



Fifth BEPA General Assembly *Matchmaking event*

Tuesday, 6 December 2022

BATT EU Topics in Horizon Europe 2023 Work Programme

HORIZON-CL5-2023-D2-01-01

Technologies for sustainable, costefficient and low carbon footprint downstream processing & production of battery-grade materials



Expected EU contribution per project: 7m€ (3 projects)



Type of Action: **Research and** Innovation Action

TRL: 5



In few words: R&I activities with focus on improved battery metal and material production, refining and recovery while minimizing environmental impact of downstream processing







HORIZON-CL5-2023-D2-01-02

New processes for upcoming recycling feeds



Expected EU contribution per project: **5m€ (3 projects)**



Type of Action: **Research and** Innovation Action

TRL: **4**



Battery 2030+

In few words: Focus will be on improved and verified circularity of collected, dismantled and pre-treated battery waste feeds, aiming at the maximal recovery of input elements and components, rather than selected fractions.

Proposals are encouraged to establish links with those submitted under topic HORIZON-CL5- 2024-D2-01-01, "Advanced sustainable and safe pre-processing technologies for End-of-life (EOL) battery recycling". EUROPEAN





HORIZON-CL5-2023-D2-01-03

Advanced digital twins for battery cell production lines



Expected EU contribution per project: 7m€ (2 projects)



Type of Action: **Research and** Innovation Action

TRL: **4-5**



In few words: Developing digital twins of battery cell manufacturing routes at pilot line level that incorporate appropriate models but also their connection to real manufacturing plants

Battery 2030+





BATT EUX Topics in Horizon Europe 2023 Work Programme

HORIZON-CL5-2023-D2-01-04

Battery management system (BMS) and battery system design for stationary energy storage systems (ESS) to improve interoperability and facilitate the integration of second life batteries BEDA



Expected EU contribution per project: 7.5 m€ (2 projects)



Type of Action: Innovation Action

TRL: **6-7**



In few words: This topic aims at developing an open and interoperable BMS and suitable battery system design for stationary ESS, enabling a better integration of 2nd life applications for used batteries.

Projects are expected to share information with projects emanating from topic HORIZON-CL5-2023-D2-02-03





HORIZON-CL5-2023-D2-01-05

Hybrid electric energy storage solutions for grid support and charging infrastructure



Expected EU contribution per project: 6 m€ (2 projects)



Type of Action: Innovation Action

TRL: **7**



In few words: Demonstration of hybrid energy storage technologies for long duration storage (from hours to days) and provision of multiple grid services with improved technical performances.

Proposals are expected to establish links with projects funded under the following topic: HORIZON-CL5-2022-D3-01-10





BATT EUX Topics in Horizon Europe 2023 Work Programme

HORIZON-CL5-2023-D2-02-01

Advanced materials and cells development enabling large-scale production of Gen4 solid-state batteries for mobility applications



Expected EU contribution per project: 8 m€ (3 projects)



Type of Action: Innovation Action

TRL: 6



In few words: To demonstrate, at cell level, the scale-up of solid-state advanced materials for anodes, cathodes, electrolytes and separator with performances and costs compatible for mobility markets.







HORIZON-CL5-2023-D2-02-02

New Approaches to Develop Enhanced Safety Materials for Gen 3 Li-Ion Batteries for Mobility Applications



Expected EU contribution per project: 5 m€ (2 projects)



Type of Action: **Research and** Innovation Action

TRL: **5**

In few words: Developing safer materials for high-performing Li-ion cells by targeted modification in main cell components, namely the cathode, anode, separator and electrolyte.





BATT EUX Topics in Horizon Europe 2023 Work Programme

HORIZON-CL5-2023-D2-02-03

Creating a digital passport to track battery materials, optimize battery performance and life, validate recycling, and promote a new business model based on data sharing



Expected EU contribution per project: 8m€ (1 project)



Type of Action: Innovation Action

TRL: 7



In few words: A downstream development and implementation of a battery pack Digital Product Passport (DPP) at minimum subset design system level addressing raw materials (at least anode and cathode critical raw materials), cells and modules.







Topics in Horizon Europe 2023 Work Programme (joint topic with 22ERO partnership)

HORIZON-CL5-2023-D5-01-02

Innovative battery management systems for next generation vehicles



Expected EU contribution per project: 5m€ (2 project)



Type of Action: Innovation Action

TRL: **6**



In few words: Improved and optimized monitoring and predictive diagnostics for a more accurate reliable and efficient battery management maintenance (data-driven diagnostics, over-the-cloud software updates and firmware replacements, self-testing and on-board diagnostics) that are accessible to other third parties.









