



thyssenkrupp

Insights_Polysius



Cement production: activated clay significantly reduces CO2 footprint

The polysius® activated clay technology developed by thyssenkrupp is reducing the process-related carbon dioxide emissions generated in the production of conventional cement by up to 40 percent. The Netherlands-based company Cimpor Global Holdings (CGH) is using this technology on an industrial scale in its new plant in Cameroon and is replacing 30

percent cement clinker with activated clay. At the same time, it is reducing its production costs and thus improving its competitiveness twice over. For CGH, this is already the second project in which calcined clays are used.

The cement producers are among the largest CO₂ emitters in the world. It is estimated that around seven percent is accounted for by this industrial sector. The production of one tonne of cement clinker generates around 790 kilograms of process-related CO₂ emissions. About two thirds of this is accounted for by the limestone used, which releases CO₂ in the course of the process through a chemical reaction. The cement clinker, the main component of conventional cement, is burnt in an energy-intensive process at temperatures of more than 1,400 degrees Celsius.

“With the help of polysius[®] activated clay technology, our customer Cimpor Global Holdings is significantly reducing its CO₂ footprint and energy costs.”

Pablo Hofelich, CEO Cement Technologies

But the cement clinker can be replaced up to 30 % by activated clay. Heated to 800°C to 900°C, the previous 790 kilograms of CO₂ per tonne of cement clinker produced can be reduced to up to 120 kilograms of CO₂ per tonne of activated clay. Cimpor Global Holdings will thus be able to save more than 120,000 tonnes of CO₂ per year at its plant in Cameroon from autumn 2021.

thyssenkrupp has set itself a groupwide target of reducing 16 percent of the emissions caused by the use of its products. The polysius[®] activated clay technology makes an important contribution to achieving this ambitious target by 2030.

Conclusion:

More and more cement manufacturers want to reduce the clinker factor in their products and increase the volume of SCMs (Supplementary Cementitious Materials) in their products. Activated clay offers a sustainable and cost-effective alternative to conventional cement clinker. Aim is to maximize the clinker factor reduction in new ternary cement type (limestone-activated clay cement) which normalization is of essence for the cement industry globally. With the polysius[®] activated clay technology, thyssenkrupp offers a doubly effective solution for the industrial use of clay as SCM.

Cement manufacturing process

Pressurized air	0,5%	(3 kg ³)
Cement packaging	1,0%	(7 kg ³)
Grinding and preparation of primary materials	1,5%	(10 kg ³)
Quarrying, crushing, storage and transport of the raw materials	1,5%	(10 kg ³)
Zementtransport	1,8%	(15 kg ^{2,3})
Grinding of cement	3,7%	(25 kg ³)

90,0% Clinker production & cooling (607 kg^{1,3})



CO₂ emissions per tonne cement (clinker factor: 0.75)

¹ Electricity CO₂ emissions 20 kWh/tcem (15 kg CO₂/tcm) + limestone CO₂ emissions (474 kgCO₂/tcl = 355 kg CO₂/tcm) + combustion CO₂ emissions aus (316 kg CO₂/tcl = 237 kg CO₂/tcm) = 607 kg CO₂/tcm

² transport by truck (24 ton truck / 0,05 kgCO₂/tkm) travelling 300 km (return trip) 360 kg/24 t = 15 kgCO₂/tcm

³ CO₂ emission factor 0.7 kgCO₂/kWh



Sources: thyssenkrupp, Chatham House