



TAIHEIYO CEMENT NEWS LETTER

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CARBOFIX® CO₂-absorbing/cured Cementitious Material Successfully Developed

Taiheiyo Cement Corporation (Headquarters: Bunkyo-ku, Tokyo; President: Masafumi Fushihara) has succeeded in developing CARBOFIX®*1 cement, a cementitious material that generates a reduced amount of carbon dioxide (CO₂) during the cement manufacturing process and hardens through the reaction with CO₂.

CARBOFIX cement (**Photo 1**) is a new material characterized by its ability to develop required strengths through a chemical reaction with CO₂ during hardening*2. The content of CaO in it is lower than that in ordinary portland cement, which makes it possible to burn clinker at lower temperatures, thereby reducing CO₂ emissions during production. With the CO₂ absorption during the hardening process combined with the reduced CO₂ emissions during production, total CO₂ emissions can be reduced significantly.

CARBOFIX cement was developed to bind captured CO₂ in cement or concrete as part of carbon recycling (CCU*3) technologies, based on our findings from the Project of Development of Carbon Circulation Technology for the Cement Industry (FY 2020-2021) which was funded by the New Energy and Industrial Technology Development Organization (NEDO) of Japan. In that Project, interlocking paver blocks were manufactured using CARBOFIX cement (**Photo 2**) to demonstrate that CO₂ emissions were reduced by up to about 60% (**Figure 1**). The reduction in CO₂ emissions related to raw materials can be further expanded (**2** in **Figure 1**) by using calcium carbonate synthesized from CO₂ bound in waste concrete (demonstration test performed in the same project) and various recycled raw materials which contain CaO. With all of these, it will be even possible to achieve carbon negativity.

CARBOFIX cement has β -C₂S, one of the minerals in portland cement, as the main mineral component, and also contains aluminates phases. The new cement can be manufactured by using existing rotary kilns and other manufacturing equipment conventionally used for portland cement. Although waste is already accepted in large amounts as recycled raw materials in the production of ordinary portland cement, CARBOFIX cement allows the use of even more recycled raw materials. This will make a greater contribution to the creation of circular economies, not only to the reduction of CO₂ emissions.

Under the Carbon Neutral Strategy 2050, Taiheiyo Cement Group is working to achieve carbon neutrality in the entire supply chain by 2050, with special focus on technological development for CO₂ capture from cement kiln exhaust gas, as well as for CCU to utilize CO₂ as a new resource.

Our efforts will continue toward the earliest commercialization of CARBOFIX cement which will be one of the innovative technologies that will contribute to the realization of full carbon neutrality.



Photo 1. Appearance of CARBOFIX cement



Photo 2. Interlocking block made of CARBOFIX cement

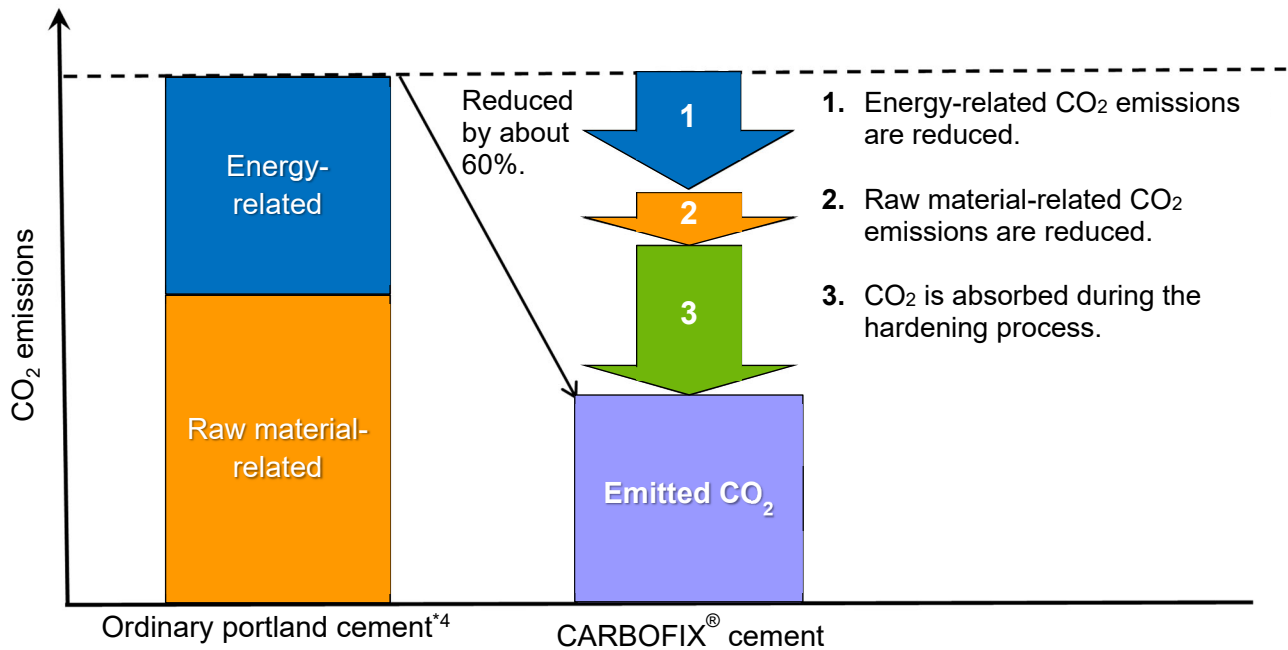


Figure 1. An example of CO₂ emissions of a concrete product using CARBOFIX cement

*1: CARBOFIX is a registered trademark of Taiheiyo Cement Corporation.

*2: CARBOFIX cement absorbs CO₂ during carbon curing (curing in supplied CO₂-containing gas) and develops enhanced strength and other performance characteristics.

*3: CCU stands for carbon dioxide capture and utilization.

*4: CO₂ emissions during production of ordinary portland cement come from decarbonation of raw materials and emissions related to energy for burning, with the former accounting for about 60% and the latter for about 40%.