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URBAN

CO_2-reduced concrete by upcycling residues from waste concrete processing

KIT coordinated industrial project with the aim of developing a highly CO_2-reduced, high quality and resource efficient concrete cycle from real waste concrete

Summary

Around 50 million tons of waste concrete from demolition accumulates in Germany every year. Waste concrete is usually crushed and replaces natural aggregate in road and path construction. During crushing, fines that have so far been of little use are produced as waste.

In the URBAN project, crushed fractions from waste concrete and production residues from the project partners are used as raw materials for the production of a belite cement clinker. Here, in particular, fines are used. In the production of the belite clinker, the process emissions are reduced compared to Portland cement clinker. During the belite production process, the released CO_2 is separated in concentrated form. This CO_2 can be used for the carbonation of coarse crushed concrete sand or for the carbonation hardening of RC aggregate. RC aggregate (1), RC cement made from belite clinker (2) and, if necessary, carbonate produced in connection with a carbonation process (3) are used to produce an R^3 concrete consisting of three recycled parts, which is returned to the concrete production cycle.

The project comprises several parts, which are located at the respective project partners and deal with the cement and cement clinker production, the concrete recipe development, the adaption of additives , the carbonation process and the techno-economic evaluation.

Expected results

Waste concrete from production or demolition should be reused as completely as possible to make concrete. All relevant steps are demonstrated using the example of the industrial production of precast concrete elements. The process chain is described and evaluated with a process-based life cycle assessment.

Partner

KIT – Institut für Technische Chemie
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Leibniz Universität Hannover – Institut für Baustoffe
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