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# THERMAL SCIENCE

## International Scientific Journal

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### CO<sub>2</sub> REDUCTION OPTIONS IN CEMENT INDUSTRY - THE NOVI POPOVAC CASE

#### ABSTRACT

The cement industry contributes about 5% to global anthropogenic CO<sub>2</sub> emissions, and is thus an important sector in CO<sub>2</sub>-emission mitigation strategies. Carbon dioxide is emitted from the calcination process of limestone, from combustion of fuels in the kiln, and from the coal combustion during power generation. Strategies to reduce these CO<sub>2</sub> emissions include energy efficiency improvement, new processes, shift to low carbon fuels or waste fuels in cement production, increased use of additives in cement production, alternative cements, and CO<sub>2</sub> removal from flue gases in clinker kilns. Increased use of fly ash as an additive to cement and concrete has a number of advantages, the primary being reduction of costs of fly ash disposal, resource conservation, and cost reduction of the product. Since the production of cement requires a large amount of energy (about 2.9-3.2 GJt<sup>-1</sup>), the substitution of cement by fly ash saves not only energy but also reduces the associated greenhouse gas emissions. The paper evaluates the reduction of CO<sub>2</sub> emissions that can be achieved by these mitigation strategies, as well as by partial substitution of cement by fly ash. The latter is important because the quality of the produced concrete depends on the physical-chemical properties of the fly ash and thus partial substitution as well as the type of fly ash (e.g., the content of CaO) has an effect not only on energy consumption and emissions, but also on the produced concrete quality.

#### KEYWORDS

GHG emission, Cement industry, CO<sub>2</sub> decreasing

PAPER SUBMITTED: 2009-12-11

PAPER REVISED: 2010-06-21

PAPER ACCEPTED: 2010-07-05

DOI REFERENCE: [10.2298/TSCI091211014S](https://doi.org/10.2298/TSCI091211014S)

CITATION EXPORT: [view in browser](#) or [download as text file](#)

THERMAL SCIENCE YEAR 2010, VOLUME 14, ISSUE 3, PAGES [671 - 679]

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