Battery2Life – unlocking the potential of second-life EV batteries

Guest Contributor

26 May 2025

Energy Storage Electric Vehicles Energy and Mobility Europe & UK EV Infrastructure Low Carbon Transportation Projects Zone

The vision of BATTERY2LIFE is to facilitate the smooth life use of batteries and to boost their transition to 2nd innovation in the European battery industry.

By 2030, over 5 million metric tons of EV batteries will no longer be suitable for mobility, but with a remaining capacity of 70-80% after this first life.

These batteries can be repurposed for energy storage with a projected cumulative capacity of 1,000GWh by 2030. The electrification of trucks and industrial machinery will further increase the availability of large batteries for second-life applications.

However, challenges remain in battery disassembly, assessment, and reconfiguration for reuse.

Main challenges for 2nd life EV batteries

There are three main challenges to address.

- Lack of standardised packaging with complex disassembly, assessment and reconfigurations due to manual processes, safety risks and non-detachable connections. A standardised, modular design is needed to improve efficiency and minimise waste.
- Battery management systems (BMSs) must adapt as existing BMSs are tailored for automotive applications and not adaptable for 2nd life uses. A shift to a flexible, data-driven BMS is necessary to integrate different battery technologies and to ensure safe, optimal performance.
- Limited monitoring and assessment methods result in variations in calculated battery degradation making it difficult to assess the remaining capacity and suitability for reuse. Reliable diagnostics require standardised access to battery usage data, which is currently restricted.

BATTERY2LIFE solution

BATTERY2LIFE introduces two new battery system design frameworks serving the upcoming market needs. The first supports the business transition for the initial market by restructuring existing battery design patterns, while the second introduces completely new design principles for 1st and 2nd life of the battery.

A new BMS design mentality is being introduced to the battery industry with delivery of an open and interoperable hybrid BMS architecture (with an embedded and a cloud section). This should lead the transition from technology-driven BMS designs towards new data-driven and application-agnostic designs that can be easily adapted and updated to serve the requirements of different battery technologies and any 2nd life battery stationary storage application.

Furthermore, BATTERY2LIFE is introducing innovative embedded sensing and more [illegible]rate SOX safety and warranty estimation algorithms along with new SOX indicators [illegible]ropriate for 2nd life use.

Additionally, a new energy information system implementation approach is introduced by integrating it in the BMS, in order to enable detailed safety and reliability monitoring at both cell and module level during 1st and 2nd life usage.

All of this will be demonstrated through two promising and sustainable business cases, carefully selected to represent the two most common stationary energy storage applications – domestic storage in a smart home and grid scale storage in an EV charging microgrid.

2nd life energy storage applications

CIDETEC will assess 2nd life energy storage applications through the development of a self-developed sizing tool, which will consider techno-economical parameters to ensure that the selected chemistry, sizing and BMS exploitation is reliable in the short- and long-term use of each site; and a data driven predictive advanced diagnostic tool, which will diagnose the RUL of the batteries.

In addition, the development and validation of open source BMS algorithms will be carried out. SOX estimators will be developed through early detection of risk phenomena.

For this purpose, thermal runaway and lithium plating tests at cell level will be conducted, covering both fresh and aged cells.

This way, CIDETEC will be able to contribute to the selection criteria of the modules valid for 2nd life depending on the EV 1st life application and stationary 2nd life application, as well as the commissioning of used batteries.

Overall the project aims to align with Europe's objectives of driving digital and sustainable transformation by advancing key technologies in mobility, energy, construction and production.

Second-life EV batteries play a crucial role in the EU's energy transition, supporting energy storage markets. Battery pack and BMS designs prioritise modularity, safety and reconfiguration for reuse, aligning with the battery passport concept.

The goal is to cut repurposing costs by 30%, assess environmental impacts and boost market expansion and job creation through wider adoption of stationary energy storage systems.

For more information, see the websites of BATTERY2LIFE and CIDETEC.

About the author

Izaskun Aizpurua Arconada holds a degree in Energy Engineering from Mondragon University and a Master's in Smart Grids and Distributed Generation from the University of the Basque Country. A researcher at CIDETEC since 2023, she leads the Battery2Life team on battery sizing and diagnostics for second-life applications, developing tools for techno-economic assessment, predictive diagnostics, open-source BMS

algorithms and safety testing to optimise battery reuse in stationary storage.

Subscribe to *The List* newsletter

PREVIOUS NEXT

Select Topic

Select Topic

Topic

Energy Storage

Follow Topic

Related content

Powering the transition: Why hybrid energy storage...

Energy Storage

New project spotlight – Stationary storage with ...

Energy Storage

Hydrostor's long duration energy storage technol...

Energy Storage

Projects Involved

BATTERY2LIFE

View Project

Sign up for a bi-weekly newsletter of what's hot and happening in the energy sector

Sign up

Articles you might like

BW ESS and Ibersun to develop 2.2GW BESS portfolio across Sp...

BW ESS and Spanish energy storage developer Ibersun have signed a joint venture to develop 2.2GW of utility-scale BESS projects ac...

Augwind to build first commercial-scale AirBattery in German...

Augwind's AirBattery Hydraulic Compressed Air Energy Storage (CAES) technology combines pumped hydroelectric principles with com...

Why southern Sweden is a case study in energy transition res...

An industry meet-up in Lund unpacked how the region's resilience in delivering energy transition could impact beyond the borders o...

About

Sign up for a bi-weekly newsletter of what's hot and happening in the energy sector

Sign up

Our Events
News Desk
Jobs
Power Engineering International
Smart Energy International
Privacy Policy

Contact

+31 346 590 901

service@enlit.world

Sales & Sponsorship Enquiries

Enlit is a constantly growing, inclusive and end-to-end forum that addresses every aspect of the energy agenda. A community that for 365-days a year collaborates and innovates to solve the most pressing issues in energy. Join us for the latest news, inspiring stories, insights, marketplace and virtual and live events.