



Title: Analysis and Optimization of Carbon Dioxide Emission Mitigation Options in the Cement Industry

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Abstract: The cement industry is responsible for approximately 5% of global anthropogenic carbon dioxide emissions emitting nearly 900 kg of CO₂ for every 1000 kg of cement produced. Effective control strategies to mitigate these emissions are discussed and a mathematical programming model able to suggest the best cost effective strategy is outlined. Control costs consisting of operating and investment costs along with the efficiency of control options are taken into account in the model. A representative case study from the cement industry was considered in order to illustrate the use of the model in giving optimal control strategies. Efficiency improvement measures were found to be effective options for reduction targets up to 10 %. The model suggested that fuel switching and carbon capture must be considered at reduction targets higher than 10%. The cost of cement production was shown to increase dramatically with an increase in reduction target.