Fact Sheet – Electric Vehicle and Lithium-ion Battery Fire Safety

Key points

- Road-registered electric vehicles do NOT increase fire risk.
- There have been only six EV battery fires in Australia, none caused by charging.
- There are about seven petrol/diesel vehicle fires a day in NSW.
- Electric vehicles have 1/10 to 1/20 the risk of fire compared with petrol/diesel vehicles.
- There is about one e-bike/ e-scooter fire each week – mostly low quality, damaged and misused devices. Most were on charge and unattended when the fire started.
- To reduce this risk, ensure all such devices, batteries and chargers:
    - have the regulatory compliance mark (appendix 2);
    - are not used if damaged;
    - are not modified in anyway;
    - are charged in a safe place with the correct charger;
    - are not charged in a fire exit path; and
    - have someone present and awake during charging with a working smoke detector installed according to EPA standards

OCN's e-bike and e-scooter template by-law embodies these recommendations and gives owners corporations the ability to manage this risk.

Introduction

The perception that electric vehicles create a significant new risk from a fire safety standpoint has been widely covered in the media.

OCN is concerned this media coverage distorts the risk, creating a barrier to the introduction of electric vehicle charging in apartment buildings. This directly affects the implementation of the Government's sustainability and safety agendas.

OCN advocates for the better, cleaner future that electric vehicles help to provide, and has prepared this sheet to present the facts.

Rather than focus just on electric vehicle fire risk, this fact sheet deals with the broader issue of lithium-ion battery fire risk and summarises the most relevant and current information regarding this risk, including:

- The ACCC report on lithium-ion battery risks https://www.accc.gov.au/system/files/Lithium-ion%20Batteries%20report_3_0.pdf;
- Responses to the NSW Parliamentary inquiry into electric vehicle safety by the Electric Vehicle Council (EVC) and OCN – see appendix 1;
- EV FireSafe, a company funded by the Australian Department of Defence to research electric vehicle battery fires and emergency response – among the world leaders in this space.

All these reports have a focus on consumer education, risk mitigation and the need for better regulation on e-bike/ e-scooter products.

