SAFELOOP

NEWSLETTER #1

SEPTEMBER 2025

Our story

Funded by the European Commission's Horizon program, SAFELOOP is a 36-month project bringing together 15 partners from 11 countries. Launched in June 2024 with a kick-off meeting in Finland hosted by the coordinators, University of Oulu, the consortium quickly defined objectives, responsibilities, and collaboration structures. Since then, meetings in Poznan (IMN) and Nyborg (Koppers), along with regular online sessions, have supported coordination and alignment between all parterns' activities and initiatives. A strategy for intellectual property and data management has been set, and the project website and social media channels are active. SAFELOOP also engages with the Battery 2030+ and Batt4EU networks to strengthen impact and create synergies with other Battery Innovation initiatives throughout Europe.
In its first year, the project has advanced its mission to improve electric vehicle (EV) battery safety and performance through sustainable materials and processes.

Achievements

- Development of automotive LIB-grade recycled and functionally enhanced anode materials, and evaluation of various compositions.
- Synthesis and evaluation of NMC and LFP cathode materials, prioritizing recycled sources.
- Safety testing of baseline and functionally enhanced separators.
- Identification and initial testing of electrolyte formulations compatible with new anodes and cathodes.
- Validation of baseline 18650 cells and preparation for new material integration.

Progress and next steps

A suitable cell chemistry for gigafactory-scale production has been selected, with improvements in cyclability and capacity already demonstrated. Sustainability is a key factor: frameworks for eco-design, end-of-life management, and life cycle assessment have been established, alongside data collection for battery value chain impact studies. The first scientific publication has also been released.
Next steps include optimizing electrode materials with recycled content, refining electrolyte composition, and assembling and testing full cells.

BATTERY 2030+

Funded by
the European Union

Our goal

The SAFELOOP project is reshaping the way batteries for electric vehicles are made. Together with 15 battery experts organizations from 11 countries, the project is developing innovative key battery components—anodes, cathodes, separators, and electrolytes—using recycled materials provided by its consortium members. These will be combined into battery packs designed for e-buses.

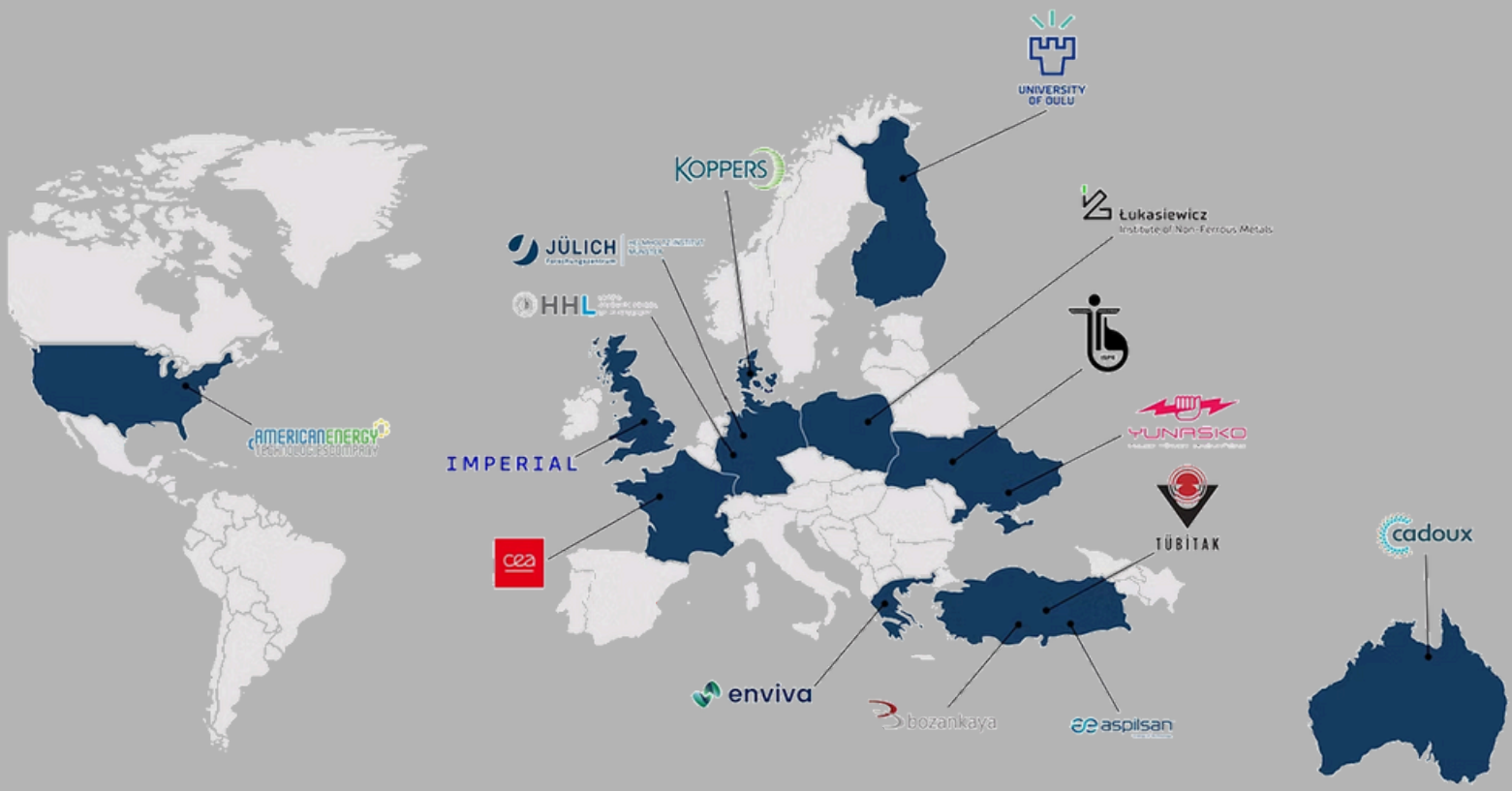
The need is urgent: by 2025, global demand for EV batteries is expected to reach 735 GWh, with more than 125 million EVs on the road by 2033. SAFELOOP's mission is to make these batteries not only more sustainable, but also safer. The project aims to increase battery lifetime by 15% by 2030, set new safety benchmarks aligned with EUCAR Hazard Level 3 standards, and contribute to Europe's ambitious recycling targets.

