



Solid-statE lithium
metal bAttery
wiTh in situ
hyBrid ELecTrolyte

Horizon Europe

THE NEXT EU RESEARCH & INNOVATION
INVESTMENT PROGRAMME (2021 - 2027)

HORIZON-CL5-2021-D2-01
DG/Agency: CINEA



HORIZON EUROPE PROGRAMME – HORIZON-CL5-2021-D2-01-03
Advanced high-performance Generation 4a, 4b (solid-state) Li-ion batteries
supporting electro mobility and other.

SEATBELT project – Grant Agreement no. 101069726



DELIVERABLE 1.1

Eco-design kit

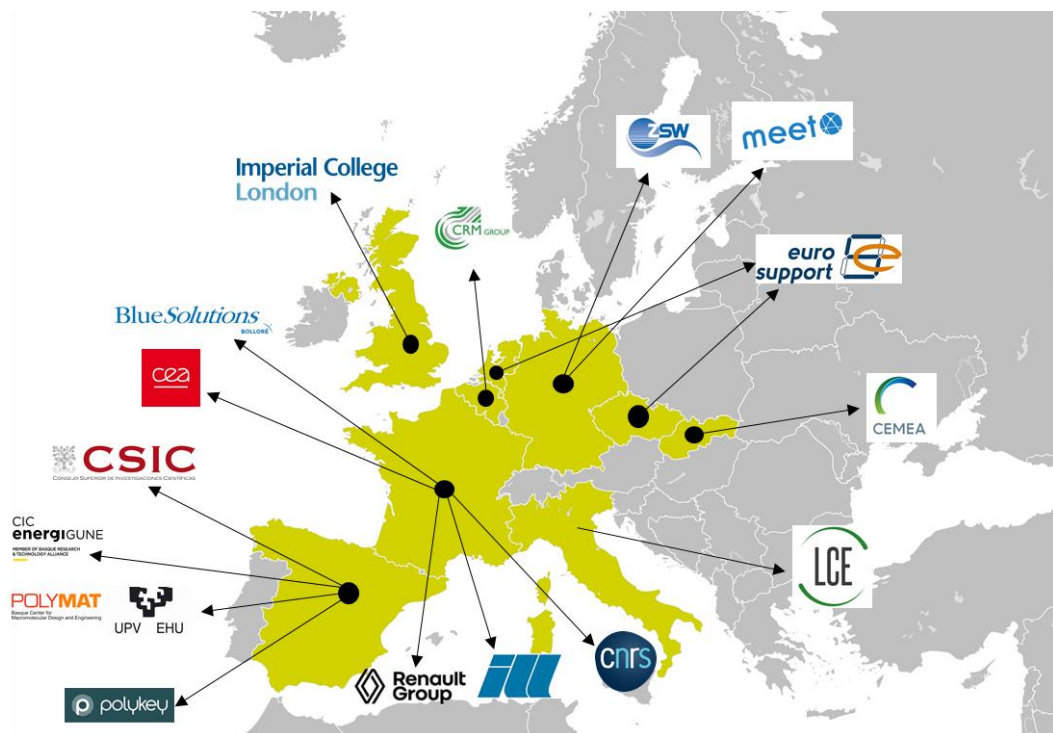


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SEATBELT consortium

No.	Participant	Acronym	Type	Country
1	Centre National de la Recherche Scientifique	CNRS	RTO	FR
2	Commissariat à l'Energie Atomique et aux Energies Alternatives	CEA	RTO	FR
3	Polykey Polymers	PK	SME	ES
4	Life Cycle Engineering	LCE	SME	IT
5	Centre De Recherches Metallurgiques	CRM	RTO	BE
6	Consejo Superior de Investigaciones Científicas	CSIC	RTO	ES
7	Blue Solutions	BS	IND	FR
8	Münster Electrochemical Energy Technology	MEET	UNI	DE
9	Universidad Del Pais Vasco	UPV	UNI	ES
10	Zentrum für Sonnenenergie- und Wasserstoff-Forschung Baden-Württemberg	ZSW	RTO	DE
11	CIC energiGUNE	CICe	RTO	ES
12	Institut Laue-Langevin Europe	ILL	RTO	EU
13	Renault	Renault	IND	FR
14	Euro Support Advanced Materials	ES	IND	NL
15	Imperial College of London	ICL	UNI	UK
16	Centrum Pre Využitie Pokročilych Materialov SAV	CEMEA	IND	SK



1. Overall project presentation

As of 2025, new generations of Li batteries based on silicon/carbon (Gen. 4a) and Li metal (Gen. 4b) anode, where flammable liquid electrolyte is replaced by a non-flammable solid-one, will take over the current Li-ion device. However, only all-solid-state Gen. 4b Li batteries are expected to fulfil the needed cell gravimetric energy density specifications demanded by electromobility and stationary applications. Therefore, SEATBELT ambition is to generate a local EU industry that revolves around a cost-effective, robust all-solid-state Li battery comprising sustainable materials by 2026. SEATBELT intends to achieve the first technological milestone of developing a battery cell (TRL5) meeting the needs of Electric Vehicle (EV) and stationary industry. The low-cost SEATBELT cell is safe-by-design with sustainable and recyclable materials, reaching high energy densities (>380 Wh/kg) and long cyclability (>500 cycles) by 2026 in line with the 2030 EU targets. The cells are produced by low-cost solvent-free extrusion process comprising a combination of innovative materials: thin Li metal, hybrid electrolyte, a safe cathode active material without critical materials and thin Al current collector. The cell design being optimized by interface (operando and atomistic modelling) and process (machine learning) methodologies. In addition, new in situ imaging instrumentation will be developed to investigate safety properties and mechanical deformation to assess cell safety in real conditions. An innovative recycling cycle from materials to cell level will be also established. Thus, SEATBELT will be the start point of a first EU all-solid-state battery value chain, whose main players in RTD and Industry sectors are within the consortium. So, cells and modules will cycle using industrially relevant protocols dedicated to EV and stationary applications. SEATBELT consortium is composed of 15 beneficiary partners and 7 affiliated entities, and 1 associated partner, from 8 European countries.

More information at:



Project website: <https://seatbelt-project.eu/>

CORDIS website: <https://cordis.europa.eu/project/id/101069726>

2. Public summary

The underlying idea of this deliverable is to guide the project consortium members to develop a battery cell comprising sustainable materials and to have a sustainability perspective directly embedded in the project spine. The goal of this deliverable D1.1 is to enable SEATBELT choices with an eco-design way of thinking to reach the objective sets by EU in term of battery value chains.

This analysis has been engraved in the eco-design framework as a mandatory step before starting the sustainability assessment (D1.2).

The main strategy of this document is related to:

- regulation analysis,
- eco-design definitions, and
- KPI construction.

The methodology behind the KPI construction is based on Environmental and Social screening assessment and second life/disposal pathways in order to have an overview of the possible route to reuse/recover/recycle for the possible raw materials along the supply chain.

Disclaimer



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Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or CINEA. Neither the European Union nor the granting authority can be held responsible for them. This project also contributes to the objectives of the Batt4EU Partnership under call topic ID: HORIZON-CL5-2021-D2-01-03 (Advanced high-performance Generation 4a, 4b (solid-state) Li-ion batteries supporting electro mobility and other applications).