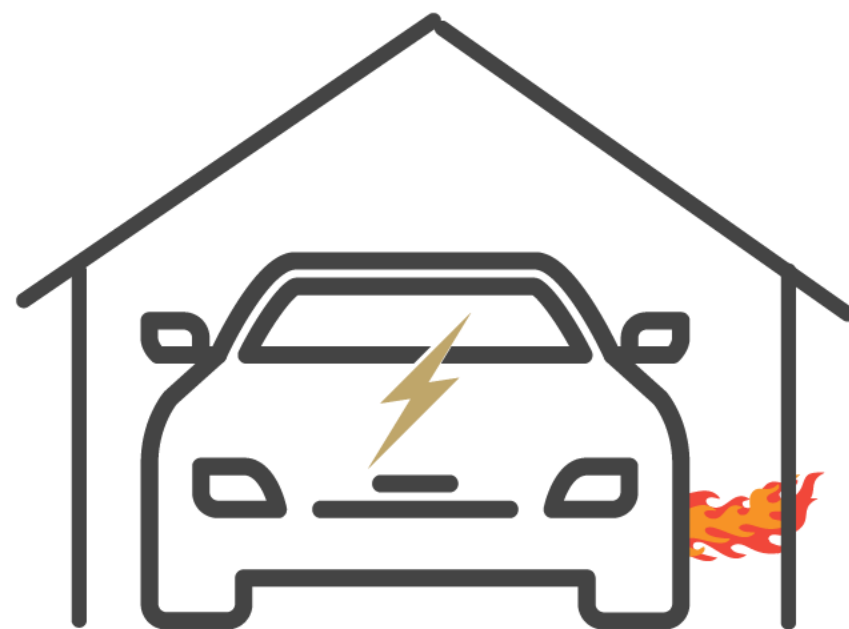
51%

of incidents have an **UNKNOWN** cause, primarily because it was not investigated



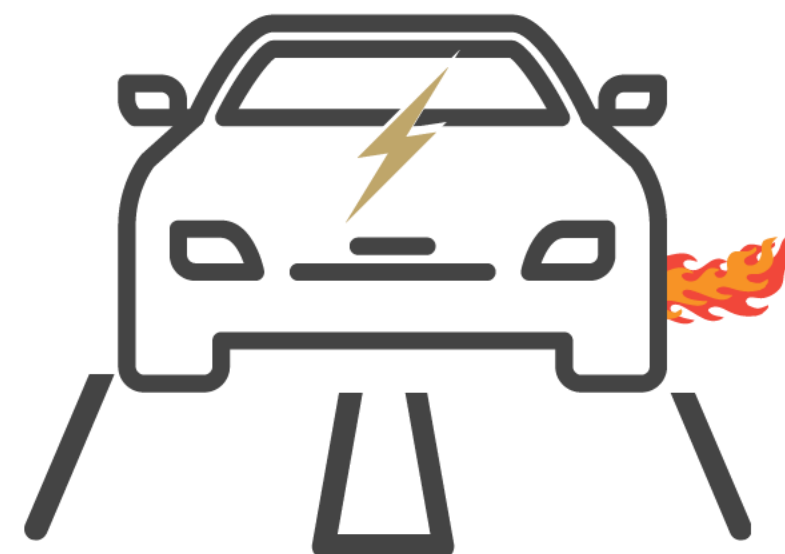
# PLACES EV BATTERY FIRES HAPPENED

Most EV battery fires occurred outside on the road or in car parks, primarily due to collision