To achieve this, SAFELOOP is focusing on building a European supply chain, securing raw materials, reducing reliance on imports, and limiting environmental impacts. The goal: the world's first EV battery with the required recycled content and improved recycling rate within a decade.

By combining research excellence with industrial know-how, SAFELOOP is paving the way for safer, greener, and more competitive European batteries.

Our partners

Our project encompasses all aspects of the battery life and each individual partner offers unique expertise towards achieving the project's goal



Building Safer Anode Materials
Work package 2

Within SAFELOOP, Work Package 2 (WP2) brings together suppliers and processors of both primary and recycled anode materials. These partners provide advanced materials—including battery-ready anode active materials, conductivity enhancers, and nanostructured safety additives—to ***Aspilsan*** *Energy, a European Gigafactory in Kayseri, Turkey.* ***Aspilsan*** *will use these inputs to produce tens of thousands of 18650-type cells, later integrated into a 12-meter e-bus developed by* ***Bozankaya*** *(Turkey). This bus will be demonstrated at a partner site as part of SAFELOOP's broader Eurocentric battery supply chain strategy.*

WP2 will also qualify non-spherical graphite, a by-product of anode production, in supercapacitors with ***Yunasko*** *(Ukraine). A distinctive feature of WP2 is its scale as up to 500 kg of active material for each of two planned Gigafactory runs at* ***Aspilsan*** *will be generated—a groundbreaking ammount even for Horizon-EU funded project standards.*

