

Concrete-cement, third "country" of greenhouse gas emissions



A building under construction in Bangkok, May 16, 2020 (AFP / Romeo GACAD)

If the concrete used on the planet were a country, it would be the world's third largest emitter of greenhouse gases, just behind China and the United States.

Why is it said that concrete and cement represent one of the worst carbon footprints in the industrial sector?

Answer: Cement is the most consumed material in the world, at a rate of about 150 tons per second. Fourteen billion cubic meters of concrete are poured each year, according to the London-based World Cement and Concrete Association (GCCA), which brings together the main players in the sector, including the giants Holcim (Switzerland, formerly Lafarge-Holcim), the Mexican Cemex or the Chinese CNBM.

The production of cement alone, a key ingredient in concrete, generates 7% of global carbon dioxide (CO₂) emissions, according to the GCCA – three times more than air transport.

"This is more than the emissions of the entire European Union or India, just behind those of China and the United States," Valérie Masson-Delmotte, a paleoclimatologist and co-chair of a UN panel of climate experts, told AFP. A trend that is not about to stop with the galloping urbanization in Asia or Africa.

How does cement emit CO2?



A building materials factory in Dubai, July 8, 2020 (AFP / KARIM SAHIB)

Cement, which is the binder responsible for gluing together the pebbles and sand of concrete, has as its main component clinker, the product of firing limestone and clay in an oven. By heating, it releases carbon dioxide.

To produce a ton of cement, firing at 1,400 ° C generates the emission of almost a ton of CO₂ too!

This massive chemical reaction, which has hardly changed in the 200 years that cement has been manufactured, accounts for 70% of the cement sector's emissions. The remaining 30% comes from the energy consumption of the furnace itself, which is needed to calcine the limestone.

How to decarbonize construction?

The global concrete industry, which announced its intention last year to achieve carbon neutrality by 2050, set in early October the goal of reducing its emissions by "an additional 25%" by 2030, which would avoid releasing 5 billion tons of CO₂.

The sector is then counting heavily on the deployment of future carbon capture and storage technologies to continue the effort until 2050.



A construction site in Singapore, May 12, 2021 (AFP / Roslan Rahman)

In addition to an increase in the recycling-reuse of old concrete, among the new avenues of greening is the replacement of fossil fuels by waste and biomass in cement kilns (animal meal, demolition wood, etc.).

In terms of carbon capture, a technology still at the prototype stage, the global industry plans to install "ten industrial-sized structures to capture carbon by 2030," says the GCCA.

Giants like China's China National Building Material Company (CNBM) have vowed to "play their part" in this decarbonization.

Many start-ups have launched: the American Solidia proposes to capture CO₂ and reuse part of it for drying concrete, which reduces water consumption. In Canada, CarbonCure Technologies injects liquefied CO₂ that is permanently embedded in concrete.

But above all, the industry relies on new "green" cements that use materials from the recovery instead of clinker.

In Britain, the substitution rate is already 26%, according to the GCCA. In France, a new low-carbon cement standard was published in May.

What is green or low-carbon cement?

For the moment, these new cements are mainly launched by start-ups. Traditional cement manufacturers find it more difficult to modernize their production instruments, heavy investments linked to quarries.



A concrete plant in Brooklyn, New York, May 3, 2021 (GETTY IMAGES NORTH AMERICA/SPENCER PLATT)

In France, Hoffmann Green Cement, based in the Vendée, is particularly advanced, with its cements based on industrial waste, clay sludge, blast furnace slag (steel waste, Editor's note), or fly ash from biomass.

Even with an estimated additional construction cost of 25 euros per square meter, the young company that has just been listed on the stock exchange says it is crumbling under the demands.

"The cement industry plans to eliminate its emissions in 2050. With our breakthrough solutions, we are getting there today," its founder Julien Blanchard, who plans to expand from one to three sites in France, told AFP.

The stakes are crucial: "Three quarters of the infrastructure that will exist in 2050 is not yet built," warned UN Secretary-General Antonio Guterres.

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