



# Risk Management Recommendations for Electric Vehicles (EVs)

The landscape of transportation is undergoing a transformative shift with the rise of Electric Vehicles (EVs), encompassing all manner of vehicles from e-bikes and e-scooters to electric cars and buses. With this transformation comes the responsibility to ensure safety and manage risks associated with EV battery use and storage.

## What is an EV?

An EV is a vehicle that is driven by one or more electric motors using energy stored in batteries. Hybrid EVs have a mix of both gas-driven engines as well as at least one electric motor to propel the vehicle forward. Electric vehicles, and their hybrid cousins, present a range of unique risk profiles, dependent largely upon their type and intended use

## Electric Buses

Battery-powered cars and SUVs have steadily grown in popularity over the past 10 years. Typically equipped with large batteries, they cater to both personal and commercial transportation needs. Electric buses can be an effective tool in the fight against greenhouse gas emissions. Due to their

substantial battery capacities, continual use, and significant loads, they can however, present a substantial fire hazard.

## Micro-mobility Devices

Micro-mobility devices such as e-bikes and scooters, despite having smaller batteries, represent a significant fire hazard. The reasons for concern here however are different: lack of controls for charging, lack of maintenance, sub-par workmanship, and a dearth of formalized risk management processes attached to those vehicles, have caused a rash of fires, some even causing death.<sup>1</sup> These fires have been linked to the charging or faulty terminals on the removable batteries for these smaller mobility devices. Due to the popularity of micro-mobility devices, from scooters to hoverboards, there has also been an upswing in injuries, particularly to minor children. While there is little current Canadian evidence, in the U.S., the Consumer Product Safety Commission (CPSC) released a report in September of 2022 demonstrating that serious injuries, including death, are on the rise, with incidents on e-scooters being the most prevalent.<sup>2</sup> This is an important consideration for municipalities that are partnering with e-scooter providers to bring these devices to their community. A thorough review

<sup>1</sup> <https://www.newsbreak.com/news/3197038730840-injuries-from-e-bikes-e-scooters-hoverboards-rise-sharply>

<sup>2</sup> [https://www.cpsc.gov/s3fs-public/Micromobility-Products-Related-Deaths-Injuries-and-Hazard-Patterns-2017-2021.pdf?VersionId=ZwlbrSm70AOuwb4de8hVrn63Jx\\_SB.e](https://www.cpsc.gov/s3fs-public/Micromobility-Products-Related-Deaths-Injuries-and-Hazard-Patterns-2017-2021.pdf?VersionId=ZwlbrSm70AOuwb4de8hVrn63Jx_SB.e)

of the agreement is a critical element in implementing an e-scooter program.

## Battery Hazard

All electric vehicles, from e-scooters to transport trucks are powered, in some manner, by batteries. Battery technology is ever-evolving to accommodate higher capacity, easier and faster charging, longer life overall, and as the industry moves forward, potentially more eco-conscious disposal of batteries at the end of their life.

Though there are many different varieties of batteries on the market, presently Lithium-Ion batteries are the most common type being used for transportation. They are relatively safe, have the ability to hold a charge for a long time, and provide ample power. Like all forms of energy, they do have safety concerns that can be made worse by mistreatment or neglect.

Evidence suggests that EVs, when considering cars, trucks and SUVs, have a much lower incidence of catching fire than vehicles with an internal combustion engine (ICE). The National Fire Prevention Association (NFPA) states that, *“EV vehicle fires are less common of an occurrence, but more complicated of an event, since EVs fires can last longer and have the potential for electrical shock and reignition.”*<sup>3</sup>

Like an ICE vehicle, if overheating is occurring, the vehicle’s sensors will typically warn of a hazardous situation. Drivers must understand what to do in those scenarios (arguably for both ICE-vehicle fires as well as EVs). When fires involving an EV do occur, they require a different firefighting response than a gas-powered vehicle. EV fires run hotter and can be tricky to fully extinguish. As a result, if you are changing your fleet over to zero-emission vehicles, or if you are just considering one yourself, common-sense safety precautions should be taken. If your fleet is being transitioned over to zero-emission vehicles, drivers, in-house mechanics, as well as local firefighters must understand the complexity of these types of fires, what to watch for, and how to extinguish them properly.

Smaller mobility devices are typically, but not always, recharged by removing their batteries and charging them separately from the device. Reports of overheating and fires occurring at the charging source are on the rise. The increase in these incidents can be linked to a dramatic increase in their use overall, as well as other complicating factors. Where batteries must be removed and charged

separately, the charging contacts are subject to increased wear-and-tear, especially when the devices are used regularly and not just on a recreational or occasional basis. Inspection of the battery contacts on both the cell itself and at the charger, as well as the device must be carried out regularly.