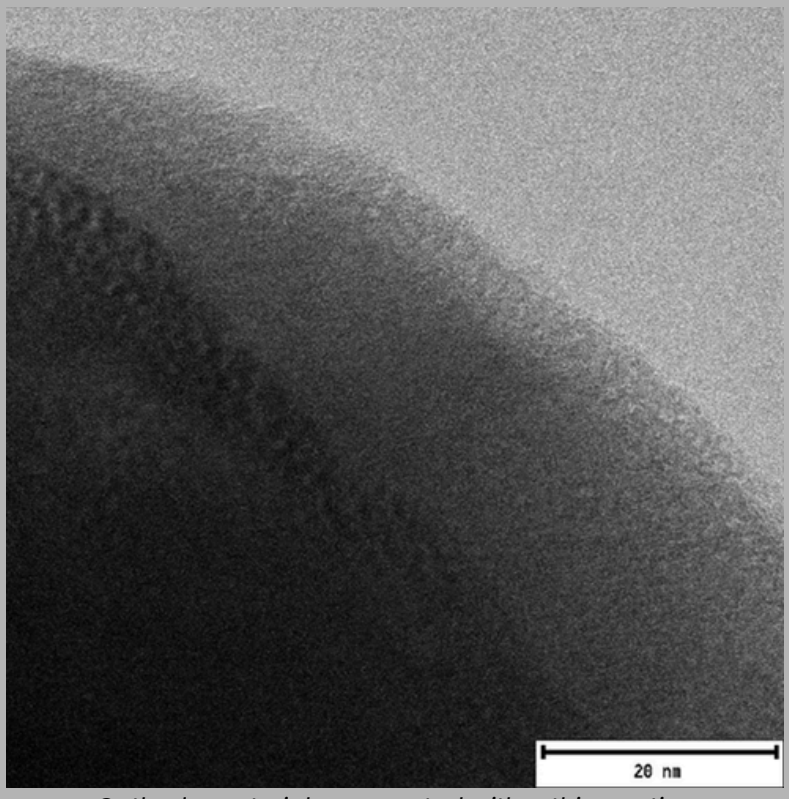
The anode material features an innovative composite structure incorporating recycled components, with core inputs supplied by ***Aspilsan*** *(Turkey),* ***Koppers*** *(Denmark),* ***CEA*** *(France), and* ***Cadoux*** *(Australia) and processing done by* ***AETC*** *(USA).* ***ISPE*** *(Ukraine) is optimizing electrode formulation and performance testing, supported by industrial partners including* ***AETC*** *(USA).*

Creating an innovative Cathode chamber

Work package 3

The research activities of WP3 are producing cathode active materials from primary and recycled material flows. NMC811 reference cathode is successfully synthesized using the coprecipitation method, followed by lithiation. Furthermore, Lithium Nickel Manganese Oxide (LNMO) cathode was prepared, and electrolyte optimization for this high-voltage material is ongoing. One of the first publications related to LNMO synthesis and characterization is under review process. To improve the cyclability, the cathode material was successfully modified. For example, a graphene oxide coating for NMC88 was applied, and the results were published as the project's first paper. These results will also be published.

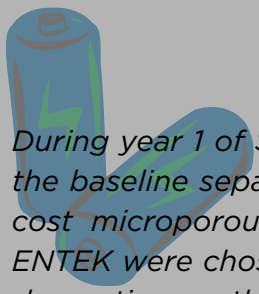
Coprecipitation is used in the synthesis of cathode precursors at the ***University of Oulu***



Cathode materials are coated with a thin coating layer to improve the cyclability of battery cells.

Engineered carbon materials from WP2 have been used as carbon additives in slurry optimization with the aim of improving battery cyclability and safety. Electrochemical performance of materials is evaluated using coin cells and pouch cells. Current activities are focusing on the use of recycled materials, especially raw materials from spent batteries and metal refining industry from the EU region, to produce cathode active materials, and thus to reduce the supply chain risk.

Enhancing Electric Vehicle Battery Separators
Work package 4



During year 1 of SAFELOOP, ***Yunasko*** *(Ukraine) assessed the porosity and resistivity characteristics of the baseline separator material and its modified samples received from the partners. Commercial low cost microporous Ultra-High Molecular Weight Polyethylene (UHMWPE) membranes EPX-12 from ENTEK were chosen as a baseline sample. Porosity tests were performed using the Nitrogen sorption-desorption method at 77K and Quantachrome Nova Instrument. Functionally enhanced separators obtained from* ***AETC*** *and* ***Aspilsan*** *were tested in prismatic pouch-type cells with electrode areas of 35.7 or 15.0 cm^2 and various electrode components and various electrolytes including that recommended* ***FZJ****.*

Electrolyte and components compatibility assessment
Work package 5

JÜLICH Forschungszentrum | HELMHOLTZ-INSTITUT MÜNSTER

The WP5 activities are centered around the development of innovative non-flammable electrolyte formulations compatible with the project-defined primary and recycled anode (graphite), cathode (NMC811 and LNMO) and separator to provide 15% improved long-term galvanostatic cycling stabilitycompared to the baseline cell chemistry, through the formation of effective solid electrolyte interphase (SEI) on anode and cathode electrolyte interphase (CEI) on cathode combined with improved safety (flame retardancy) achieved through implementation of targeted functional additives/co-solvents and/or conducting salts. ***FZJ*** *provided all partners with a recommendation for the GEN0 electrolyte and furnished the contact details of the supplier. To ensure reproducibility and comparability of results,* ***FZJ*** *issued standardized protocols for CR2032 coin cell assembly and galvanostatic cycling evaluation. These protocols were adopted by WP5 partners to facilitate consistent, meaningful comparisons across experiments. The GEN0 cell chemistry was identified as the baseline for initial measurements.*