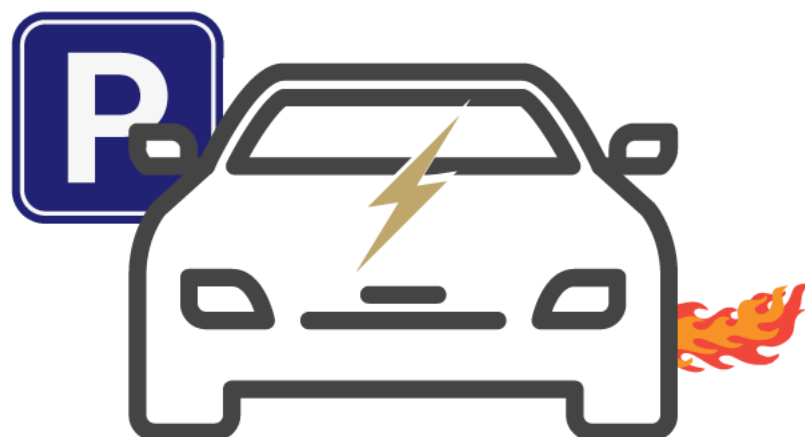
**117**

Underground /  
enclosed  
spaces



**155**

Outside  
& driving



**173**

Outside &  
parked



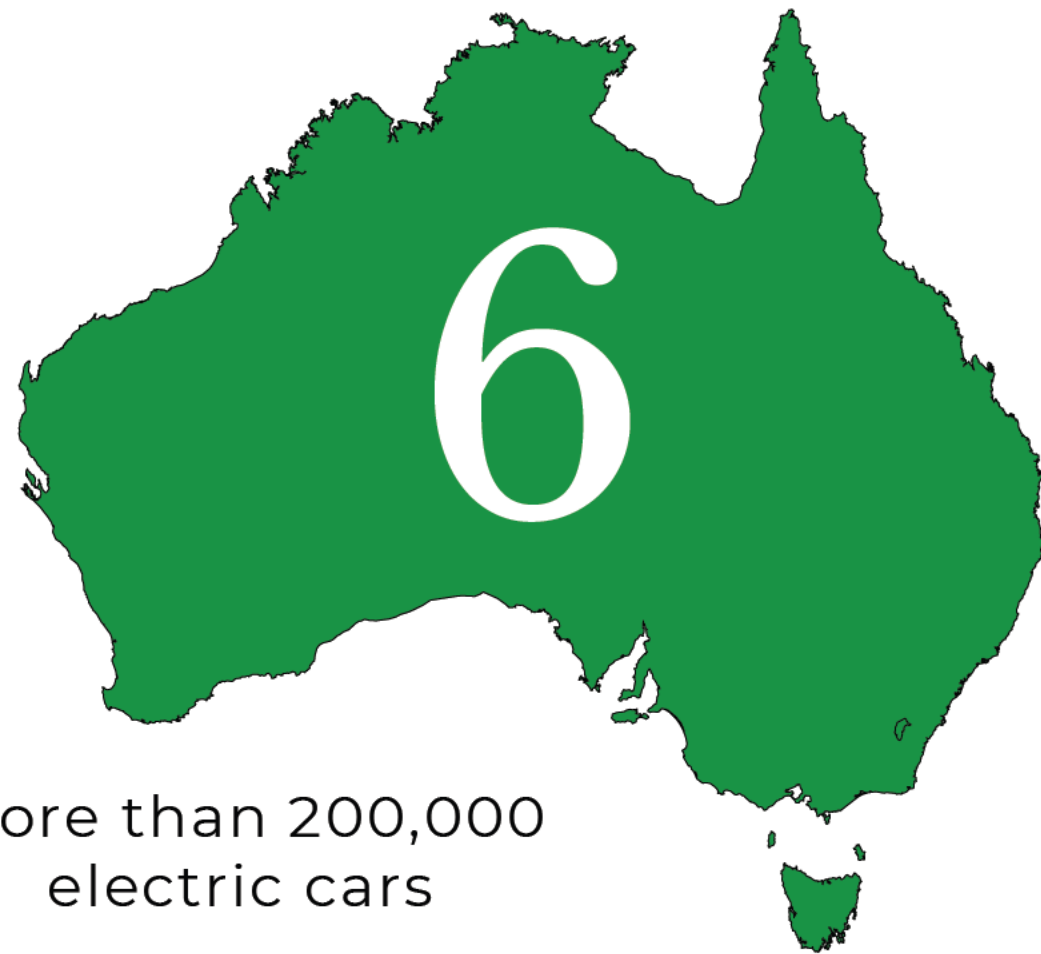


# NUMBER OF EV BATTERY FIRES IN AUSTRALIA

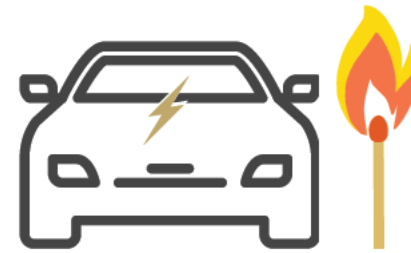
We've verified 6 EV battery fires, with 2 under investigation.



