



***Global Automakers***  
*of Canada*

**Guidelines for Managing  
Electrified Vehicle Batteries at End of Life**

August 2019

### *Background:*

With the projected increase in sales of electrified vehicles in Canada the need to responsibly re-purpose and/or dispose of vehicle batteries at end of vehicle life has become an issue of concern for automotive manufacturers. Currently there is only a small percentage of electrified vehicles batteries that are reaching their natural end-of-life with the need for battery disposal mostly coming from damaged or malfunctioning batteries and batteries from conventional or plug-in hybrids. All OEMs are interested in identifying and developing safe processes that will allow batteries to be effectively recycled, with the support of key partners as needed. Furthermore, there is a wealth of opportunities for the analysis and re-use of these batteries once they are no longer suitable to power a vehicle.

It is in this environment that entrepreneurial firms have emerged to provide the recycling services that will benefit electrified-vehicle manufacturers. All GAC members who have brought electrified vehicles into the market have had individual contracts in place with recycling firms to responsibly manage batteries or are engaged in the process of doing so. The freedom to choose new recycling partners, with different processes and recovery rates, is important for our industry at this stage. As an industry we are cognizant of the negative environmental impacts that would arise if these batteries end up in landfill or other disposal sites. For these reasons we as an association have chosen to develop guidelines that promote the development of responsible and innovative solution(s) for battery recycling.

### *Safety Considerations:*

All our members who produce electrified vehicles with lithium-ion batteries are aware of the potential safety hazards involved in handling, storage, and disposal of these components. All OEM battery packs are clearly labelled to indicate where high voltage danger is present. Furthermore, our members focus on:

- Providing safe handling documentation to consumers who purchase electrified vehicles
- Providing safety information and handling documentation to first responders
- Providing proper storage and safe handling instructions to collection points (i.e., dealerships, auctions)
- Requiring that all battery haulers and processors have the appropriate safety certifications

### *Safety Considerations for Partners*

Our industry has chosen to partner with various service providers in Canada and in the US. All our partners adhere to strict principles of safe handling, transport, and storage when it comes to batteries. This includes high voltage training for any employees handling damaged batteries and proper adherence to Transport Canada's regulations and any relevant provisions of the [Transportation of Dangerous Goods](#).

### *Environmental Considerations:*

Guidelines for managing electrified vehicle batteries at end of life are based on the environmental principle of the 3 R's (Reduce, Reuse, Recycle). In this instance

- **Reduce** (or eliminate) the number of lithium-ion batteries ending up at scrapyards or landfill sites where they may not be effectively managed
- **Reuse** battery components where possible and, as the technology develops, explore options for the reuse of vehicle batteries in other configurations
- **Recycle** the rare metals and other components in these batteries with the most effective means possible

There are various mixes of battery chemistry currently available in electrified-vehicles and these will continue to evolve. Environmental safety factors coupled with scarcity of raw materials stimulates an emerging market for collecting and recycling these batteries. It is with these environmental principles in mind that our association members have entered into contracts with various processors. The reuse and refurbishment of batteries by manufacturers offers the potential to avoid having to recycle materials to their constituent parts but when that recycling becomes necessary our industry has begun to partner with third party service providers. As new metallurgical and recycling techniques emerge in this field our members may wish to engage multiple vendors to ensure that their products are recycled as much as possible and re-introduced into the market. As they do so, the principles outlined above in the 3 R's shall be kept in mind.

### *Review of Guidelines:*

The market for electrified vehicles is still in its infancy. As the current generation of electrified vehicles reach their end of life more batteries will end up being recycled and reused. New recycling techniques and new opportunities for reuse will become available. Therefore, these guidelines may be reviewed and amended, from time to time.

*Definitions:*

**Electrified Vehicles** includes hybrid electric vehicles (HEVs), plug-in hybrid electric vehicles (PHEVs), fuel-cell electric vehicles (FCEV), and battery electric vehicles (BEVs).

**Battery** includes nickel metal hydride (NiMH), lithium-ion (Li-ion) batteries, and other battery chemistries used to power and propel an Electric Vehicle.

**End of Life** means when an electrified vehicle battery can no longer be used to power that vehicle. This can happen after the battery is irreparably damaged or when the battery has degraded over time to the point it is no longer suitable for powering the vehicle. At this time, the battery may still be suitable for reuse as stationary storage.