First promising functional additives for the advancement of reference electrolyte composition to be evaluated in resulting cell chemistry were selected and evaluated on the electrolyte level. For the initial evaluation of the selected electrolyte components and the resulting formulations, commercially available NMC811, LNMO, and graphite electrodes served as the reference standard, pending deployment of the project Gen0 cathode and anode materials. ***FZJ*** *received Gen0-1 and Gen0-2 anode sheets and performed preliminary electrochemical assessments in half-cell setups (Gen0-1 vs. Li). Lastly,* ***FZJ*** *recommended an electrolyte formulation for Gen0-1-2 cells (designated for WP6 pouch cell assembly). This recommendation was based on* ***FZJ****'s prior data on electrochemical performance evaluations conducted in NMC811||Gr cells as well as in the Gen0-1Gr||Li and Gen0-2 Gr||Li cells.*

Cell assembly for performance and safety assessment
Work package 6

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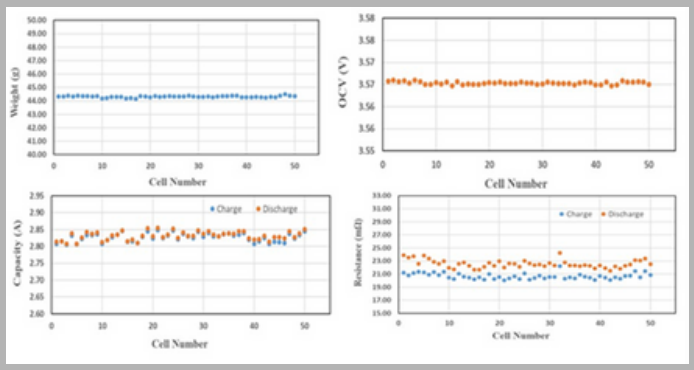
aspilsan Energy of Technology

Notably, up to 10% of the recycled materials will be reintegrated into active material formulations for new cell manufacturing. This initiative aims to demonstrate the recyclability and cycling performance of ASPILSAN's 18650 cylindrical cells using recovered materials.
*In parallel, partners **Yunasko**, **ISPE**, and **IMN** conducted independent and detailed characterizations of the **Aspilsan** cells. Their analyses included measurements of cell capacity, internal resistance, safety, and other performance parameters, providing valuable insights into cell behavior and consistency. The test results are presented in the graphs below.*

***HHL** has completed an initial battery pack unit economics model and a patent landscape analysis of LIB recycling technologies in the EU, supporting project partners in the development of innovative and cost-effective recycled LIBs for Gigafactory production.*

***Aspilsan** has successfully delivered its 18650-type cylindrical lithium-ion cells to several project partners. Among these, 7,000 used cells were shipped to **AETC** in Chicago, USA, for advanced recycling. The recycling process involved discharging, mechanical disintegration, dewinding of the jellyroll and separation of the cathode, anode, and separator. These materials were recovered to promote circularity in battery production.*



*The results show consistent and stable electrochemical performance and charge/discharge characteristics, paving the way for their suitability in both parallel and series-configured battery packs. These packs are currently being developed by **Bozankaya**, **Yunasko**, and **TÜBİTAK** for use in an electric bus.*
This collaborative effort highlights the project's commitment to sustainable battery development and closing the materials loop through innovation and scientific cooperation within Europe.