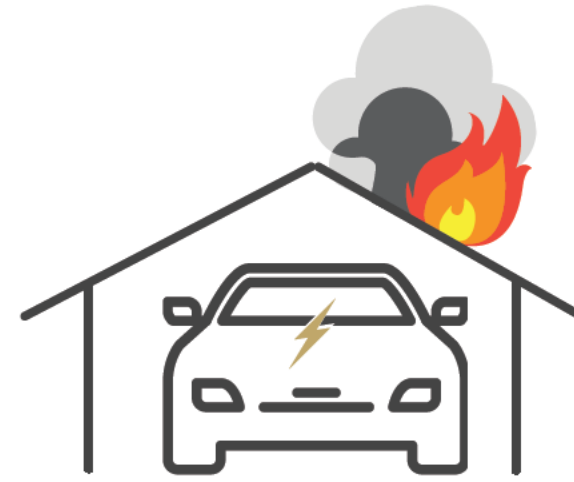
evfiresafe.com



more than 200,000  
electric cars



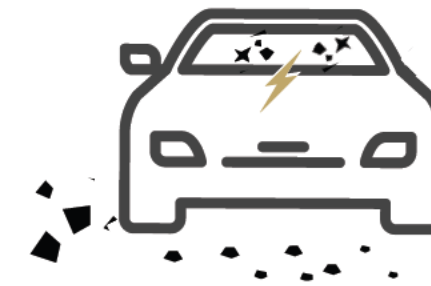
Arson



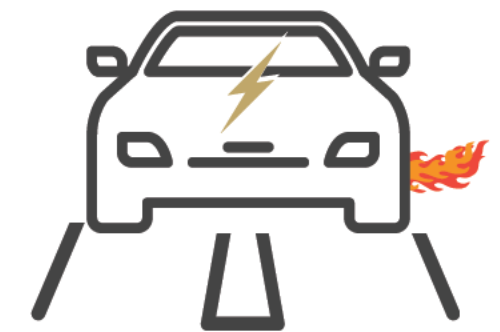
Exposure to  
another fire



Exposure to  
another fire



High speed  
collision



High speed impact  
with road debris

# BREAKDOWN OF EV BATTERY FIRES IN AUSTRALIA

Six EV battery fires, caused by battery abuse from:

- Arson x 1
- External fire (structure burnt down around EV) x 3
- Collision x 1
- Road debris x 1

None of the EVs:

- Were connected to charging at the time of fire
- Were spontaneous or unexplained
- Caused a vapour cloud explosion

