R-Zement

Low-CO_2 processing of the clinker mineral dicalcium silicate from recycled building materials

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Cement production accounts for about 35 % of industrial CO_2 emissions in Baden-Württemberg. Two thirds of these emissions originate from the deacidification of the natural raw material limestone. In terms of climate protection, it would therefore be reasonable to replace limestone by almost CO_2-free, cement-containing residual materials from the recycling of building materials as secondary raw material.

The aim of the project is to demonstrate and optimize this approach on a pilot scale based on a newly developed thermal process. The unit produces dicalcium silicate clinker at approx. 1000 °C using previously non-usable residual materials. Dicalcium silicate clinker may be used as a main constituent of European standard cements. Furthermore, depending on the quality produced, dicalcium silicate is suitable as a raw material for the manufacture of aerated concrete or sand-lime bricks, or as a raw material for the production of low-lime cements ("Celitement"). In the latter case, an estimated reduction in CO_2 emissions of up to 75 % would be possible for recycled low-lime cement relative to Portland cement.

Released CO_2 is generated in concentrated form. Its suitability e.g. for methanation or carbonation hardening of e.g. concrete aggregate is being investigated.

Within the project duration of 3 years, the technology will be set up in a pilot plant with a throughput of 10 kg/h and operated, optimized and demonstrated with real recycling products. The central component of the plant is a rotary kiln operated in a CO_2 atmosphere for burning the dicalcium silicate. In addition, the plant comprises equipment for mixing and grinding the raw materials and for processing the product. The funding includes investments in the pilot plant and research expenditures to increase the technological maturity from TRL 2-3 to about TRL 5.

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