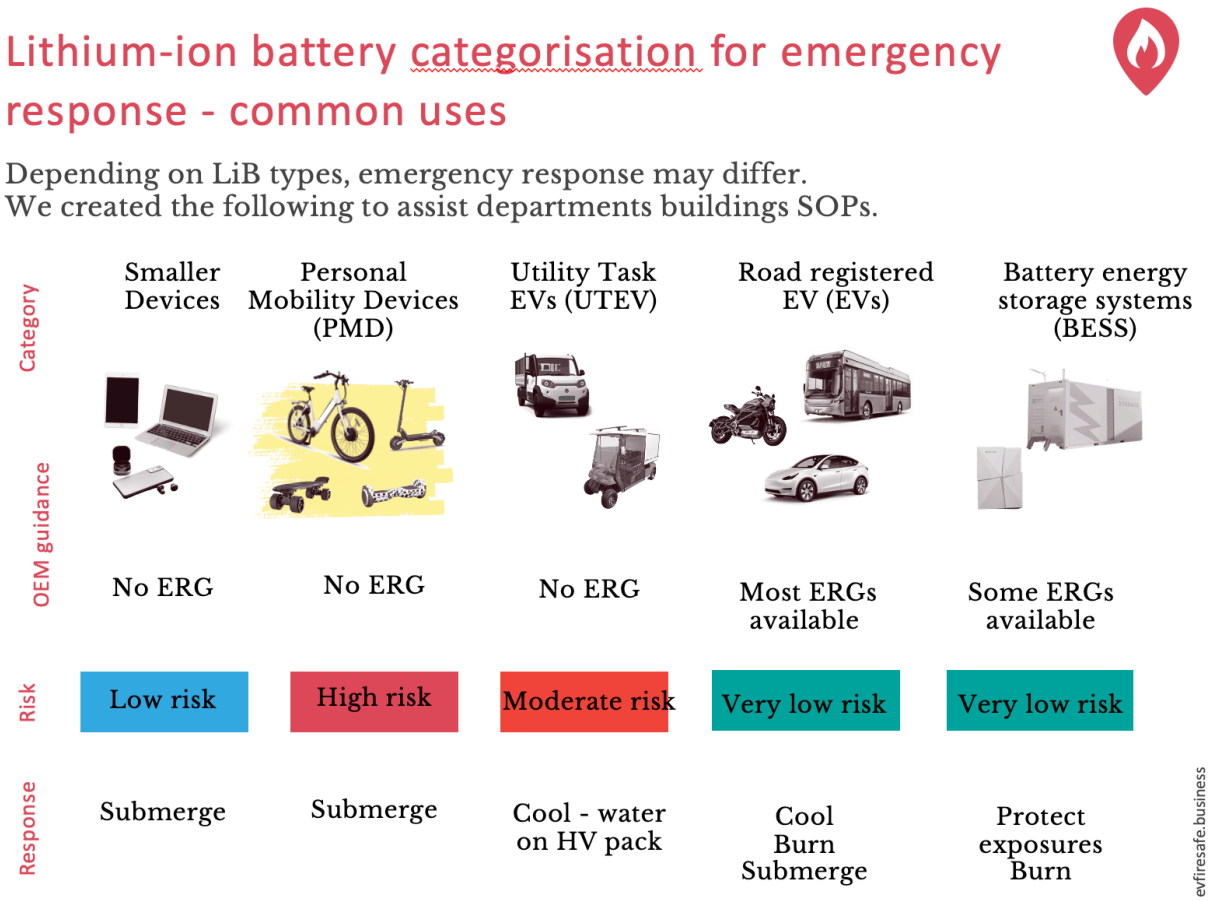
Risk is determined by a number of factors, including:

- Regulation: There have been few Li-ion battery safety incidents associated with road-registered e-vehicles. This can be attributed to robust regulatory coverage and the

requirement for all vehicles to meet the Australian Design Rules. However, poor regulation of smaller electric mobility devices like e-bikes and e-scooters leads to a higher fire risk.

- Charging and charger issues: generic chargers are often cheaper than branded products and manufacturers and may falsely claim they are compatible with branded products.
- Battery management systems: electronically managing the cells within the battery is critical to performance and safety and is often inadequate in cheaper products.
- Manufacturing defects and damaged or low-quality batteries: defective or damaged Li-ion batteries are more dangerous.

EV FireSafe have produced a handy graphic that helps to qualify that risk across the range of li-ion powered devices:



ERG = Emergency response guide, the presence of which indicates how serious the respective suppliers are about fire safety.

Disposal - In addition, it is important that consumers are aware of how and where to correctly dispose of Li-ion batteries.

Risk Mitigation strategies

1. Smaller Devices

Smaller devices are commonplace and include: laptops, smart watches, tablets, rechargeable power banks, power tools, phones, cordless vacuum cleaners, and many more.

Although they are the most common product types seen in the ACCC incident data, incidents involving mobile phone and computer batteries have decreased over the last five years, possibly due to improvements in safety or changes in consumer awareness or behaviour.

It is almost impossible to regulate this part of everyday life, however the fire risk associated with the Li-ion batteries in these devices, despite being very low, should be understood, respected and mitigated against. Such risk mitigation includes:

- Avoid unsafe charging practices
- Avoid the use of incompatible chargers or overcharging batteries
- There may be charging risks where there is no battery management system to protect against overcharging, or where incompatible charging equipment is used, or devices are overcharged
- Hazards may arise when products with Li-ion batteries are repurposed or modified. This includes DIY retrofitted and second-life battery applications.