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automotive aeronautic aeronautic intervention energy environment intervention interventintervention intervention interv

Our mission is

To increase competitiveness and industrial development of companies operating mainly in the transport and energy sectors

Strengthening their industrial fabric by increasing their technological capabilities, allowing the development of new products and processes



400 Industrial clients

72 Millions Euros R&D facilities and equipments

15 New Technology Based Firms

23.304 m² Total surface



What we do?



HORIZON-CL5-2023-D2-02-02: New Approaches to Develop Enhanced Safety Materials for Gen 3 Li-Ion Batteries for Mobility Applications

Project idea

The safety of LIBs is one of the main obstacles restricting the development of EVs. Improved safety and implemented preventive safety measures are of great significance to the popularization of EVs. This project aims to develop high performance, and safer, next generation batteries by informed **modification of differing cell components**, namely **advanced cathode and coatings** thereof, **novel anode architecture**, **advanced electrolytes**, **binders** and **separators**. Combining **simulations** with **experimental data** it will be possible to **understand the phenomenon compromising the cell safety** and dive into various battery design scenarios pointing out important aspects that needs to be consider to improve the final cell and fed the results onto the development of the new battery components.



Role of CIDAUT in this project

Our main objective in the project will be: combination of experimental and simulation approach to predict internal short-circuit and propagation of failures due to short-circuit when mechanical abuse conditions are applied to the battery cells. This will allow the development of multi-physical simulation models for quasi-static load analysis as a tool to be able to predict the behaviour of cells under different real abuse scenarios which can compromise their safety. This models will also allow **understanding the severity of failures**, which potentially can be used to reduce the risk of sequential failure in the battery pack.





Power Sources, 378, (2018), 153-168

Contact person: Dr Noelia Cabello Moreno Project Manager - Electric Mobility and Hydrogen Technologies Email: <u>noecab@cidaut.es</u> Phone: +34 983 54 80 35 (Ext.: 5165) M.: +34 610 002 196





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CIRCE Research Centre for Energy Resources and Consumption

Zaragoza 2022





CL5-D2-01-04

Battery management system (BMS) and battery system design for stationary energy storage systems (ESS) to improve interoperability and facilitate the integration of second life batteries (Batt4EU Partnership)

- Development of safe communication protocols for battery data collection and management (SoC, SoH, SoP)
- Creation of a technology agnostic BMS to improve performance and life span
 - Interconnection of BMS with other systems and initiatives on batteries digital passport
 - Evaluation of optimal repurposing stationary application of 2nd life batteries
- Recommendations on legal framework for battery design and management

Main innovations



Actions and requests for collaboration

- Current stage: consortium creation and ideas definition
- Looking mainly for potential **demo sites** to test innovations. Examples:
 - Stationary Energy Systems (ESS). Ideally with already existing ESS with 2nd life batteries
 - Hybrid BESS
 - Large EV charging stations
 - Agro-PV
- Innovations / concepts regarding BMS
- Contact us: Isabel Alonso at ialonso@fcirce.es
- Deadline: 16th December







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Pitch battery pasport project: we can deliver a good realistic test bench for a reality check



Contacts: Catherine Lenaerts Directeur vzw FEBELAUTO asbl

Woluwedal 46 b.13 Blvd de la Woluwe BE-1200 Bruxelles Tel +32 2 781 08 49 Gsm +32 495 771 206 <u>E-mail catherine.lenaerts@febelauto.be</u> www.febelauto.be





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ECO- & SUSTAINABLE-BY-DESIGN OF THE BATTERIES OF THE FUTURE The key for a circular, European & sustainable supply chain of batteries



COMPANY OVERVIEW



ECO- AND RECYCLABLE BY DESIGN FOR A CIRCULAR BATTERY VALUE CHAIN IN TRANSPORT & STATIONARY APPLICATIONS. *From Raw Materials up to recycling and second life batteries.*





SUSPAINABLE Solutions Battery

SUS AINABLE solutions

> BATTERY ECO- & RECYCLABLE-BY-DESIGN FOR A CIRCULAR BATTERY VALUE CHAIN. *A common idea for to 2 Horizon Europe Cluster 5 opportunities.*



SUSPAINABLE Solutions BATTERY ECO- & RECYCLABLE-BY-DESIGN FOR A CIRCULAR BATTERY VALUE CHAIN. *A common idea for to 2 Horizon Europe Cluster 5 opportunities.*



Technologies for sustainable, cost-efficient and low carbon footprint downstream processing & production of battery-grade materials RIA | 7M € | 3 projects to be funded | 18.04.2023 HORIZON-CL5-2023-D2-01-01

