



On the cover

With more electric and hybrid vehicles on the road in British Columbia each year, employers need to take steps to protect workers from hazards such as fire and electrical shock.

# The evolution of electric vehicle safety

By Sarah Ripplinger

## As B.C. outpaces other provinces in zero-emission vehicle sales, some industry experts say there's a need for improved safety protocols and procedures for handling electric vehicles and the high-voltage batteries that power them.

The Automotive Retailers Association (ARA) recently released [electric vehicle \(EV\) safety guidelines](#), developed in partnership with WorkSafeBC.

Geared toward the towing, recovery, and recycling industries, the guidelines outline safety considerations for workplaces that come into contact with EVs and the high-voltage lithium-ion (li-ion) batteries that power them. They are part of a mounting effort to provide clarity for employers about their responsibilities and steps they should take to protect workers from hazards such as fire and electrical shock.

“When EVs first came out, we had to go to manufacturers’ websites to find the emergency services protocols for the vehicles to know how to properly dismantle them,” recalls Jim LeBrun, industry relations advisor for Powerhouse Recycled Auto and Truck Parts in Cumberland, B.C., a director at the ARA and chair of their B.C. Auto Recyclers Division.

A lot of companies that dismantle vehicles and recycle or sell their parts have avoided EVs because of the lack of information on how to handle them safely, notes Ken Hendricks, a senior advisor with the ARA. Those that do can process anywhere from as few as 2 or 3 EVs to as many as 50 per year — still a small fraction of the thousands of cars processed at many auto wrecking sites each year.

As the market for EVs trends upward, the number on the road, in salvage yards, and being towed is increasing. In December 2020, there were approximately 54,000 light-duty EVs registered in B.C., and 9.4 percent of all new light-duty vehicle sales in the same year were EVs. That’s up from 1 percent in 2016 and 4 percent in 2018, according to [the Province’s zero-emission vehicle reports](#).

Added incentives for EV car ownership, a growing desire for green technology, and the mandate under the provincial *Zero-Emission Vehicles Act* that all new car sales be exclusively EVs by 2040, will likely continue to fuel demand.

## EV hazards are well established

Unlike standard combustion engine cars, fully electric vehicles, such as Teslas, use hundreds of li-ion battery cells to power an electric motor. While EVs must meet all federal and provincial safety standards, the sheer volume of high-voltage li-ion batteries housed within them presents unique hazards. This is because the batteries typically contain highly flammable electrolytes and chemical compounds.

Short-circuiting, overcharging, external heat or fire, impact, punctures, or water ingress can start an irreversible thermal event in a li-ion battery known as thermal runaway. The amount of heat generated by cells in one area can spread to adjacent cells, setting off a chain reaction that can eventually result in a fire or explosion.

“All lithium-ion batteries have a residual charge that, even when the battery seems to be dead, can be a risk to workers in terms of a fire or electrical hazard,” notes Mukesh Sharma, an occupational hygiene officer in WorkSafeBC’s Risk Analysis Unit.

This makes it important to keep EVs with potential battery damage at least 50 metres away from combustible materials, according to National Fire Protection Association (NFPA) guidelines.

In most fully electric vehicles, the main battery pack is found between the wheelbases and is connected by a high-voltage cable, often orange in colour for easy identification. But other batteries can be located throughout the vehicle, says Michael Chafe, senior regional health and safety manager at Schnitzer Steel Industries, Inc., and ARA project member. “Until technology that can detect these batteries is widely available,” says Chafe, “industry is reliant on manual inspection processes to remove these items from waste streams.”

Plug-in and non-plug-in hybrids, such as certain Toyota Prius models, have a mix of an electric motor and a combustion engine, and come with similar risks. In 2019, a plug-in hybrid SUV rolled into the ocean at a boat launch in Port Moody, B.C., and burst into flames after being towed from the water, likely due to a short in the battery caused by salt water damage.

EV batteries, which range from 200 to 800 volts, pose a risk of electrocution because of the current flowing through the network of cables, so it’s critical to ensure that all power sources are completely disconnected





**Tesla vehicles have a tow mode that can make loading and unloading the vehicle safer. Proper training ensures workers know how use safety features on electric and hybrid vehicles.**

before dismantling EVs. In addition, the electrolytes, hydrogen fluoride, and other fumes from burning batteries can expose workers to noxious substances and a potential risk of explosion from contact with a spark or flame.

## **The start of comprehensive EV guidelines**

The ARA's EV guidelines put B.C. at the forefront of developing EV safety standards for the automotive aftermarket in North America, says Hendricks, who spearheaded the undertaking with help from WorkSafeBC Small Business Initiative funding.

Starting in early 2020, a task force conducted a needs analysis to collect industry data. It established a technical advisory committee consisting of representatives from the recycling and towing industries, as well as BCAA and WorkSafeBC, to oversee and provide feedback on industry surveys, reports from subject matter experts, and the final guidelines documents.

While the guidelines provide a first step, Hendricks says the ARA is now working on more comprehensive EV safety training and certification programs it hopes to roll out later this year.

"There's still more work to be done in terms of standardization," says Chafe. For example, "The high-voltage cable is often orange so it can be easily identified, but it's not mandatory for car manufacturers to use that colour."