Ensuring batteries are charged properly, stored properly and eventually, disposed of properly, are important risk-management considerations. Proper handling and appropriate protective packaging are essential to minimize risks. Storing batteries in specially designed metal cabinets, such as those offered or recommended by the manufacturer, is recommended as part of an asset management strategy. Protocols should be in place to address damaged batteries promptly and must comply with environmental and local legislation and manufacturers’ recommendations. These depleted power cells should not simply be disposed of in the trash.

Though EV fires are a relatively rare event, when they do occur, the subject battery could fall prey to the strange phenomenon of “thermal runaway:” a self-sustaining reaction within the battery, which can lead to a swift release of energy, potentially causing combustion. These fires are very challenging to extinguish and often reignite as excess heat created in the battery continues to escalate, almost feeding on itself. Most EVs have advanced technology to monitor excess heat in batteries, so safety procedures for drivers and mechanics can, and should align with warnings when they happen, and ways to prevent excess heat in batteries. Micro-mobility devices, as noted earlier, pose a different, but still substantial, fire hazard.

## Charging Infrastructure

In order to reach net zero, and promote adoption of EVs in general, a safe, reliable and accessible network of charging stations is vital. Charging stations and the infrastructure they require however, represent another set of complex challenges and risks.

There are different ways to charge an EV, from a basic home plug, to high voltage DC-fast charging stations, electricity can be delivered by “charging” a fee (either by kWh or for the minutes parked) or as a free service to EV users. There is already an established network of for-hire charging stations in pre-existing gas stations as well as an increasing amount of installations found at shopping centres and restaurants. Many municipalities have installed chargers to promote

<sup>3</sup> <https://www.nfpa.org/News-and-Research/Publications-and-media/Blogs-Landing-Page/NFPA-Today/Blog-Posts/2022/11/28/EVs-and-Parking-Structures>

EV use in their community by partnering with standalone companies which provide electricity delivery via on-line apps (typically, but not always, for a fee). Regardless of how charging stations have been installed, hazards, some of which are specific to chargers and some that are just general concerns, must be contemplated.

It is vital that these installations are regularly inspected and maintained by qualified and certified inspectors. As with any agreement, municipalities must be cautious when entering into partnerships with charging station providers by being clear about the expectations of the arrangement on both sides, especially as it pertains to the all-important indemnity provisions. Be sure to confer with counsel to ensure the intent is clear and that your best interests are front-of-mind.

There have been increasing reports about charging station vandalism; in some cases, the electrification of vehicles has become a political statement. Consequently, installing or reconfiguring CCTV cameras, and ensuring that the charging areas are well-lit are important risk management considerations. Bollards, those concrete beams that prevent vehicle impact to the charging station, must be installed in concert with the installation of the charging stations themselves.

## **Risk Management Considerations**

The principles of risk management compel us to look at historical losses to help predict future losses and manage the hazards accordingly. That is very difficult when faced with such a dynamic, and fluid risk profile. At the rate advances are being made in the area of zero-emission vehicles, looking at historical loss data to inform future decisions will not be helpful. There are some recommendations that can act as a starting point to a risk management strategy, but reliance on experts in the field, guidance from manufacturers, and regular reviews of cutting-edge technology, must be components of your program.

## **Training and Awareness**

- Provide driver training on EV handling and emergency procedures.
- Refer to the National Fire Protection Association (NFPA) for guidance on EV fire hazards.
- Train maintenance staff in EV-specific protocols.

## **Maintenance and Inspection**

- Conduct regular battery inspections including terminals and overall battery performance (as per manufacturer's specifications)
- Ensure regular maintenance; brakes, tires, and other systems.

## **Insurance and Liability**

- Consider the challenges in EV repair and replacement due to supply chain issues.
- Proactively maintaining charging stations, as well as the vehicles themselves, are important factors in avoiding potential liability.

## **Environmental and End-of-Life Considerations**

- Establish partnerships with battery recycling firms.
- Implement a program for recycling/storing and decommissioning batteries which complies with (or exceeds) environmental legislation and best practices.

## **Cybersecurity**

- Ensure network security for connected EVs and charging stations.
- Review the cybersecurity practices of all partner vendors to ensure they meet or exceed your own.
- Regularly update software to protect user data.

## **Emergency Protocols**

- Equip areas with suitable fire suppression systems.
- Ensure local fire departments are trained for EV fires.
- Consider the use of fire blankets for EV fires.

The adoption of zero-emission vehicles (including EVs) is pivotal for reducing greenhouse gas emissions and the negative effects of climate change. While there are undeniable operational benefits, it's imperative to understand and manage the risks involved with this still-emerging technology. A proactive risk management approach will ensure a smooth and safe transition to EVs in our communities.

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