

LIFE GRAPHIREC

Empowering Europe's Battery Recycling

Project 101147368 – LIFE23-ENV-IT-LIFE GRAPhiREC
Waste GRAPhite RECycling for new lithium and alkaline batteries

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Co-funded by the European Union

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Turning Tomorrow’s Battery Waste into Tomorrow's Resources

In a world increasingly reliant on renewables and e-mobility, the demand for batteries particularly for electric vehicles, grid storage and domestic use has surged. While Europe aims to meet these demands sustainably, the continent faces significant challenges due to insufficient local supplies of graphite, a key component in battery production. The LIFE GRAPhiREC project aims to address this challenge by pioneering advanced technology for recycling graphite from battery waste, thereby fostering a more sustainable and circular economy.





8

PROJECT PARTNERS

working together to achieve sustainable battery recycling in Europe.

20%

REDUCING

CO2 emissions by 20% by project completion.



WHY FOCUS ON GRAPHITE?

Graphite is essential for the anode material in most batteries and in lithium-ion batteries in particular, which power everything from smartphones to electric vehicles. Currently, the European Union (EU) heavily depends on graphite imports. This reliance poses a risk to the EU's industrial competitiveness and its goals for climate neutrality. The continent lacks sufficient quantities of graphite to meet its own needs.

1,800

TONNES

of recycled graphite targeted 5 years after the project ends.

PIONEERING GRAPHITE RECYCLING ON AN INDUSTRIAL SCALE

LIFE GRAPhiREC's overarching goal is to implement the EU's first industrial-scale pilot project for the recycling of graphite from two types of batteries (alkaline and lithium). This initiative will not only reduce dependence on imported graphite but also enhance the EU's autonomy by lowering the need to source new raw materials.

90%

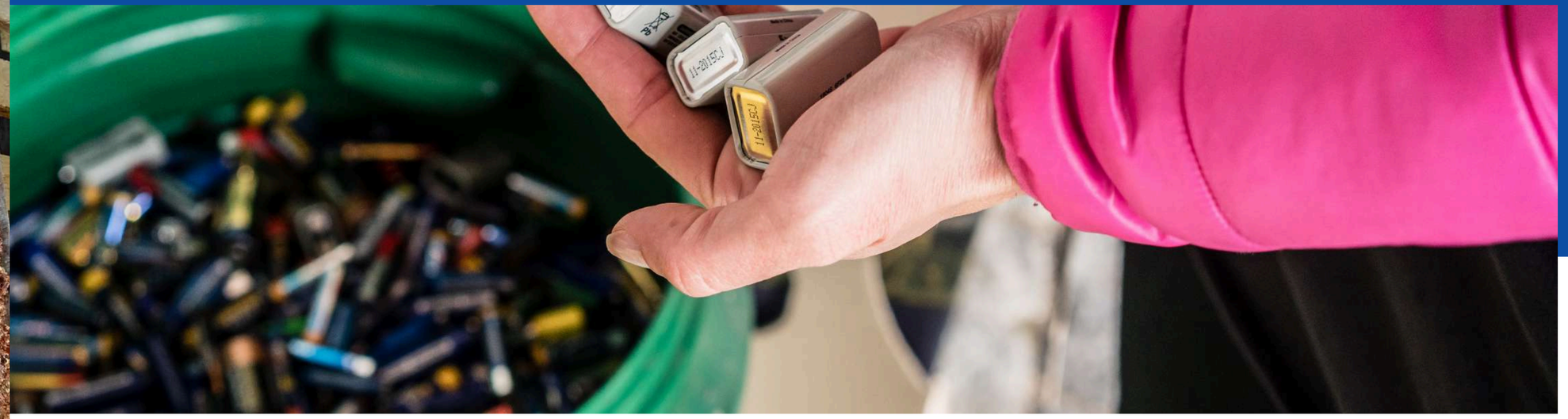
RECOVERY RATE

of graphite from lithium-ion and alkaline batteries.