OCN has established a code of practice to assist owners corporations to educate owners on these simple risk mitigation strategies

2. e-bikes and e-scooters

In this fact sheet the term e-bikes and e-scooters is used to describe what is sometimes called 'light electric vehicles', 'micro mobility' and 'personal mobility devices'. It includes e-bikes, e-scooters, e-skateboards, hover boards and all other such devices.

Allianz Insurance analysis of 183 claims related to Li-ion battery related fires shows the majority involved e-bike and e-scooters, caused by poor quality devices, poor charging practices, unmanaged charging and overnight charging.

The EV Council observes that while e-bikes and e-scooters present an excellent pathway to reducing overall transport emissions and lowering the overall cost of transport, and that their technical standards may be adequate, the regulatory environment around these products in Australia is presently inadequate.

Most electric vehicle fires are not caused by road registered electric vehicles but rather by e-bikes and e-scooters. This is a worldwide issue and there is clear evidence of a need for better education and regulation of such devices. This is borne out by the ACCC process and report, which identified that just 1% of the Li-ion battery fires FRNSW responded to over a twelve-month period involved a road registered electric vehicle. 99% of Li-ion battery fires responded to by FRNSW were for other consumer products.

Some key takeaways from the ACCC report concerning e-mobility:

> *5.1.4 "FRNSW reported 149 battery-related incidents between 1 January and 15 September 2023, a 16% increase on the same time last year. […] 22% involved e-mobility devices, a 94% increase.*
>
> *5.1.5: "Data released by the London Fire Brigade indicates e-scooters and e-bikes have become a growing concern over the past 5 years with fires caused by these products rising from 5 in 2018 to 116 in 2022 – representing a significant increase. The London Fire Brigade reportedly estimates it is now called to an e-bike or e-scooter fire once every 2 days on average.*
>
> *The importation and sale of equipment of this type is very lightly regulated in practice, which will predictably result in the importation and sale of cheap, non-compliant product. Better regulation, and regulatory enforcement activity, around the importation and sale of this type of product is needed. By comparison, road-registered vehicles, such as cars, motorbikes, and trucks, are massively regulated, with strong enforcement regimes.*

Recommendations include greater consumer education about best practice for charging and managing Li-ion battery products will assist with risk mitigation. Consumers need to be aware of the risks of these products as well as the steps and tools available to them to reduce those risks.

OCN supports a risk mitigation approach to manage the e-bike and e-scooter fire risk. This includes:

- Education on the safety risks of e-bikes and e-scooters.
- Advocating that NSW government should increase resourcing to NSW Fair Trading to address the rising incidence of unsafe products outside of the road-registered vehicle domain, including ACCC and CSIRO recommendations on testing and labelling.
- Government to investigate the case for recommendations relating to the safe storage and charging of e-bikes and e-scooters, especially in environments such as apartment complexes and offices.

OCN has developed an e-bike, e-scooter template bylaw to assist owners in implementing risk mitigation.

Steps consumers can take to reduce the likelihood of charging-related incidents include:

- ensure e-bikes and e-scooters have a recognised regulatory compliance mark;
- do not store or charge e-bikes and e-scooters in any fire exit path;
- ensure there is a working smoke alarm according to EPA standards;
- ensure the charger is suitable for the battery being charged;
- being present during charging times of Li-ion battery products and disconnect products from chargers once they are fully charged (consider setting timers as a reminder to unplug devices);
- avoid leaving any devices charging overnight.
- do not use batteries or devices if products are overheating or showing signs of failure such as swelling, leaking or venting gas. In these cases, place leaking or damaged batteries on a piece of wood and half a bucket of water to cool them down and then place in a clear plastic bag and contact your local council for disposal options;
- charge batteries and devices on a hard surface and away from combustible materials (such as beds, sofas or carpet);
- store Li-ion batteries in cool, dry places out of direct sunlight, including while charging;
- allow time for batteries to cool down after use and before recharging.

These steps can help avoid charging related incidents. When using replacement chargers, consumers must ensure the charger is suitable for the battery in the product they are charging.