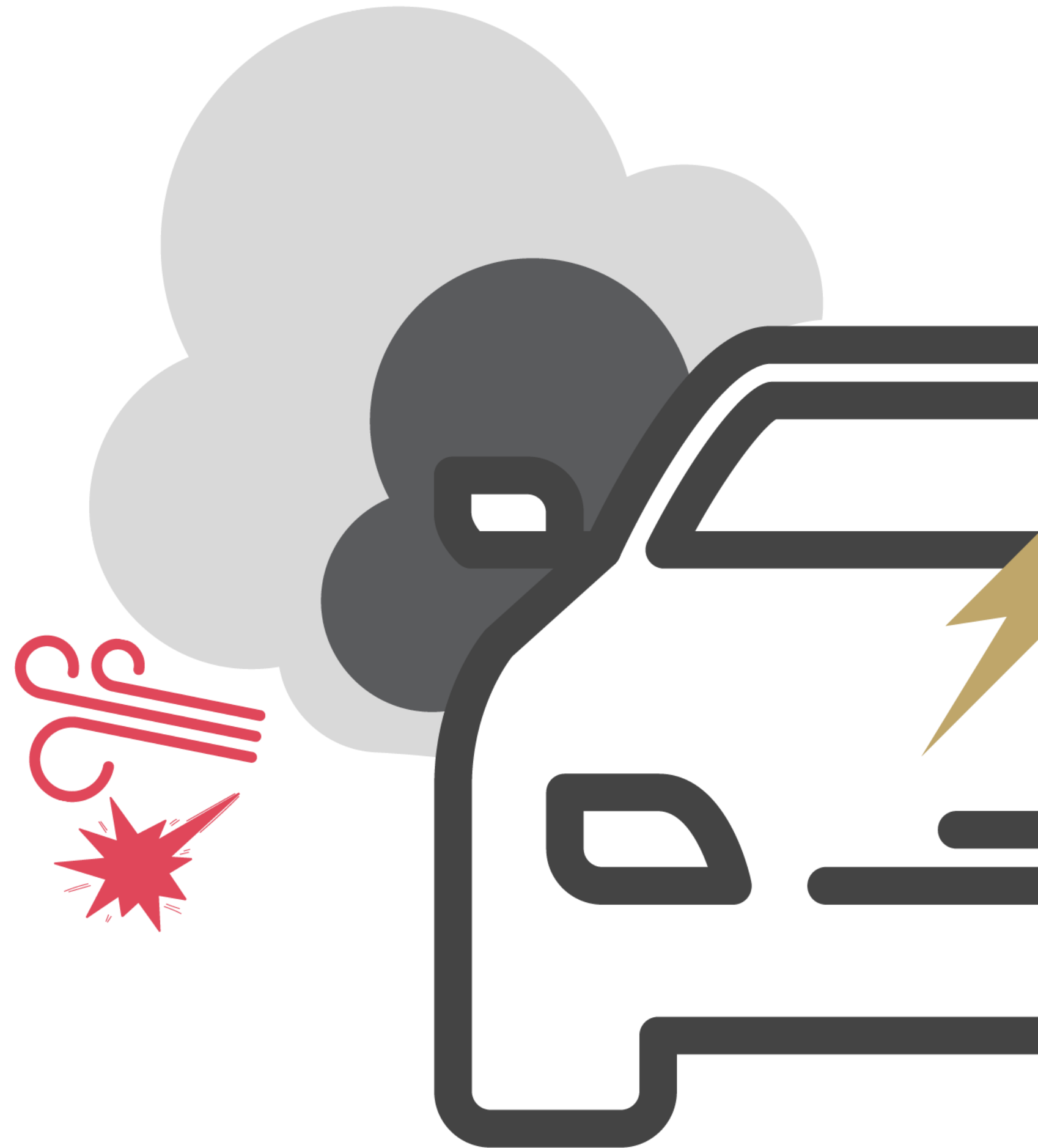
In these incidents:

- Most required 10,000+ litres of water
- 2 x were brought under control in <30 minutes
- There were no injuries requiring hospitalisation
- 1 x fatality, cause currently under investigation
- Incidents under investigation:
  - Maleny, Qld, 2024
  - Sydney, NSW, 2024



# **ELECTRIC VEHICLE *BATTERY FIRES***

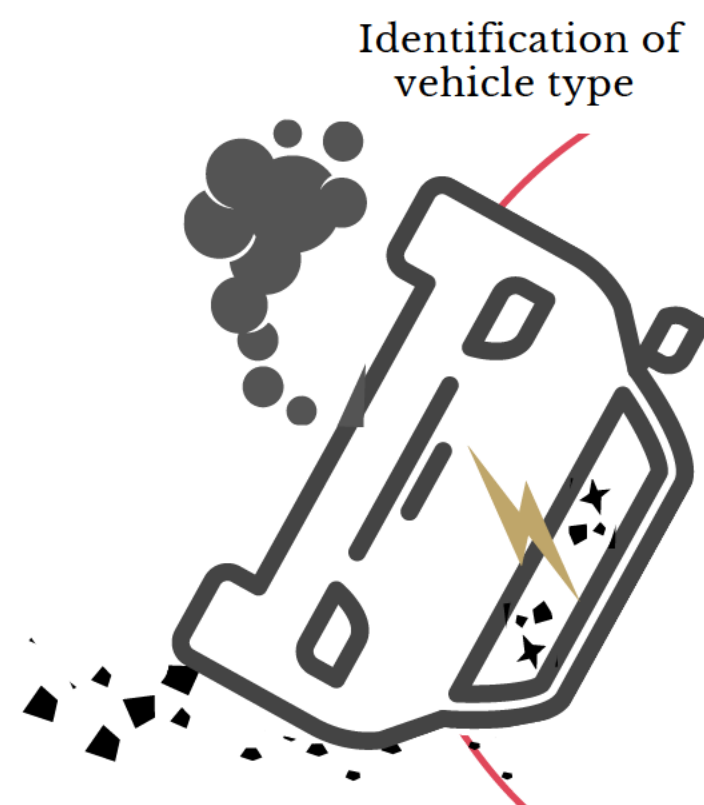
**WHILE RARE, EV BATTERY FIRES POSE  
NEW HAZARDS AND RISKS FOR  
EMERGENCY RESPONDERS**



