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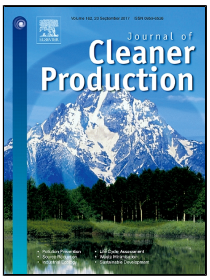

On Carbon Dioxide Utilization as a Means to Improve the Sustainability of Ready-Mixed Concrete

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On Carbon Dioxide Utilization as a Means to Improve the Sustainability of Ready-Mixed Concrete

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Abstract

Concrete is the world's most important and widely used construction material. Carbon dioxide utilization in the production of ready mixed concrete was investigated through the injection of an optimal amount of CO_2 during batching and mixing. The carbon dioxide improved the concrete compressive strength with minimal impact on fresh air content or workability. Three-way comparisons between a reference batch, reduced binder batch and reduced binder batch with CO_2 addition, confirmed that the carbon dioxide could allow for a 5 to 8% reduction in binder loading without compromising strength. A model case shows that integrating a CO_2 utilization step into conventional concrete production can, net of process emissions, reduce the carbon footprint of the concrete by 4.6%. The direct utilization is amplified to attain a carbon footprint improvement that is more than 35 times larger than the amount of carbon dioxide required. One year production at a medium sized producer would use about 24 tonnes of carbon dioxide to achieve nearly 897 tonnes of CO_2 absorbed and avoided.

Keywords: Concrete, Carbon Footprint, Construction Materials, Environmental Impact, Carbon Dioxide Utilization