



## Sustainable cement production—present and future

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### ARTICLE INFO

#### Article history:

Received 23 March 2011

Accepted 28 March 2011

#### Keywords:

Cement manufacture (E)

Alternative fuels and raw materials

Grinding (A)

Clinker substitution

CO<sub>2</sub>

### ABSTRACT

Cement will remain the key material to satisfy global housing and modern infrastructure needs. As a consequence, the cement industry worldwide is facing growing challenges in conserving material and energy resources, as well as reducing its CO<sub>2</sub> emissions. According to the International Energy Agency, the main levers for cement producers are the increase in energy efficiency and the use of alternative materials, be it as fuel or raw materials. Accordingly, the use of alternative fuels has already increased significantly in recent years, but potential for further increases still exists. In cement, the reduction of the clinker factor remains a key priority: tremendous progress has already been made. Nevertheless, appropriate materials are limited in their regional availability. New materials might be able to play a role as cement constituents in the future. It remains to be seen to what extent they could substitute Portland cement clinker to a significant degree.

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### 1. Introduction

Cement production has undergone a tremendous development from its beginnings some 2000 years ago. While the use of cement in concrete has a very long history, the industrial production of cements started in the middle of the 19th century, first with shaft kilns, which were later on replaced by rotary kilns as standard equipment worldwide. Today's

annual global cement production has reached 2.8 billion tonnes, and is expected to increase to some 4 billion tonnes per year. Major growth is foreseen in countries such as China and India as well as in regions like the Middle East and Northern Africa (Fig. 1) [20].

At the same time, the cement industry is facing challenges such as cost increases in energy supply, requirements to reduce CO<sub>2</sub> emissions, and the supply of raw materials in sufficient qualities and amounts. The World Business Council for Sustainable Development and its Cement Sustainability Initiative, comprising cement producers worldwide, has initiated the project “Getting the Numbers Right” which for the first time

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