

Harnessing secondary resources for sustainable and circular practices in the construction sector



D. Hidalgo*, L. Pablos, M. Gómez, J. Castro, F. Verdugo*, F. Corona

CARTIF Technology Centre, Circular Economy Area, Boecillo (Valladolid), 47151, Spain.

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E-mail*: fraver@cartif.es; dolhid@cartif.es

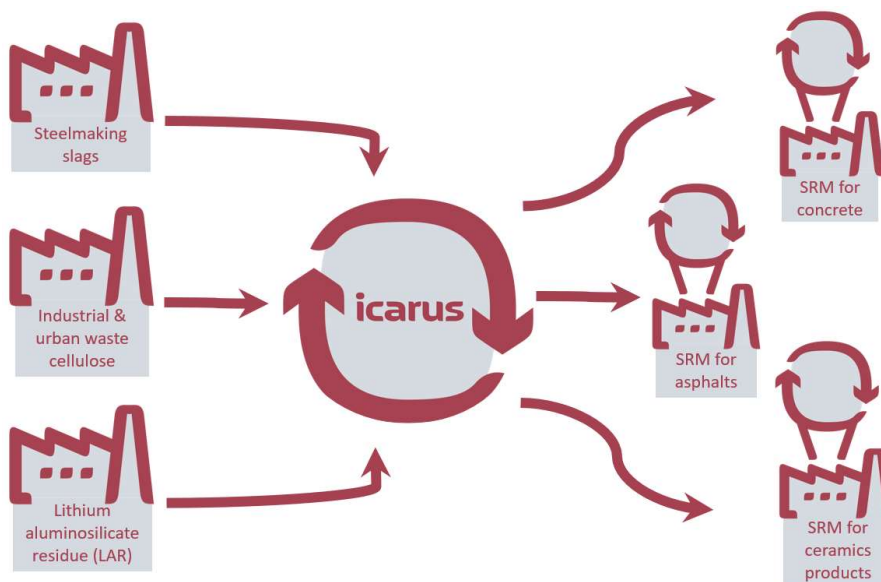
Introduction



The quest for sustainable practices in the construction sector has led in a new era of resource exploration, with a growing focus on secondary materials. In this frame, the **icarus** project seeks to innovate approaches to waste material recycling, focusing on **lithium residues, cellulose waste, and steel slags**.

Furthermore, **icarus** aims to provide technological support to energy-intensive and construction industries for the transition to more sustainable and digital processes in a business model for successful market implementation. **icarus** represents a breakthrough in the research and demonstration of new technologies to upgrade **Secondary Raw Materials (SRM)**, ensuring similar quality as primary raw materials of three waste streams to improve circular economy principles.

Methodology



For the extraction of **minerals** from steel slags, **icarus** will leverage high-gradient magnetic separation, ensuring precise separation of minerals for direct incorporation into construction materials. Selective leaching processes will be employed to target specific minerals within steel slags, providing a tailored approach to mineral extraction.



In the extraction of **cellulose** from waste streams, **icarus** will utilize enzymatic hydrolysis, breaking down complex structures to facilitate cellulose fibre extraction. This environmentally friendly process will yield high-quality cellulose suitable for various construction applications. Mechanical separation techniques, including sieving and centrifugation, will also be employed to isolate cellulose, ensuring its purity and quality.



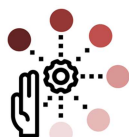
To recover **Lithium** from industrial residues, **icarus** will employ advanced hydrometallurgical techniques, utilizing environmentally friendly solvents in a process that ensures high extraction efficiency and minimal environmental impact. Additionally, innovative ion exchange resins will be used for selective lithium capture, enhancing the purity of the recovered lithium for applications in battery production.

Expected results

Concrete formulations and materials enhancement

- New concrete formulations with improved workability and durability including a super absorbent for hydration improvement.
- Supplementary cementitious materials for concrete and road layers.
- Alternative aggregates for asphalts.
- Recycled cellulose fibres for concrete shrinkage prevention

Digitalization, sustainability and standardisation



icarus will integrate blockchain technology for Digital Product Passports, ensuring a secure and transparent record of the origin, composition, and processing history of construction materials, including the assessment of technical and environmental performance of products and solutions and skills development and standardization approaches.



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