TOPIC OBJECTIVES & KEY POINTS:

- Developing sustainable and cost-efficient processing methods for batterygrade materials and components coming from either primary or secondary streams and novel technologies for battery metals processing enabling the reduction of carbon footprint and other emissions.
- Developing and demonstrating technologies to improve battery grade metals and materials production, refining and/or recycling.
- Addressing zero waste and zero discharge strategies for the valorisation of the generated waste materials during the refining processes by: improving the reuse of waste where CRM are present; Increasing the sustainability of batteries materials by reducing the use of chemicals and energy use in the downstream processing considering the objectives of the proposed battery regulation as evaluated by LCA or similar approaches; using safe and low impact disposal methodologies for those materials that cannot be recycled.
- Pre-assessing recycling concepts by their life cycle sustainability and safety impacts (in line with Safe and Sustainable by Design Framework [...]) and studying overall techno-economical solutions for recovery systems.

CALL FOR KNOWLEDGE AND CAPACITIES:

- R&D institutes working improved battery metal and material production, refining and recovery.
- Battery manufacturers and battery pack components manufacturers.

Creating a digital passport to track battery materials, optimize battery performance and life, validate recycling, and promote a new business model based on data sharing (Batt4EU Partnership) IA | 8M € | 1 project to be funded | 05.09.2023 HORIZON-CL5-2023-D2-02-03

TOPIC OBJECTIVES & KEY POINTS:

- Be applicable to 3 or more use cases among the main transport or mobile applications.
- Address: 4R methodological approach; use of recycled and reusable material to reduce energy usage/CO₂ footprint; Streamlined compliance with the European Battery Regulation.
- Promote the adoption of a downstream development and implementation of a battery pack Digital Product Passport (DPP) at minimum subset design system level.
- Consider the key performance indicators proposed by Batteries Europe or by the dedicated Partnerships, reflected in the Partnership Strategic Research Agenda (SRA).
- Develop a safety second life-battery certification protocol
- Aim for cross-sectorial applications
- Validate new business models, capable to demonstrate improvement in remanufacturing, repurposing and recycling.

CALL FOR KNOWLEDGE AND CAPACITIES:

- · Capacities to coordinate such proposal.
- R&D institutes, universities specialized in battery research.
- Battery manufacturers as end-users.







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Berner Fachhochschule Haute école spécialisée bernoise Bern University of Applied Sciences

BFH project idea on EU calls



Expertise:

- LIBs degradation investigation by electrochemical characterization
- Advanced LIBs models from ECM to PBM to AI
- SoA testing infrastructure
- Coordinators of Swiss Ecosystem on Battery technologies and applications

HORIZON-CL5-2023-D5-01-02: Innovative battery management systems for next generation vehicles (2ZERO & Batt4EU Partnership) HORIZON-CL5-2023-D2-02-03: Creating a digital passport to track battery materials, optimize battery performance and life, validate recycling, and promote a new business model based on data sharing

Dr. Priscilla Caliandro, Prof. Dr. Andrea Vezzini

2022-12-06 BEPA Matchmaking event, Sofitel Brussels Europe Hotel



The BFH Statistical Data Frame (SDF)



Berner Fachhochschule | Haute école spécialisée bernoise | Bern University of Applied Sciences Dr. Priscilla Caliandro – priscilla.caliandro@bfh.ch





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Area of Activity

• Largest Low Voltage Electric Company in Turkish Shipbuilding Industry

Foundation Year

• 1980

Success Record

 Delivered over 500 electrical and automation projects

Company Certificates

- Integrated Quality System
- NATO Facility Security Clearance













Gemi inşa sanayimizde GÜÇLÜ birliktelik!



elkon Funded R&D Projects



Project acronym / Starting date	Main objectives	Main activities
HESDAD / 2018 TEYDEB	DC/DC Converter for Battery hybrid ships	 Prototype Product Development Control of Power Electronics equipment
İDA-OTOSEVK / 2019 SAYEM	Industrial Innovation Network for Autonomous Ships in Turkey	 Roadmap and R&D projects development for achieving Autonomous Ships in Turkey
ADAK / 2019 TEYDEB SA-DE	Solid State Active DC breaker	Prototype Product Development Control of Power Electronics equipment
550 KVA GRID CONVERTER for MARINE HOTEL LOADS / 2019 TEYDEB 1505	Grid Converter design for DC grid vessels.	 Prototype Product Development Control of Power Electronics equipment
REGBES / 2020 TEYDEB 1501	Robotic Electric Ship Battery Feeding System	Prototype Robotic Charger Product development
ADRIATIC MARTERA ERANET / 2020 Call funded	CooperAtion unDerwater foR efficient operATions vehiCles (AUVs, ROVs)	 Energy management Algorithm development for AUVs and ROVs
SEA-SAR TEYDEB 1707	Ship Hull Cleaning ROV	 Propulsion and Energy Efficiency gain calculation before and after Hull Cleaning

