

Why Icarus?

- Resource usage in the construction sector accounts for 50%¹ of the EU's total material extraction.
- The estimated level of circularity for the construction sector in the EU is of only 12.4% material use rate², which means that over 87% of material is wasted.
- The European Commission considers the construction sector a priority for its circular economy action plan due to its actual lack of wholeness and high pressure on resources.

ICARUS project aims to serve as a pivotal initiative for advancing the circular economy within Europe. By recovering and transforming waste into valuable resources, this project not only addresses the pressing environmental challenges of resource depletion and waste management but also fosters economic resilience and innovation. The pursuit of the integration of recovered construction materials into the market exemplifies a pragmatic approach to closing the loop, ensuring that secondary materials are reused, repurposed, and reintegrated into the economy, thereby enhancing resource efficiency and fostering sustainable development across the EU.

¹ single-market-economy.ec.europa.eu

² Eurostat (2020), Material flows and resource productivity: Circular Material Use Rate.

Benefits

Economic impacts:

- Increasing the level of circularity within the construction and process industries.
- Creating new business opportunities, jobs, and revenue flows for recycling companies, particularly benefiting SMEs.
- Establishing Europe as the first digitally-led circular, climate-neutral, and sustainable economy.

Research and technological impact:

- Provision of the technical and economic feasibility study of the use of secondary resources in the process industries leading to products equivalent to those produced using primary resources.

Environmental impact:

- The increase in the use of secondary resources in the process industries will lead to a significant increase in resource efficiency across the value chain and a subsequent reduction of CO₂ emissions.
- The reduction of waste sent to landfill will have an overall positive environmental impact by reducing CO₂ emissions and water consumption.

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Coordinated by  **acciona**


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Calcinor
QUÍMICA NATURAL
Cales de Llerca

[TECHNOLOGY CENTRE] **CARTIF**


CSIC **ICV**
Consejo Superior de Investigaciones Científicas
Instituto de Cerámica y Vidrio (ICV)


ISO


i-FORIA

KERABEN GRUPO
  


K-UTEC
SALT TECHNOLOGIES


LITHIUM
IBERIA


PNO
BY PNO GROUP

REVOLVE


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GROUP


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Upcycling Secondary Resources

ICARUS is advancing circular economy principles through groundbreaking research and innovative technologies. The project aims to provide technological support to energy-intensive and construction industries for the transition to more circular, sustainable and digital processes in a business model for successful market implementation.

Demo 1

What?

Upcycling of waste from the Lithium extraction & refinery

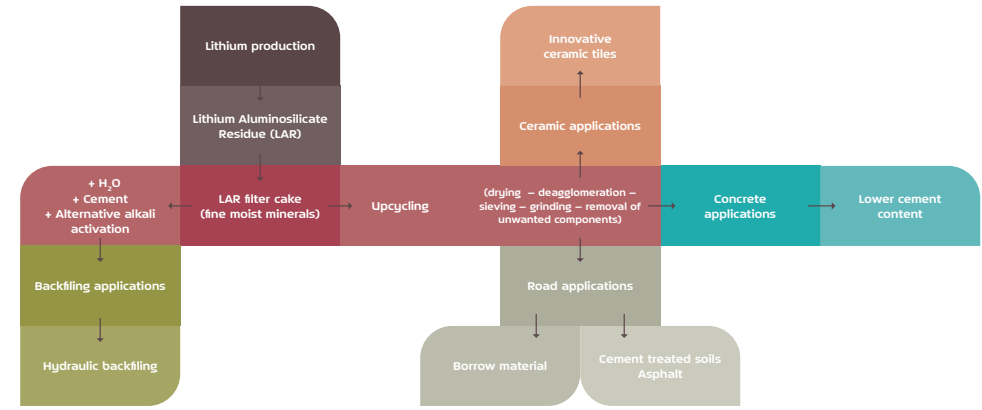
Where?

Cáceres, Castellón and Madrid (Spain) & Germany.

Who?