He suggests a multilayered approach of outreach and education, proper labelling by manufacturers, industry standards for manufacturing and recycling products that contain batteries, and technology for detecting batteries in all kinds of products, not just EVs.

## **EV aftermarket best practices**

Powerhouse has been recycling vehicles since the 1960s, and hybrids since the early 2000s. However, the EVs they purchase require special precautions, says LeBrun.

“Whenever an EV comes onto the lot, it’s immediately flagged with caution tape. We isolate it from the other vehicles, remove the fuses, and disconnect the battery.”

Only senior dismantlers handle EVs after undergoing training on proper safety protocols, including wearing lineman or highwire gloves to protect against electric shock, along with other personal protective equipment (PPE).

Doing everything in a safe and efficient manner is the best way to save money at the end of the day, says LeBrun. “As an industry, we are very safety conscious. We want all of our workers to stay safe so that they can go home uninjured.”

Mitchell’s Towing also implemented separate protocols for handling EVs, says owner Mitchell Martin, including using soft straps to avoid metal-on-metal contact with an EV’s battery when towing. They also keep fire blankets on hand in case a vehicle ignites.

The Tesla Motor Club is now the largest auto club serviced by Mitchell’s small business of around 27 workers. The majority of Tesla vehicles they tow right now — around 10 per day — are for service or software issues, such as doors that won’t open or a dead battery. But he anticipates towing an increasing number of vehicles involved in collisions as more EV rubber hits the road.

At regular toolbox talks, Mitchell’s shares bulletins from Tesla about software and hardware updates that could impact how workers interact with EVs, along with information about safety and PPE best practices.

“Workers need to know which panels to remove to re-engage the vehicle’s 12-volt battery, for example,” says Martin. “For some Teslas, the vehicle’s software can allow us to put it into tow mode, which elevates the airbag suspension or puts the vehicle into neutral so that it can roll freely onto the truck deck.”

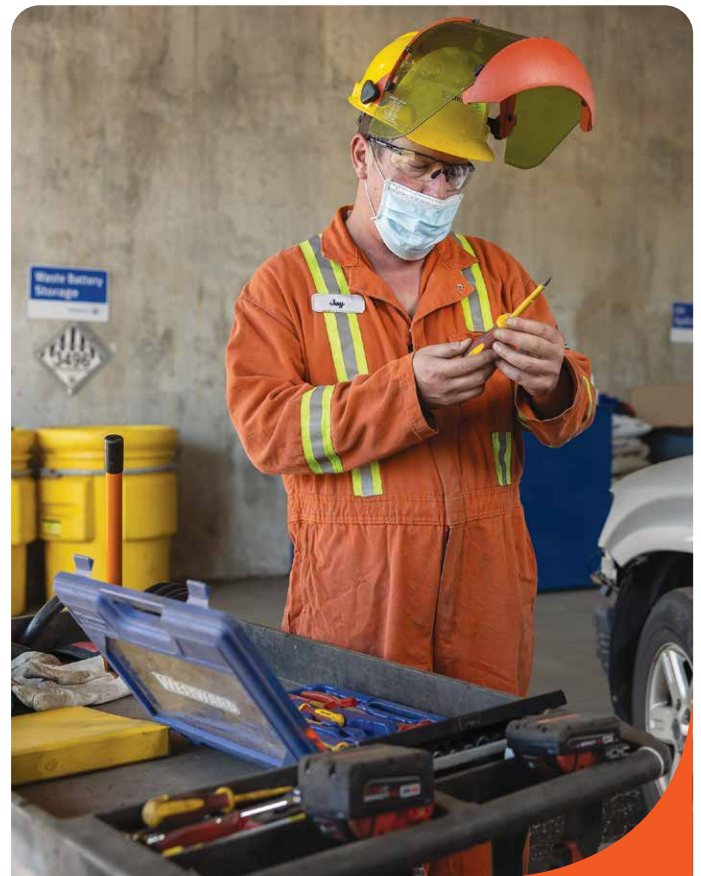
Schnitzer Steel conducted a thorough risk assessment before welcoming EVs onto its lots. While EVs are still a minor part of the company’s metals and auto recycling business — consisting of over 100 units and 3,000 employees throughout Canada and the United States, including around 100 workers in B.C. — Schnitzer is planning ahead. This involves consulting safety and training materials through the ARA and NFPA.

“EVs are a huge part of the greener tomorrow, and these vehicles are just starting to gain traction,” says Chafe. “If you don’t know about a risk, you can’t control it. The more we know about what safety precautions to put into place, the more we can plan and budget for them as part of our workplace safety strategy.”

He emphasizes that it’s important to find practical, attainable solutions to addressing these hazards, especially for smaller operations. “We want to share what we’ve learned and what we’re doing with other employers; it’s about keeping workers and communities safe, not competing with other businesses.”

### For more information

Find the Automotive Retailers Association electric vehicle guidelines at [ohs.ara.bc.ca/ev-guidelines](https://ohs.ara.bc.ca/ev-guidelines). You can also search for “electric vehicles” on [worksafebc.com](https://worksafebc.com). ☺



**A worker visually inspects insulated tools before processing a hybrid vehicle for recycling.**