3. Light delivery electric vehicles

Not included in the document

4. Electric Vehicle Fire Safety Risk

There is a false perception that electric vehicles create a significant new fire safety risk. This misperception has been fed by some sensationalist media reports and is not supported by the facts.

Some key takeaways from that ACCC report concerning the electric vehicle industry:

> 5.1.4: “FRNSW reported 149 battery-related incidents between 1 January and 15 September 2023, a 16% increase on the same time last year. […] 1% involved electric vehicles”,
>
> 5.1.1: “The Electric Vehicle Council noted the lack of Li-ion battery safety incidents associated with road-registered e-vehicles and attributed this to more robust regulatory coverage of

these products. The CSIRO noted that road vehicles are required to meet the Australian Design Rules (Australia's national standards for road vehicle safety) in accordance with the Motor Vehicles Standards Act 1989"

OCN reinforces the fact that road registered EVs have one twentieth the fire risk when compared with internal combustion engine vehicles (ICE). Despite this far higher risk of fire in ICE vehicles, no one is calling for any changes to the way ICE vehicles are garaged or fueled.

EVFiresafe analysis confirms there have been only 6 EV battery fire in Australia since 2010.

- 1 caused by arson
- 3 caused by an associated building fire
- 1 caused by collision
- 1 caused by road debris – a drive shaft from a heavy truck

There have been no charging related fire reports.

5. Battery Energy Storage systems

Not included in the document

Appendix 1 - Summary of responses to key questions from the NSW Parliamentary Inquiry.

Electric Vehicle Council (EVC) Commentary on electric vehicle maintenance and repair

Road registered vehicles with batteries at voltages high enough to be hazardous have been in the Australian market since the late 1990s, with the introduction of the Toyota hybrids. There are now in excess of 400,000 road registered vehicles with traction batteries on Australian roads, from many manufacturers.

From the point of view of risk to the people undertaking maintenance on these vehicles, it has long been understood that higher voltage batteries constitute a different type of risk. The relevant Australian standard in this domain is AS5732, which has recently been updated with input from a broad cross-section of industry and government experts at a national level.

In terms of the adequacy of this arrangement, we'd point to the fact that there is no record we're aware of where an injury in the automotive maintenance space attributable to the battery in a hybrid or electric vehicle has occurred. We'd suggest that this is prima facie evidence that the existing regulatory arrangement is likely adequate.

EVC Commentary on Emergency services personnel

There has been substantial international research in this domain. EV FireSafe, a company funded by the Australian Department of Defence to research electric vehicle battery fires and emergency response, are among the world leaders in this space.

The short version is that vehicle manufacturers provide data to the ANCAP rescue app, have been proactive in supporting training for first responders, and have supported and complied with requirements to label EVs for easy recognition by emergency services.

Vehicle fires are, by their nature, hazardous, regardless of the powertrain. The products of combustion of a vehicle are toxic. The same measures used by emergency services personnel to protect themselves from harm when addressing petrol and diesel vehicle fires are applicable when addressing electric vehicle fires.

Electric vehicle traction battery fires in Australia have been small in number, with a total of six while in normal operation. In all cases, the EVs suffered major damage to the high voltage lithium-ion battery pack, leading to thermal runaway. In all cases, fire fighters have successfully responded using existing tools and techniques for vehicle fires.

EVC Commentary on the Built environment

Many parties have suggested that the existing minimum requirements in our buildings are inadequate with respect to managing the risk posed by EVs.

There have been some efforts made by government to set the record straight on this matter. The Australian Building Codes Board published a guidance note, laying out practical and low cost recommendations where new buildings are including EV charging:

https://www.abcb.gov.au/resource/advisory-note/abcb-advisory-note-ev-charging

This was welcomed by the industry. Regrettably, while the ABCB guidance does not call for special hazard treatment, it also does not make it clear that special hazard treatment of car parks is not warranted.