HORIZON-CL5-2022-D5-01-01: Exploiting electrical energy storage systems and better optimising large battery electric power within fully battery electric and hybrid ships (ZEWT Partnership)- IA

- **NEMOSHIP**: New electrical architecture and digital platform for optimising large battery systems on ships.
- FLEXSHIP: Flexible and modular large battery systems for safe on-board integration and operation of electric power,

demonstrated in multiple type of ships.

	European Commission Single Electronic Data Interchange Area (SEDIA)					Welcome	Welcome Erdeniz EROL (nererden)		
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	My Proposal(s)		ACRONYM *	TOPIC ID +	PROGRAMME \$	PROJECT \$	PHASE ¢	P •	
	My Project(s)		FLEXSHIP	HORIZON-CL5-2022-D5-01-01	HORIZON	101095863		1	
F	My Formal Notification(s)	NEMOSHIP	HORIZON-CL5-2022-D5-01-01	HORIZON	101096324		1	

ELKON ELECTRIC R&D Strategy Matrix 2.0 (2022-2027)



2023 Horizon Europe Batt4EU Calls

No.	CALL ID	OBJECTIVES	SCOPE of elkon
1.	HORIZON-CL5-2023-D2-01-04	BMS and battery system design for stationary energy storage systems (ESS) to improve interoperability and facilitate the integration of second life batteries.	 Prototype and product devolopment System integration
2.	HORIZON-CL5-2023-D2-01-05	Hybrid electric energy storage solutions for grid support and charging infrastructure.	 Product devolopment System integration Control of power electronics equipment
3.	HORIZON-CL5-2023-D2-02-02	New approaches to develop Enhanced Safety Materials for Gen 3 Li-Ion Batteries for mobility applications.	 Creating a roadmap for Waterborne Transportation Prototype devolopment
4.	HORIZON-CL5-2023-D2-02-03	Creating a digital passport to track battery materials, optimize battery performance and life, validate recycling, and promote a new business model based on data sharing.	 Product devolopment System integration Create a new business model
5.	HORIZON-CL5-2023-D5-01-02	Innovative battery management systems for next generation vehicles (2ZERO & Batt4EU Partnership).	 Prototype and product devolopment System integration Control of power electronics equipment







Questions & Comments ?

Erdeniz Erol, Liaison Officer Partnership for an Industrial Battery Value Chain

R&D Manager, Elkon (https://elkon-tr.com)

Erdeniz Erol, R&D Manager at Elkon (Turkey), holds a Bachelor Degree Electrical and Electronics Engineering from the Middle East Technical University. In addition, Mr. Erol holds a Master Degree in Computational Science and Engineering (Piri Reis University) and is currently a Ph. D. candidate in Maritime Transportation Engineering at the Istanbul Technical University. He has got experiences in defence & avionics and energy sectors before he started in the maritime sector 8 years ago. For the last 7 years he is leading Elkon Marine Electric Technologies R&D Center aiming to find solutions for new challenges in ship electrification and decarbonisation projects.





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2023 Horizon Europe BATT4EU Calls

Sabanci University Dr. Alp Yurum

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SABANCI UNIVERSITY

Research at Sabancı University is an interdisciplinary effort extending across all branches of science, technology and arts, taking place in various centers and institutions such as

- The Faculty of Engineering and Natural Sciences,
- The Faculty of Arts and Social Sciences,
- The School of Management,
- Sabancı University Nanotechnology Research and Application Center.

OUR RESEARCH INTEREST

Produce special electrodes or coatings that minimize the metal used in the cell.

- This leads to a lightweight cell with a higher energy density and lower cost.
- These structures are also resistant to expansion occurring during the lithiation.
- Due to not needing metallic current collectors, the recycling of these cells is much easier and less energyconsuming.
- Also, the process can also be used for better solid electrolyte/electrode interface interaction.



TARGET CALL TOPIC

HORIZON-CL5-2023-D2-02-01: Advanced materials and cells development enabling large-scale production of Gen4 solid-state batteries for mobility applications

- Interfaces and coating for better performance
- Materials and cells design with mechanical properties and constraints that enable large scale production processes at a competitive cost
- Higher energy density electrodes
- Current collectors that can accommodate volume changes

THANK YOU...