# EV HAZARDS & RISKS FOR FIRST RESPONDERS

Electric vehicle lithium-ion battery fires are very rare, but there are **new hazards and risks that Australian emergency responders are not yet TRAINED for.**

EV ROAD TRAFFIC COLLISION



Identification of vehicle type

Silent, uncontrolled vehicle movement

Electrocution

Chemical exposure

High voltage isolation

New hazards & risks of electric vehicles

Jet like, directional flames

Projectiles

Secondary ignition

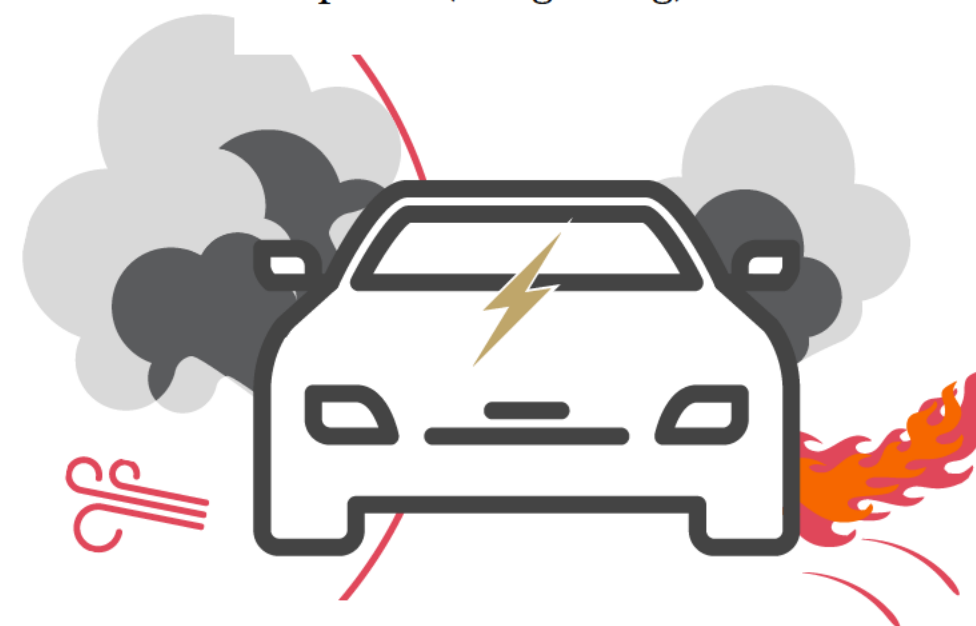
Water quality

Air quality

Toxic & flammable vapours (off-gassing)

Vapour cloud explosion

EV LITHIUM-ION BATTERY FIRE



# ALSO FOR OTHER SECTORS...




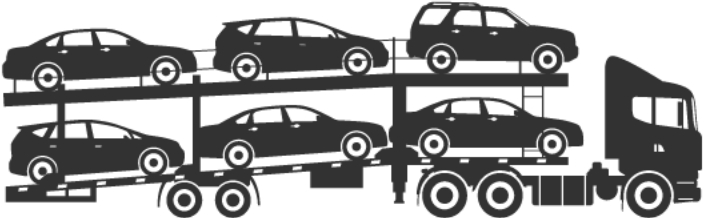
These hazards and risks also apply to:

- Airports
- Military
- Mining
- Shipping
- Retail sites
- Commercial sites
- Industrial sites

and especially:

- Automotive



		<i>Number of incidents (global)</i>	<i>Primary causes</i>
Salvage yard		5	4 - EV reignition due to collision 1 - unknown
Towing		8 <i>At least 6 driver injuries requiring hospitalisation</i>	2 - EV reignition due to collision 3 - EV reignition due to submersion 1 - external fire 2 - unknown
Transport (non-EV)		11	2 - collision of truck itself* 9 - unknown
Transport (EVs)		3 (+1 train carrying EVs)	3 - all due fire starting in brakes of truck Train due to impact with power line

*\*In transport of non-EV LiBs trucks were carrying; 1 x e-motorbikes, 2 x Tesla battery packs, 2 x e-mopeds/scooters & 5 x assorted smaller LiBs (phone, laptop, vapes etc)*

# **ELECTRIC VEHICLE *BATTERY FIRES***

## **TERMS OF REFERENCE**

**TWO PRIORITIES:  
EMERGENCY RESPONDER TRAINING  
SAFER EV CHARGING SITES**





# INQUIRY TERMS OF REFERENCE

EV FireSafe's submission is in response to the following Terms of Reference:

The House of Representatives Standing Committee on Climate Change, Energy, Environment and Water will inquire into and report on the transition to electric vehicles (EVs), with regard to:

- *The establishment of resources, systems and infrastructure required to support transition to EVs*
- *The impact of moving from internal combustion engine vehicles, including fuel excise loss, existing auto industry component manufacturers and the environment*
- *The opportunities for fuel savings, such as by combining EVs with other consumer energy technologies and savings for outer suburban and regional motorists*
- *The impact on electricity consumption and demand*
- *The opportunities for expanding EV battery manufacturing, recycling, disposal and safety, and other opportunities for Australia in the automotive value chain to support the ongoing maintenance of EVs*
- *The impact of Australia's limited EV supply compared to peer countries, and*
- *Any other relevant matters.*

EV FireSafe will focus on:

- The establishment of resources, systems and infrastructure required to support transition to EVs

# *SAFER TRANSITION:* FIRST AND SECOND RESPONDER TRAINING

There is **little to no training globally** for emergency response to electric vehicles following emergency incidents. What does exist is quickly leapfrogged by new technology or is not data-driven.

By extension, there is no process in place for secondary responders, such as towing and salvage, to manage their risk. This also extends to insurance assessors, fire investigators, forensics and crash reconstruction.