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Methodology and Technical Approach

The project will establish two pilot plants for the hydrometallurgical recovery of graphite:

1. PLANT FOR LI-ION BATTERY MANUFACTURING SCRAPS

This plant will recover graphite from the manufacturing scraps of Li-ion batteries, aiming for a recovery rate of 90% and achieving high purity levels suitable for battery production.

2. PLANT FOR EXHAUSTED BLACK MASS FROM ALKALINE BATTERY

Another plant will focus on exhausted black mass from alkaline batteries, similarly aiming for high recovery rates and purity.

Both plants will utilise advanced separation and purification technologies, ensuring that the recycled graphite meets industry requirements for reuse in battery production.



ENVIRONMENTAL IMPACT & COMMUNITY ENGAGEMENT

The recycling processes developed by LIFE GRAPhiREC will significantly reduce the environmental footprint associated with graphite anode material. By the project's completion:

CO2 Emission

- CO2 emissions are expected to be substantially lower compared to current levels due to less energy-intensive production processes.

Waste Reduction

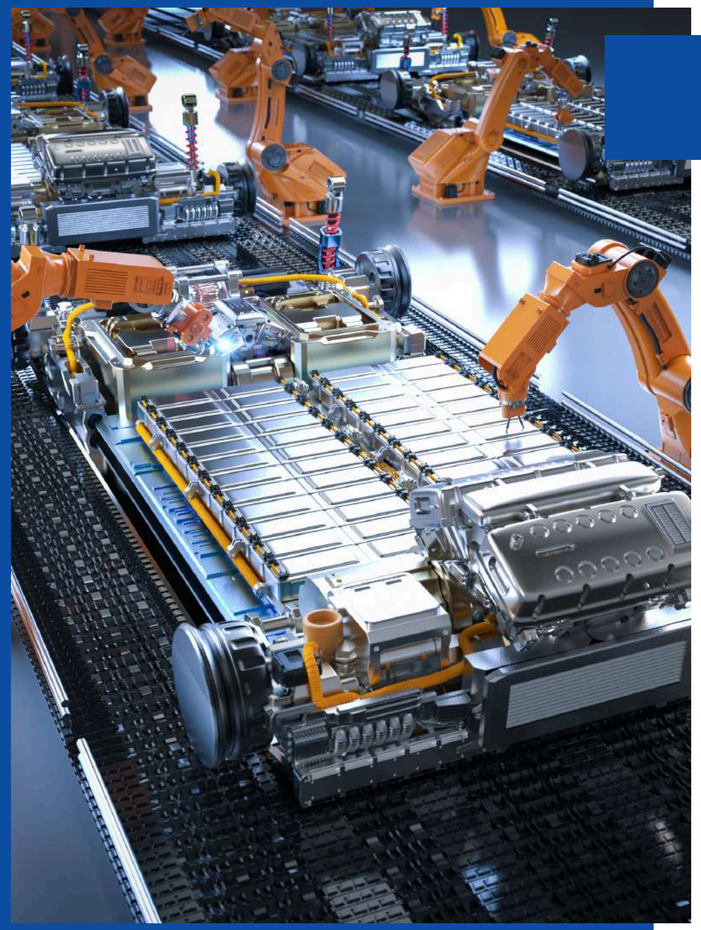
- Waste production will be substantially reduced, with a significant decrease in the use of natural resources.

Contribution to EU Economies

- The project will also contribute to local and EU economies by creating new jobs and fostering innovation in recycling technologies.

SUSTAINABLE DEVELOPMENT GOALS





SHAPING THE FUTURE OF CIRCULAR ECONOMY IN EUROPE

The GRAPhiREC project is not just about recycling graphite; it's about redefining the future of resource sustainability and industrial competitiveness in Europe. By implementing innovative technologies, the project delivers far-reaching socio-economic benefits:

- **Economic Growth:** Generating an estimated €23.4 million in gross revenues for project partners by the end of the project and saving €25 million in graphite supply costs for European battery manufacturers.
- **Job Creation:** Creating over 34 full-time positions across pilot plants and related sectors by 2032.
- **Technological Leadership:** Setting a benchmark for industrial-scale recycling plants with cutting-edge processes for graphite recovery.