Sustainability assessment and Circular Economy
Work package 7

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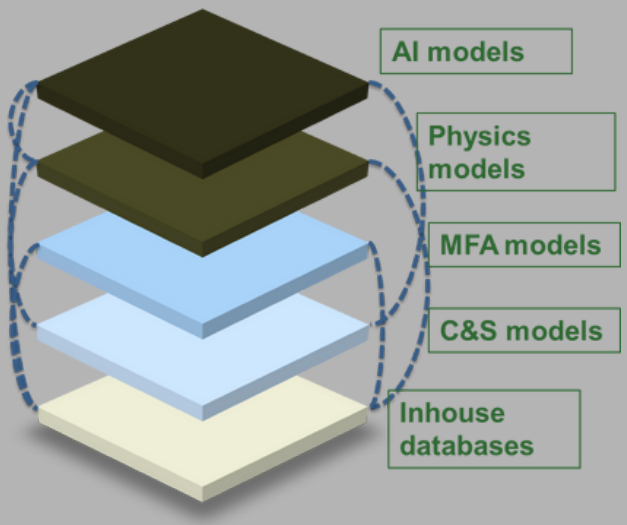
IMPERIAL

SAFELOOP's WP7 has been active in corresponding with project partners to understand the processes involved in the SAFELOOP value-chain. This objective of this was to map out the whole value-chain by creating a nodes and arcs diagram where all inputs and outputs are analysed through the Mass Flow Analysis (MFA) method. This in turn served as the basis for all the tasks involved in WP7, including the description and understanding of the innovative processes involved in SAFELOOP. With this information, the Eco-Design guidelines were adapted and developed to the SAFELOOP environment, following the Safe and Sustainable by Design (SSbD) principles. The framework for the Second Life and EoL battery was also developed based on the mapping performed in close coordination with the development of circular business models for the SAFELOOP project. The mapping of the SAFELOOP value-chain will be the backbone for the environmental and social assessments, with the input data from project partners updated periodically. The framework for this approach has been developed. ***Imperial*** *is now collecting data to initiate the assessments.*



HHL LEIPZIG GRADUATE SCHOOL OF MANAGEMENT

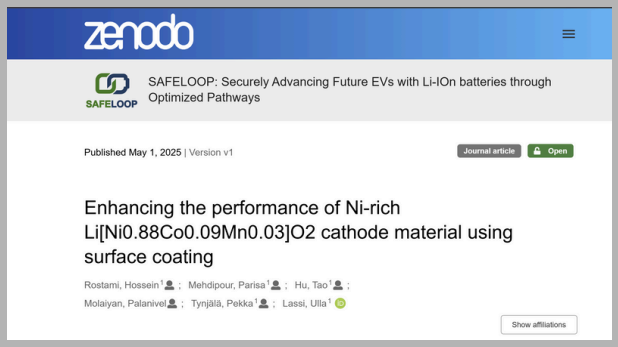
In close cooperation with Imperial, ***HHL*** *Leipzig Graduate School of Management completed an initial economic analysis of LIB circular operations, identifying the main cost drivers. The work then focused on simulating the economics of different circular business models to maximize the value of deploying recycled SAFELOOP batteries in the EU. Interviews with European companies experienced in LIB deployment provided unique insights for developing economically and technically attractive LIB offerings for circular operation. These results enabled HHL to begin aligning local stakeholders for the deployment of SAFELOOP outcomes in Germany and across the EU.*

Communication, dissemination and exploitation
Work package 8

*SAFELOOP is a proud member of the **Battery2030+** cluster and actively participated in its 4th Annual Meeting, where it showcased its significant progress and innovative solutions. As part of the **Battery2030+** communication network, SAFELOOP joins monthly coordination meetings alongside communication leaders from other cluster projects. These meetings promote the sharing of best practices, collaborative planning of joint outreach activities, and alignment on impactful communication tools (e.g. social media campaigns and strategies).*

SAFELOOP will capitalize on engagement videos as one of core communication media. Do you want to understand what SAFELOOP is all about? No better way that checking out this short video, starring all SAFELOOP partners (link). We are dwelling deeper in specific Work Package work through a series of interview videos with key partners. Check out the interview with the coordinator here (link). New interviews will be published each of the upcoming months.

WP8 used established communication channels and tools to successfully disseminate the project's first scientific results in the form of a paper. Although the project is still at an early stage, this publication from the University of Oulu paves the way for many more to come.



SAFELOOP's first publication

*Collaboration continues to be a central pillar of the SAFELOOP approach. Strong synergies have been established with our sister projects, **INERRANT** and **SAGELi**. These initiatives share our mission to develop next-generation battery technologies that integrate recycled materials, extend battery life cycles, and meet the highest safety standards.*
Together, we are advancing towards a more sustainable, innovative, and safer battery future.

The SAFELOOP Exploitation Steering Group has been working with representatives of the SAFELOOP consortium to develop and IP Strategy, with detailed specifications of technology access rights, aligning project partners toward the successful exploitation of project results.

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