

CO₂-emissions in the construction industry

Introduction

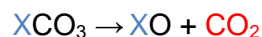
The introduction of CO₂ taxation requires us to reassess and transform the construction industry. Alternative paths must be taken to reduce the carbon footprint and the associated costs and environmental damage.

Contrary to popular beliefs, using environmentally friendly products alone will not be enough. Other factors contribute to CO₂ emissions: the building material itself, as well as its production, processing, delivery and quality.

Emission sources

- Chemical: building material

Building materials release CO₂ during their production in the burning process by converting carbonate to oxide and CO₂.



This reaction occurs in all building materials that contain carbonates (CaCO₃, MgCO₃). The production of cement alone releases up to 790kg CO₂ per ton. Of this, 2/3 is the released CO₂ from the raw materials (inherent) and 1/3 from fuel consumption. The inherent proportion depends on the amount of carbonate in the mineral mixture.

However, CO₂ can be saved through the targeted use of additives and other raw material compositions which are produced with less energy input.¹

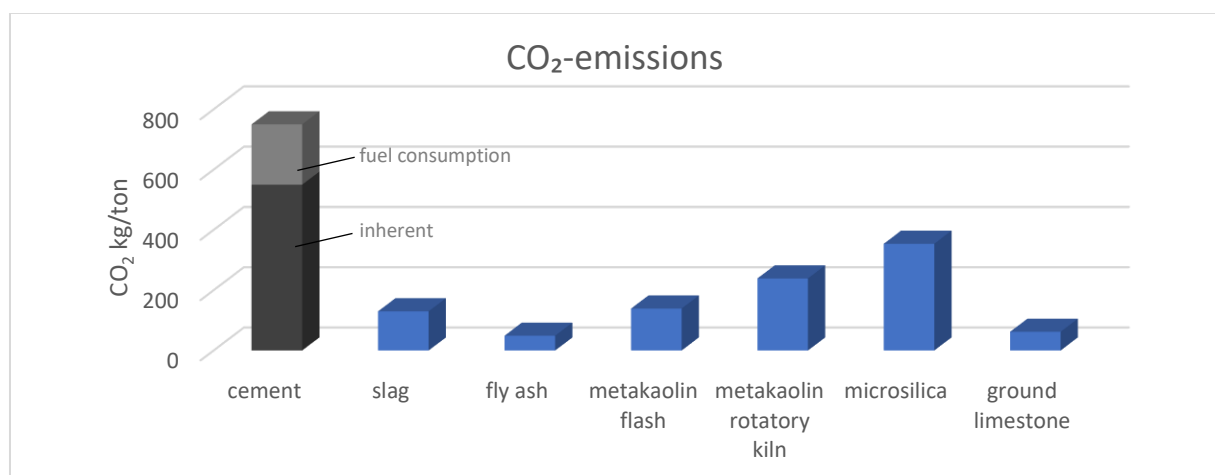


Figure 1 Carbon emission of mineral additives² compared to cement.

The given figures from fig. 1 represent the sum of chemically released CO₂, as well as fuel emission consumed for the production process. These values may vary depending on the composition and production conditions.

¹ See also Newchem's "Metakaolin Cement Substitute" fact sheet.

² Société de l'industrie minérale, « Empreinte carbone des ciments et des additions », EMPREINTE CARBONE; LIANTS HYDRAULIQUES & BETONS, in: mines et carrières, n°295, octobre 2021, S.8-11

- Industrial: technical - mechanical

On the other hand, you must look at the entire production chain. Every single step can be optimized.

- Raw material extraction
- Raw material processing
- Calcining process
- Delivery

The choice of transport means and the distance building material has to travel from the factory to the customer can further influence emissions.

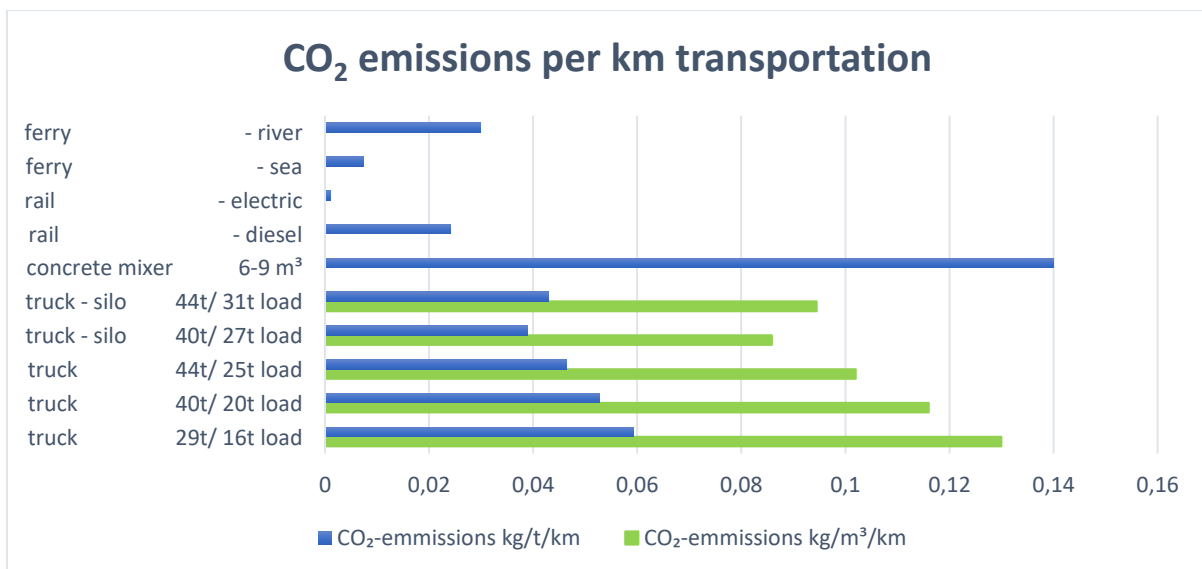


Figure 2 Carbon emission of different means of transportation.³

Example: Truck delivery of 24t Metaver from western France to Berlin

$$0,0464 \text{ (CO}_2 \text{ emissions truck)} * 24 \text{ (t product)} * 1600 \text{ (km transport route)} = \underline{1601,11 \text{ kg CO}_2 \text{ consumption}}$$

To this result must be added the emissions of the mineral extraction, the building materials themselves, their processing, etc.

Measures

- Addition of CO₂-neutral additives
- Cement clinker substitution
- Reduction of concrete quantity (UHCP)
- Energy-efficient production, fuel switch
- Optimize transport conditions (choice of regional products, transport method)
- Construction of durable buildings

³ Société de l'industrie minérale, « Empreinte carbone des ciments et des additions », EMPREINTE CARBONE; LIANTS HYDRAULIQUES & BETONS, in: mines et carrières, n°295, octobre 2021, S.8-11