

Lead Batteries: The Silent Safety Net

Virtually every conventional, hybrid and fully electric vehicle on the road relies on a lead battery. That's over 340 million vehicles in Europe alone.

In a **traditional vehicle**, one powered by an internal combustion engine, the lead battery provides voltage to fuel injection systems, high current to start the engine, and power for the vehicle's lights and other electrical accessories. Lead batteries can start internal combustion engines in extremely cold conditions where other battery types may struggle.

But in an **electric or hybrid vehicle**, the high-voltage lithium-ion battery pack drives the wheels. A **separate 12V auxiliary battery**, typically a lead-based absorbent glass mat (AGM) or enhanced flooded battery (EFB), powers the vehicle's 12V electrical network and acts as an independent back-up for safety-critical systems. **Find out more:**



WHAT THE AUXILIARY BATTERY DOES:

Power steering

Keeps steering assisted so the driver retains control if the main system fails.

Braking & ABS

Back-up for brake boosting and anti-lock braking.

Door locks

Ensures doors can be unlocked and occupants can exit.

Emergency lights

Hazard and emergency lighting stay on after a fault.

eCall

Powers the automatic emergency call system after a crash.

Board net & electronics

Lighting, wipers, infotainment, sensors and control units.

IF THE MAIN BATTERY FAILS:

1

Normal driving

High-voltage pack drives the car; 12V battery supports the board net.

2

Fault occurs

The high-voltage system fails or is isolated.

3

Lead battery takes over

The 12V auxiliary battery powers safety functions on its own.

4

Safe stop

Driver keeps steering and brakes to pull over safely.

SIX REASONS WHY LEAD IS THE BATTERY OF CHOICE

Safe

Inherently safe, non-flammable aqueous chemistry with a long safety record.

Reliable

Robust across a wide temperature range and well understood after a century of use.

Cost-effective

Keeps the cost of vehicle safety systems manageable.

Standardised

Performance and dimensions set by long-established automotive standards.

Recyclable

Supported by a mature, closed-loop collection and recycling system.

Secure supply

Manufactured in Europe for all its target markets, and recycled in Europe.

PERFORMANCE BENEFITS

Good dynamic charge acceptance (DCA)

Modern AGM and EFB designs, using carbon and other additives, take on charge quickly in short, intermittent pulses. This suits the irregular charging regimes in EVs and hybrids, keeping the auxiliary battery topped up and ready to act.

Strong low-temperature performance

Lead batteries deliver reliable power and accept charge in sub-zero conditions, where some other chemistries need heating or limited charging. Back-up safety power is available in winter as well as summer.

LOOKING AHEAD

- **Growing importance:** ADAS (Advanced Driver Assistance Systems) and automated driving raise the bar for uninterrupted back-up power.
- **Still essential:** Industry forecasts expect every vehicle to need a 12V power source until 2028 and beyond.
- **Hybrids too:** Virtually all HEVs and PHEVs also carry a 12V lead battery for auxiliary safety duties and monitoring of the lithium pack.
- **Charging matters:** Discharge of the 12V battery is a leading cause of hybrid and EV breakdowns, so a smart charging strategy is key.

CBI RESEARCH IN ACTION

- **Safety State-of-Function (SSOF) group:** working with Audi, Ford and Stellantis on a white paper showing how 12V lead batteries meet functional-safety requirements, including battery diagnostics.
- **New test methods:** contributing to IEC-CENELEC work on auxiliary-specific tests such as charge recovery and pulse power.
- **Electrode research:** CBI is working with the Fraunhofer Institute and the Bulgarian Academy of Sciences to improve the charge performance and power capability of lead battery electrodes in these applications.
- **ALBA workshop:** bringing lead battery and automotive experts together on 12V auxiliary and back-up applications.

Find out more: <https://batteryinnovation.org>



Fact file

- Almost every car on the road carries a 12V lead battery - ICE through to EV. In fact, over 340 million vehicles in Europe alone rely on lead-based batteries.
- A typical lead-based auxiliary battery contains 5 kg of lead compared to 10 kg in a full-size SLI (starting, lighting, ignition) unit. (Source: CBI, 2026)
- Europe has 90 GWh installed lead battery production capacity. (Source: CBI, 2026)
- Over 50 million high-quality, sustainable lead batteries are made domestically every year in the EU.
- 75% of lead in European lead batteries comes from recycled sources, supporting a sustainable lifecycle. (Source: ILZSG, 2020)
- In Europe, all lead batteries available at end of life are collected for recycling - that's an average of 56 million lead batteries recycled in Europe every year. (Source: Eftec, February 2025)

Additional references: EV safety article ([Consortium for Battery Innovation](#)); C. Rosenkranz, "How lead batteries could make EVs safer", World Economic Forum / BEST Magazine; Coverage of CBI SSOF working group and ALBA workshop, 2024 (BEST Magazine); ILZSG, "The Potential Impact of Hybrid and Electric Vehicles on Lead Demand", April 2023; Exide Technologies, "Bright future of the 12V battery as xEV revolution grows"

Developed in conjunction with the [Consortium for Battery Innovation](#), this case study highlights an essential use of lead which supports societal wellbeing through safe movement and transport.

For Europe's future, lead matters.