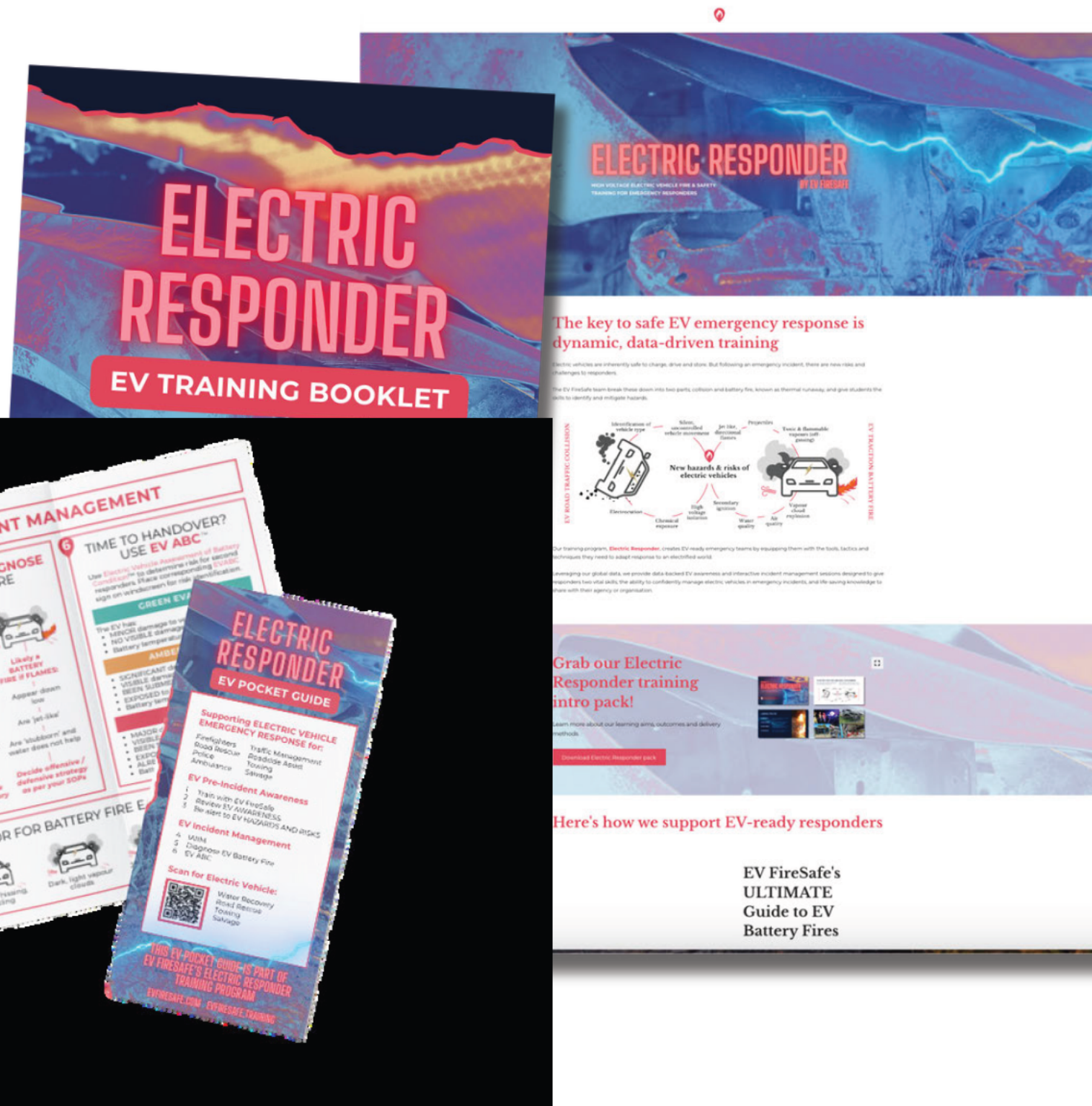
EV FireSafe has been contracted by Cox Automotive since 2023 to adapt our EVABC™ system for their booking-in process.

To dovetail this with emergency response, we've developed the **Electric Responder training program** to create an end-to-end EV fire risk process for everyone involved in the chain of custody of a damaged electric vehicle.

Here's how it works.



# ELECTRIC RESPONDER: COMPLETE EV INCIDENT MANAGEMENT



Electric Responder is designed to assist personnel enact their agency standard operating procedures (SOPs) for managing an EV in an emergency. This includes:

- Firefighters
- Road Rescue
- Police
- Ambulance
- Traffic Management
- Roadside Assist
- Towing
- Salvage

Training involves:

- A 2 hour online or in person session
- An EV Pocket Guide (for quick reference)
- An EV Training Booklet
- 12 months access to an online learning platform with regular webinars, case studies and updates