<u>alp.yurum@sabanciuniv.edu</u> 0090 216 483 95 97





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INSTITUTE OF SOLID STATE PHYSICS UNIVERSITY OF LATVIA

Dr. Gints Kucinskis Head of Laboratory of Materials for Energy Harvesting and Storage



Team of 20+ scientists:

- Electrodes for
 Li-ion and Na-ion batteries
- Ageing of electrode materials and commercial cells



44

• 300+ employees

 Leading materials-research centre in Baltics



EU-funded projects





Sustainably produced Li-ion battery cells 2022-2026

Aqueous Na-ion cell integrated with thermoelectric generator 2021-2025

CO₂-based synthesis of ethylene oxide 2017-2021

Selected project partners









Key Research Areas



Materials for Na-ion batteries

Cathodes (Na_{0.67}MO₂, Na₂MP₂O₇) Binders (water- and solvent-based) Ionic-liquid-based electrolytes



Materials for Li-ion batteries

Electrodes (LiFePO₄, graphene-based anodes) Electron-conducting additives (graphene, carbon)



G. Kucinskis et al., J. Power Sources, 2013, 240, 66

Ageing of Li-ion battery cells

Ageing of battery cells as a function of intrinsic and extrinsic paramters

Prediction of ageing from voltage behaviour



M Bozorgchenani et al., J. Electroche 030509

INSTITUTE OF SOLID STATE PHYSICS Collaboration proposal in UNIVERSITY OF LATVIA HORIZON-CL5-2023-D2-02-02 46



New Approaches to Develop Enhanced Safety Materials for Gen 3 Li-Ion Batteries for Mobility Applications

gints.kucinskis@cfi.lu.lv





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HORIZON-CL5-2023-D2-01-02

Topic "New processes for upcoming recycling feeds"

DW Fritz designs innovative, custom precision automation systems to meet customers' most complex advanced manufacturing challenges. It offers expertise in complex manufacturing processes for the battery field.

DWF has experience as supplier of assembly lines for cells, modules and packs for leaders in EV & energy storage.



Contact : veronique.rottier@id4car.org



HORIZON-CL5-2023-D2-01-04 & D2-01-05

Topic "Hybrid electric energy storage solutions for grid support and charging infrastructure"

<u>VEDECOM</u> is interested in **demonstrating in different use cases a hybrid energy storage system (HESS)** for supporting the electric grid and EV charging infrastructure. VEDECOM has the experience and resources to lead a Work Package (or more) from design to implementation, of prototype and demonstration.

Topic "Battery management system (BMS)"

<u>VEDECOM</u> is interested to participate in **developing an open and interoperable BMS** and a suitable battery system design for stationary ESS. VEDECOM can contribute to a Work Package by :

- defining a normative battery functional range,
- defining a CAN bus message to be used in HESS,
- controlling algorithms for the BMS itself, notably for on-board control of power converters.

Contact : vincent.le-meau@nextmove.fr



HORIZON-CL5-2023-D2-02-01 & D2-02-02

Topics "Advanced materials and cells development of Gen4" and "Safety Materials for Gen 3 Li-Ion Batteries"

<u>ARMOR Battery Films</u> designs, manufactures and markets Al & Cu foils primed with a coating that prevents corrosion and improves adhesion, while reducing internal electrical resistance, offering lithium-ion battery a customised product designed for large-scale manufacturing, perfectly suited to each electrochemistry and manufacturing process.

En' Safe[®] is an Aluminum or Copper foil coated with an ultra-thin (less than 1µm) conductive and protective primer, designed to improve the interface between the Anode/Cathode and the foil.

ABF is interested in next generation **batteries-oriented project with development at cell level**. Key competences: formulation, coating, pilot & production line, prototyping (button and pouch cells) and characterization



Contact : <u>veronique.rottier@id4car.org</u>



HORIZON-CL5-2023-D5-01-01 & D5-01-02

Topics "User-centric design & operation" (2Zero) or "Innovative BMS for next generation vehicles" (joint topic)

<u>VEDECOM</u> (French Institute for Energy Transition dedicated to mobility) proposes to contribute to this topic, eventually as work package leader, by working on :

- Its in-house cabin numerical platform to investigate & design innovative user-centric innovative solutions
- AI-based predictive control strategies, and validation
- **Connect the platform** to the powertrain and the battery pack
- Update the platform for thermal management at the vehicle level
- Other aspects : user studies, acceptability, ergonomics.

Contact : vincent.le-meau@nextmove.fr







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