C2CA: Social And Environmental Life Cycle Assessment of Production of High-Grade Concrete from Construction and Demolition Waste

Description

The recycling of end-of-life concrete into new concrete is one of the most interesting options for reducing worlwide natural resources use and emissions associated with the building materials sector. The production of the cement used in concrete, for example, is responsible for at least 5% of worldwide CO2 emissions.

On-site reuse of clean silica aggregate from old concrete saves natural resources and reduces transport and dust, while the re-use of the calcium-rich cement paste has the potential to cut carbon dioxide emissions in the production of new cement by a factor of two. In order to achieve this goal, a new system approach is studied in which automatic quality control assesses and maintains high standards of concrete demolition waste from the earliest stage of recycling, and novel breaker/sorter technology concentrates silica and calcium effectively into separate fractions at low cost (Figure 1.1). Finally, the smaller calcium-rich fraction, which is typically also rich in fine organic residues, is converted into new binding agents by thermal processing, and mixed with the aggregate into new mortar.

Next to technological advances, certification and design guidelines are deveolped to use the recycle concrete in a responsible and optimal way.

The project aimed to develop three innovative technologies for recycling end-of-life concrete, integrate them with state-of-the-art demolition and building processes and procedures, and test the new system approach on two Dutch concrete towers involving 70,000 tons of concrete.

A special feature of this large case study was a new type of government contract which links the recycling of the towers to the re-use of the recycled materials in new buildings.

The results of the project were used to determine which kinds of strategies and policies are most effective to facilitate an efficient transition towards optimal value recovery from Construction and Demolition Waste and sustainable building.

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