



RESTORE

Automated soRting and safE pre-procesSing of EoL BaTteries with nOvel smart and fast dismantling, and sepaRation technologies for direct reuse of high purity materials in Energy storage application



New EU-funded RESTORE project launches innovative recycling technologies for EV batteries

Barcelona, 15 January 2025

Starting in January 2025, the RESTORE project, a new Research and Innovation Action (RIA), was launched to design, develop and deploy a novel integrated and scalable battery recycling process. Funded by [the European Climate, Infrastructure and Environment Executive Agency \(CINEA\)](#) under the Horizon Europe programme, this initiative aims to shorten the recycling cycle and maximise the recovery of high-purity materials.

[RESTORE project](#) – short for *Automated sorting and safe pre-processing of end-of-life (EoL) batteries with novel smart and fast dismantling, and separation technologies for direct reuse of high purity materials in energy storage applications*, was officially set in motion on 15 January 2024 in Barcelona, in the company of all project partners, renowned representatives of European research centres and the battery industry.

Safe processing of end-of-life batteries from electric vehicles (EVs) and domestic lithium-ion batteries (LIBs)

As a project funded under the topic [HORIZON-CL5-2024-D2-01-01 - Advanced sustainable and safe pre-processing technologies for EoL battery recycling](#), co-programmed by the [European Partnership on Batteries \(Batt4EU\)](#), RESTORE is set to tackle the most pressing issues faced by recycling companies. It aims to enhance the efficiency, safety, speed, environmental footprint, and cost of pre-processing operations, while targeting the recovery of all battery materials at high purity levels.

With the support of Life Cycle Assessment (LCA), Life Cycle Cost Assessment (LCCA) through Safe and Sustainable by Design (SSbD) assessment, the most promising technological routes for recycling battery materials will finally be validated on coin cells.

Currently, battery recycling processes in Europe vary significantly, with each company employing its own in-house developed methodology. RESTORE addresses this diversity by focusing on four key complementary recycling processes. Two technical routes– notably, **dry mechanical** and **thermal treatment**, already represent the majority of current industrial processes, while the other two – **electrohydraulic fragmentation**, and **unwinding & delamination**, introduce cutting-edge



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advancements in the field. This dual approach enables, on one hand, the optimisation of current processes without requesting companies to readjust their existing industrial installations. On the other hand, the project's concept aims to help benchmark these technological routes to elucidate the best processing routes, enabling stakeholders to adopt innovations in new emerging recycling lines.

The project's concept will not only shorten the recycling process, but it will equally unlock the recovery of highly valuable materials currently lost in conventional recycling processes, such as the electrolyte, organic binder, graphite and cathode active material (CAM). The project's concept is based on three building blocks, which will allow the reinjection of the recovered materials directly into the battery production chain:

- Improvement of upstream processes for the sorting of batteries and the liberation of non-battery materials from EV battery packs.
- Optimisation of pre-processing of battery materials to effectively separate active and non-active materials.
- Improvement of downstream process to separate efficiently all battery materials and refine them to battery-grade standards.

With 20 partners across Europe, from 7 countries, including established research organisations and renowned industries, RESTORE aims to ensure the domestic battery recycling industry can meet the targets outlined by the [Battery Directive](#) and the [Critical Raw Materials Act](#) (CRMA).

“Together with major battery recycling players from industry and academia, we’re creating flexible, eco-friendly processes to turn worn-out EV and domestic Lithium-ion batteries into high-quality materials, moreover, revolutionising battery recycling towards resilient, competitive and fit green-digital European economy”, the coordinators of the RESTORE project outlined.

Founded on an interdisciplinary approach and funded by the EU with 7 999 189,50 €, the project will run for the next four years, under the coordination of ACONDICIONAMIENTO TARRASENSE ASSOCIACION ([LEITAT](#)). The other partners are: [Northvolt Revolt AB](#) (REVOLT), [Accurec Recycling GmbH](#) (ACC), [Vianode AS](#) (VIANODE), [ABB AB](#) (ABB), [Solvay Specialty Polymers Italy](#) (SYENSQO), [Toratecnica SLU](#) (S2S), [Indumetal Recycling SA](#) (IND), [E-LYTE Innovations GmbH](#) (ELYTE), [Eco Recycling Societa A Responsabilita Limitata](#) (ECO), [Fraunhofer Gesellschaft zur Forderung der Angewandten Forschung EV](#) (FRAUNHOFER), [Helmholtz-Zentrum Dresden Rossendorf EV](#) (HZDR), [Vlaamse Instelling voor Technologisch Onderzoek N.V.](#) (VITO), [Chalmers Tekniska Hogskola AB](#) (CTH), [Universitetet i Agder](#) (UIA), [DLYTE Chemicals SL](#) (DLYTE), [PNO Innovations](#) (PNO), associated partners [REELEMENTS GmbH](#) (REEL), [Batronics AG](#) (BATT), [Kyburz Switzerland AG](#) (KYBURZ), the last two funded by the Swiss Confederation (State Secretariat for Education, Research, and Innovation, SERI) with a total amount of 1 114 157,50 €.

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RESTORE consortium members



Photo gallery Kick-off meeting in Barcelona, 15 – 16 January 2025



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