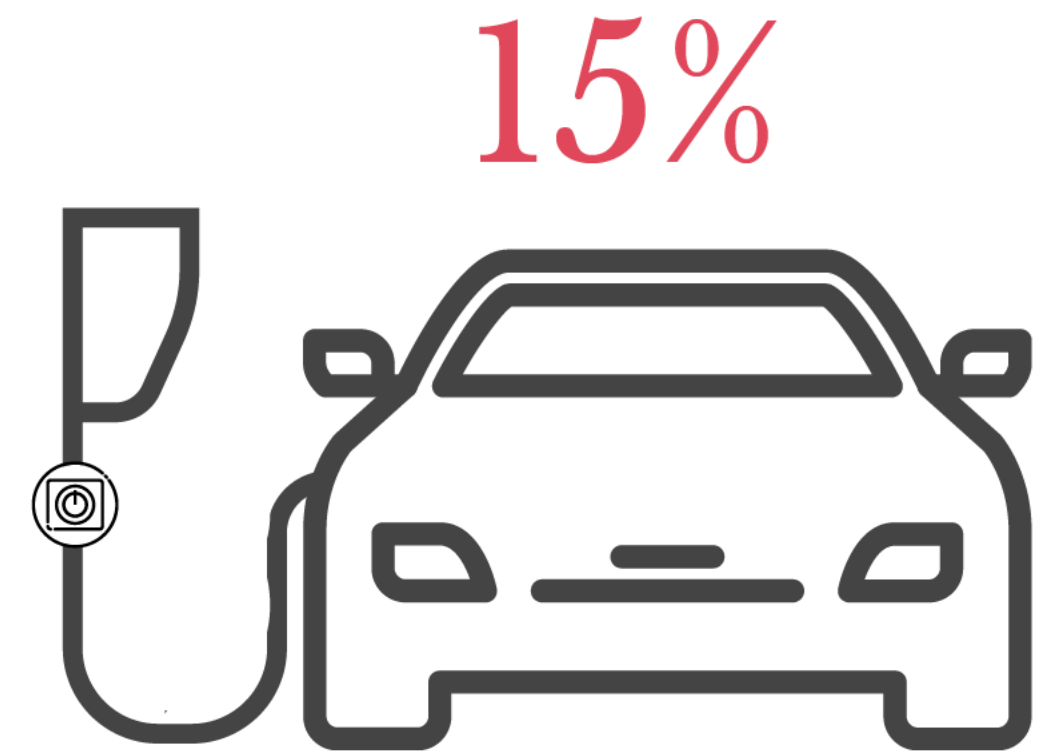


# SAFER TRANSITION: SAFER EV CHARGING SITES

Our global database indicates around 15% of all EV battery fires occur connected to charging. With this knowledge, we can start to mitigate risk around EV charging sites, both in communal or public sites and private homes.

In 2023 we were contracted by the Australian Building Code Board to develop their 15 point safety guidance for EV charging in buildings.

While regulation on fire safety for EV charging sites is still being discussed, we're assisting sites to design, install and maintain safer EV charging with a comprehensive [Fire Safety for EV Charging Sites report and workshops](#)




FULLY ONLINE, RESOURCE PACKED - ENROLL & START ANY TIME

## Fire Safety for Electric Vehicle Charging Sites

Design, Install & Maintain Safer EV Charging; your complete guide in one, simple online report!

Enroll **A\$299**

EV FireSafe with Lithium-ion Safety (Prof Paul Christensen) ★ No prior knowledge needed + access for 3 months with regular and requested updates




### Protect your site from electric vehicle and lithium-ion battery fires

Electric vehicle fires are rare, but when they do occur they present new risks and challenges for everyone.

EV FireSafe's database shows approx 18% of fires happen while the EV is connected to energised charging, with around a third of those in a car park.

This online report steps through that data, increases your awareness of risk and then provides sensible steps to work with your stakeholders to better protect life and property safety.



# OTHER MATTERS

Other matters we would like to raise with the Standing Committee:

## **Electric Vehicle Battery Fire Data:**

- The ACCC recently released a paper calling for national data to be collected for EV & other lithium-ion battery fires
  - EV FireSafe already holds a dedicated and detailed national & international database, with data sharing agreements with 3 countries (with more being negotiated)
  - EV FireSafe is able to formally track EV and lithium-ion battery fire data in collaboration with state agencies, however we are not currently funded for this

## **Risk Analysis and Mitigation for the private sector**

- Battery fire risk mitigation is vital, and EV FireSafe is developing a LiB Risk Calculator to support users and the insurance sector, however we are not funded for this.
  - Complex car parks
  - Airports
  - Military
  - Mining
  - Bus and truck depots
  - Fleets

# THANK YOU AND CONTACT

We would like to thank the Standing Committee on Climate Change, Energy, Environment and Water Inquiry into the transition to electric vehicles for accepting EV FireSafe's submission and welcome questions, either in person or online.

**Emma Sutcliffe**

Project Director



Research: [www.evfiresafe.com](http://www.evfiresafe.com)

Training: [www.evfiresafe.training](http://www.evfiresafe.training)

