Avoiding Greenhouse Gas Emissions

The Essential Role of Chemicals

The Green Sense® Concrete solution – optimizing concrete mixtures by reducing cement content

A BASF case study

Concrete is generally produced from a mixture of paste and aggregates. The paste is composed of cement and water and coats the surfaces of the fine and course aggregates. Chemical admixtures are added to modify or improve specific concrete properties. The cement production process results in high levels of greenhouse gas (GHG) emissions. The Green Sense® Concrete optimization process from BASF offers an environmentally preferable concrete solution that meets and often exceeds performance targets.

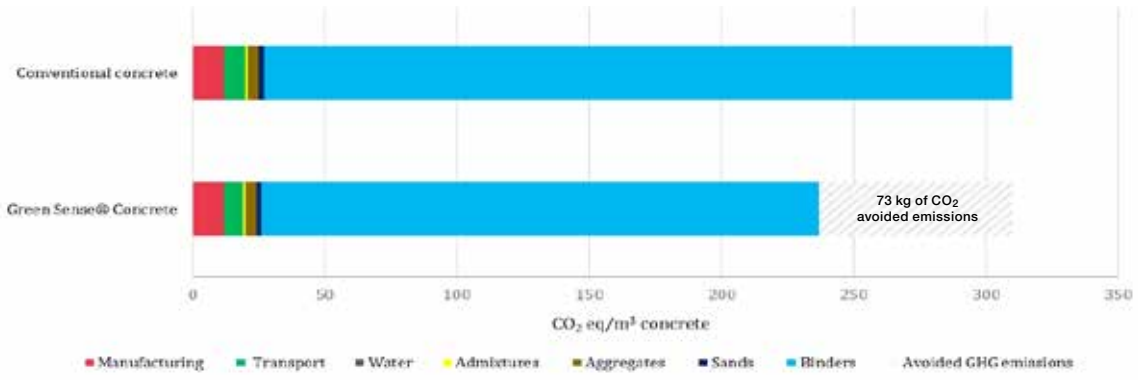
Cement, a fundamental component of concrete, generates a large carbon footprint during its production from the two processes of combustion and calcination. The life cycle assessment study compares the environmental impacts of a conventional concrete mixture with an optimized Green Sense® Concrete mixture. This optimized mixture incorporates cement replacement materials and innovative concrete admixtures without impacting the required fresh and hardened concrete properties. The avoided GHG emissions associated with this optimized Green Sense® Concrete mixture are 73 kg CO_2 eq/m^3 of concrete. For a project requiring 100,000 m^3 of concrete, this example would result in over 7.3 million tons of avoided CO_2 emissions. In addition to a reduction in GHG emissions, the Green Sense® Concrete mixture also shows lower environmental impact in ozone depletion and human toxicity.

Full study available at: www.icca-chem.org/energy-climate

432 Park Avenue Tower built with Green Sense® Concrete. It is the tallest residential tower in the western hemisphere.

Picture by Richard Berenholtz

Cradle-to-gate GHG emissions per m^3 of Green Sense® Concrete mixtures in comparison to conventional concrete



This case study illustrates how the reduction of greenhouse gas (GHG) emissions can be enabled by chemical products, as part of a series of case studies brought to you by ICCA. Chemical industry members offered Life Cycle Assessment [LCA] case studies for the purpose of showing illustrative examples on how to calculate avoided greenhouse gas emissions. The avoided emission calculations were based on the guidelines developed by ICCA and WBSCD (World Business Council for Sustainable Development) - Chemical Sector, with the support of Arthur D. Little and Ecofys. Other life cycle environmental impacts such as water and land use change were outside the scope and usually not considered.