

## EcoHydB – Eco-efficient Hydraulic Binders Produced from Waste Cement-based Materials

### Summary

The main objectives of EcoHydB are to produce and characterize recycled low-carbon cement from thermally activated old concrete, and to manufacture a more eco-efficient clinker with waste concrete as raw material, leading to a reduction of at least 20% in CO<sub>2</sub> emissions. The idea is to also develop highly sustainable all-recycled eco-concretes produced with these new binders and recycled aggregates obtained from the same waste concrete. The aim is to reduce the high economic and environmental impact of concrete production, namely in the cement manufacture, which represents more than 80% of CO<sub>2</sub> emissions of concrete. Basically, the project follows two distinct research lines: production of rehydrated cement from the physical and thermal treatment of concrete waste; production of a more eco-efficient clinker with partial incorporation of concrete debris. Concrete with these recycled binders is characterized in terms of its main fresh and hardened properties. The idea is to also develop highly sustainable all-recycled eco-concretes produced with these new binders and recycled

aggregates obtained from the same waste concrete. The best compromise between the cement properties and eco-efficiency of these recycled products is assessed by economic and environmental life-cycle analysis. To address these objectives, a comprehensive research program has been established, divided into seven main tasks: waste concrete production; production and characterization of recycled low-carbon cement; mechanical and durability characterization of concrete produced with recycled low-carbon cement; clinker production with waste concrete as raw material; characterization of concrete produced with cement from the new more eco-efficient clinker; Ca rich inorganic wastes as solid sorbents for post combustion CO<sub>2</sub> capture; economic and life-cycle assessment of produced materials. The project is developed in partnership with SECIL, one of Portugal's leading cement producers. By the end of this project, a new low-carbon recycled binder, a more environmentally friendly clinker and a new eco-efficient concrete should be achieved.



Figure 1. Closing loop of production and recycling of cement-based materials. Towards a truly circular economy for waste cement-based materials.

### Project Reference

PTDC/ECI-CON/28308/2017

### Leading Institution

IST-ID – Associação do Instituto Superior Técnico para a Investigação e Desenvolvimento (Portugal)

### Partners

SECIL (Portugal)

### CERIS Principal Investigator

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### CERIS Research Team

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### Funding

FCT – Fundação para a Ciência e a Tecnologia

### Period

2018-2022

### Total

227 568.62€

### CERIS

227 568.62€

### Project Website

<https://cdwvalue.eu/project-ecohydb>