A STRATEGIC CONTRIBUTION TO THE GREEN TRANSITION

GRAPhiREC aligns closely with the EU Green Deal and Circular Economy Action Plan. By reducing Europe's dependency on imported raw materials and enhancing local production capacities, the project strengthens Europe's resilience to global supply chain disruptions.

- **Environmental Gains:** Reducing CO2 emissions by 20% and cutting waste by over 30% by the project's completion.
- **Resource Efficiency:** Saving over 15,000 m³ of water annually by introducing sustainable water-reuse processes.

GRAPhiREC demonstrates the power of collaboration across industries, academia, and policymakers. By investing in innovation and adopting circular economy practices, Europe can lead the global transition towards sustainable resource use.



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CLOSING THE LOOP ON GRAPHITE USE

LIFE GRAPhiREC represents a key step towards sustainable development in the EU's battery industry. By closing the loop on graphite use, the project not only addresses critical raw material supply issues but also sets a benchmark for environmental stewardship and economic resilience in the face of global supply uncertainties. The successful implementation of this project could serve as a model for other regions and industries, highlighting the benefits of circular economy practices in high-tech sectors.



EMPOWERING EUROPE’S BATTERY RECYCLING INDUSTRY

Empowering Europe’s battery recycling industry with 8 partners, a 90% recovery rate, 630 tonnes of recycled graphite, and reducing CO2 emissions by 20% by project completion.

PROJECT MEMBERS

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ORIM Spa

ORIM is the project coordinator, leading the project management and work package for the construction of a new pilot plant. ORIM specialises in the recovery of raw materials from industrial waste and holds unique technology in Europe for recovering metals from used catalysts. They play an essential role in producing recycled graphite and commercialising the technology.

SIMA S.r.l.

SIMA is responsible for constructing a new pilot plant to recover graphite from industrial scraps. SIMA specialises in designing automated plants for material recovery from various wastes and will be working to supply recycled graphite to VARTA Consumer Batteries.

Università dell'Aquila

Università dell'Aquila is the lead partner of the work package on input materials characterisation and work package on project impact monitoring. The university's extensive research capabilities, especially through its Department of Industrial and Information Engineering and Economics, support the technical aspects of the project.

University of Camerino

The University of Camerino is the lead partner of the work package focusing on the physical and chemical characteristics of recycled graphite. UNICAM's strong interdisciplinary research environment supports the project's technical needs, particularly in materials science.

PROJECT MEMBERS

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TALGA AB

TALGA oversees graphite post-processing, providing expertise in green graphite production and anode products. TALGA's vertical integration ensures high performance and low environmental impact of its anode products.

VARTA Microbattery GmbH

Varta Microbattery is the lead partner of a work package dedicated to battery prototype production. VMB leverages its extensive research and production capabilities to advance lithium-ion and microbattery technology.

VARTA Consumer Batteries GmbH & Co. KGAA

VARTA Consumer Batteries is a partner in the work package focused on producing alkaline battery prototypes. VCB combines advanced R&D facilities with high-speed production capabilities to innovate in battery technology.

European Advanced Carbon and Graphite Materials Association

ECGA leads Communication and Dissemination activities and Project Exploitation Replication & Transfer. As the voice of the EU carbon and graphite industry, ECGA plays a strategic role in promoting the project's results across Europe and engaging EU policymakers.

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Join Us in Making a Difference!

We invite industry stakeholders, policymakers, and local communities to partner with us.
Together, we can forge a path towards a sustainable battery industry in Europe.

Contact Information

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For general inquiries, project information, and collaboration opportunities, please contact:

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