



Low carbon technologies to be challenged in the supply chain of concrete structures

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Abstract

Cement used in structural concrete accounts for 60% of all cement. Thus, the amount of CO₂ emission by cement in structural concrete in a year is about 5% of the amount emitted by mankind. LCA of structural concrete should consider not only the materials at the product stage but also the maintenance phase at the use stage after construction. A rough indicator is presented to grasp the CO₂ emissions of structural concrete. And low-carbon technologies currently in use is introduced. Then the need for multi-cycle structural concrete with a circular economy is presented. Moreover, it is estimated that CO₂ emissions due to disasters in the use stage could be enormous. The carbon neutrality of structural concrete is not a risk but an opportunity for us.

Keywords: carbon neutrality; LCA; multi-cycle; disaster; ESG investments.

1 Introduction

In 2020, with the world in the midst of a pandemic, more than 100 countries and regions declared themselves carbon neutral by 2050. At the same time, humanity experienced severe restrictions on activity due to the corona lockdown and saw a 3% drop in global GDP in 2020. But this was accompanied by only a 7% reduction in CO₂ emissions. In other words, we simultaneously recognised the difficulty of achieving net zero CO₂ emissions by 2050. Achieving carbon neutrality requires cost and technological innovation.

Cement used in structural concrete accounts for 60% of all cement [1]. Therefore, the amount of CO₂ emitted by cement in structural concrete in a year is approximately 5% of the amount emitted by mankind. Concrete users will eventually have access to zero carbon materials, but it is not possible to wait until then. The supply chain is

already demanding low carbon technologies that need to be addressed.

Indeed, low carbon concrete has been developed and put into practice by various organisations. However, the Life Cycle Assessment (LCA) of structural concrete shows that CO₂ is not only emitted during the production stage, but also during the use stage due to maintenance. Structural concrete, which is responsible for a large proportion of humanity's CO₂ emissions, has the potential for innovation. And we must recognise that this is not a risk for us, but a great opportunity [2].

2 CO₂ emissions in the supply chain of concrete structures

Figure 1 shows the construction supply chain according to the European standard EN15978. Below this is the classification of the construction