OCN reinforces the fact that road registered EVs have one twentieth the fire risk when compared with internal combustion engine vehicles (ICE), and there are no incidents of EV fires in Australia whilst EVs are being charged.

OCN agrees with EVC that NSW Government should act on this matter by way of the relevant state level building regulator, to make it clear that the treatment of EV charging installations and EV car parking locations as 'special hazards' is not required at this time.

OCN does not support an outcome where additional requirements are imposed in the built environment, at substantial cost to consumers, without evidence as to the need for these measures, or any form of regulatory impact testing.

Myths and Misinformation

OCN is concerned about sensationalist commentary, which both promotes misinformation and barriers to the introduction of electric vehicle charging in apartment buildings. This directly affects the implementation of the government's sustainability and safety agendas.

Some examples include:

Fire Extinguisher Misinformation

There are claims by various manufacturers and suppliers of fire suppression equipment (blankets) and fire extinguishers that there is electric vehicle specific suppression equipment and extinguishers available.

Advice from the CSIRO[1] and EV Firesafe is that there are NO certified electric vehicle or li-ion battery extinguishers. The only known effective approach is the call 000 and leave it to the fire professionals.

BCA Misinformation

An online claim that the BCA requires that 'electric vehicles to be stored in a fireproof enclosure'.

In November 2022, we received clarification from the Senior Building Codes Officer, Policy and Strategy, Building Codes and Regulation, Better Regulation Division, NSW Department of Customer Service as follows:

> The commentary within the Guide to Volume One of the National Construction Code (NCC) 2019 Amendment 1 may be of assistance. In relation to C2.12(a)(v) of the NCC Volume One, the Guide states '*Reference to "installed in the building" means batteries hard wired into the building. This includes batteries used to provide power supply for fire safety equipment, lifts, pumps, energy storage from renewable energy sources and the like. It does not include batteries associated with removable data infrastructure, vehicles or batteries that can be readily removed or relocated (such as plug-in UPS batteries).'*

Subsequently, both OCN and EVC highlighted this correct interpretation to the source of this claim. They have taken no action to correct their publication.

We continue to get enquiries from our members because of surveyors quoting this misinformation, causing confusion and delays in the installation of EV charging equipment in apartment buildings.

Building Structural Load misinformation

[1] https://activfire.csiro.au/pdfs/documents/CSIRO-AN-004.pdf

There are claims that heavier EVs have the potential to damage building fabric by exceeding carpark structural loads. While there is a weight penalty with EV batteries, a short comparison of some popular vehicles shows similarity in respective weights between Electric and Internal combustion vehicles:

	Electric Vehicle (kg)	Internal Combustion Vehicle (kg)
Sedan		
Tesla type 3	1760 - 1844	
Mercedes C class		1590 - 1940
SUV		
Volvo XC 40 Recharge	1955 - 2192	
Volvo XC 40		1497 - 1733
Dual Cab Ute		
LDV eT60	2300	
Ford Raptor		2431
Ram 1500		2640
Large SUV		
Kia EV 9 (to be released)	2405 - 2664	
Toyota Landcruiser		2580
Volvo XC9		2111 - 2356

The real issue is that vehicles, including the increasingly popular SUVs, are all getting bigger and heavier.

https://uk.motor1.com/news/622233/obesity-of-cars-new-industry-challenge/

AS 1170 defines dead and live loadings as 3kN/m^2 or about 300kg/m^2, equating to about 3,880 kg for a standard size car space (2.4m x 5.4m). This general increase in bigger and heavier vehicles, electric or not, is generally not considered a significant structural load risk in residential car parks. If the size and weight of vehicles continues to be an issue, this should be addressed via the Australian Standards.

This section and structural load misinformation is included for information only as the question of structural loading is frequently raised in the context of EV issues.

Appendix 2 – Regulatory Compliance Mark

The Regulatory Compliance Mark (RCM) is a trade mark owned by the electrical regulator (Regulatory Authorities (RAs)) and Australian Communications Media Authority (ACMA).