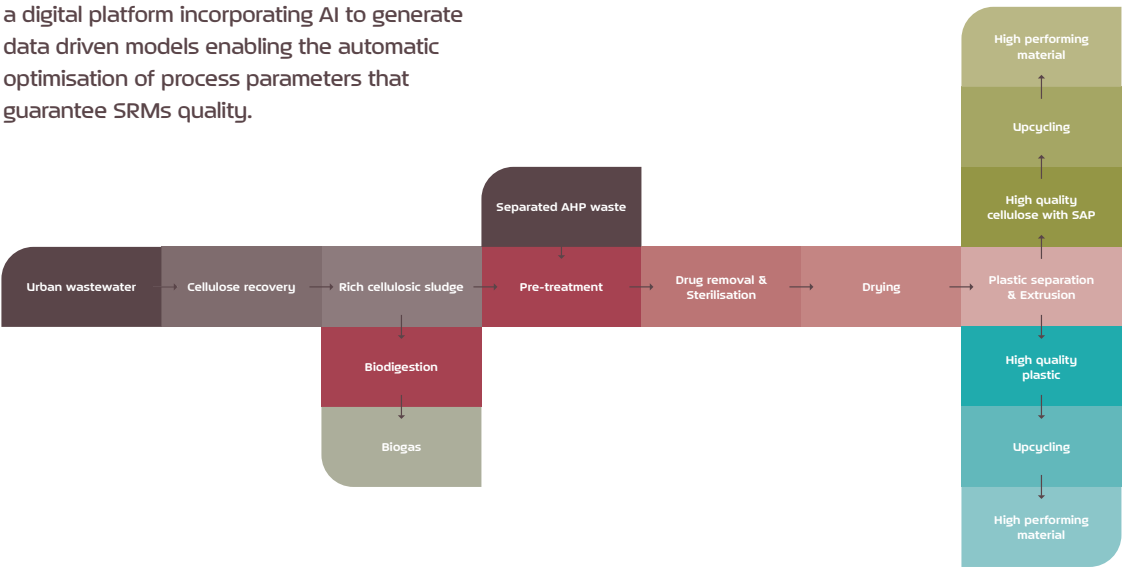
Lithium Iberia, K-UTEC, Université de Lorraine, ACCIONA CONSTRUCCIÓN, KERABEN, ICV, CARTIF.

The primary objective of DEMO 1 is to investigate the upcycling of LAR for several construction and ceramics applications (concrete, road layers, paste backfill and ceramics). It will improve upcycling technologies and processes for waste valorisation and define new formulations to meet the requirements for the final applications.



Demo 2

DEMO 2 will prototype and validate an efficient system for cellulose recovery from WWTP. Both the urban wastewater cellulose and Personal Absorbent Hygiene Products (AHP) coming from urban separate collection will be recycled by a pilot demonstration. An upcycling process of both secondary raw materials (SRMs) obtained will also be designed to formulate materials for the construction sector. Eco-design and characterisation of the obtained products, while exploring additional valorisation routes into other key sectors (chemical industry) will be considered. Finally, it will develop and integrate a digital platform incorporating AI to generate data driven models enabling the automatic optimisation of process parameters that guarantee SRMs quality.



What?

Upcycling of industrial and urban cellulosic waste

Where?

St. Celoni and Madrid (Spain) & Italy.

Who?

I-FORIA B.V., ACCIONA AGUA, CARTIF, I-FORIA, SMC

Demo 3

What?

Steelmaking slag upgrading and valorisation through different stabilisation methods

Where?

Asturias (Spain)

Who?

ArcelorMittal Global R&D Spain, Cales de Llerca, ArcelorMittal Global R&D Maizières, ArcelorMittal España, ACCIONA CONSTRUCCION, ICV-CSIC, KERABEN

In DEMO 3, the slags produced during steelmaking operations will be assessed as raw materials for the production of a sustainable Precipitated Calcium Carbonate (PCC). The co-products obtained will be analysed for the construction, ceramics, and steel sectors. The innovative process will be tailored along ICARUS' lifecycle, with the challenge of creating a win-win between the process efficiency, PCC quality and CO₂ captured in the solution, ensuring the economic feasibility of the final prototype. All is sustained in the development of digital predictive models to boost the roadmap optimisation and setting the basis towards further upscaling.

