

# CCS in cement industry

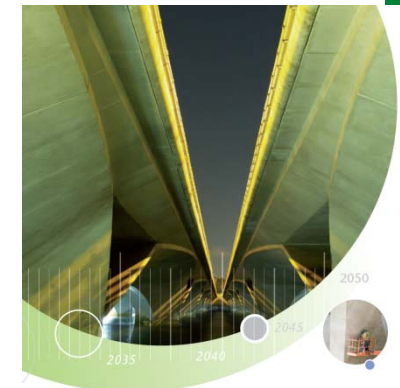
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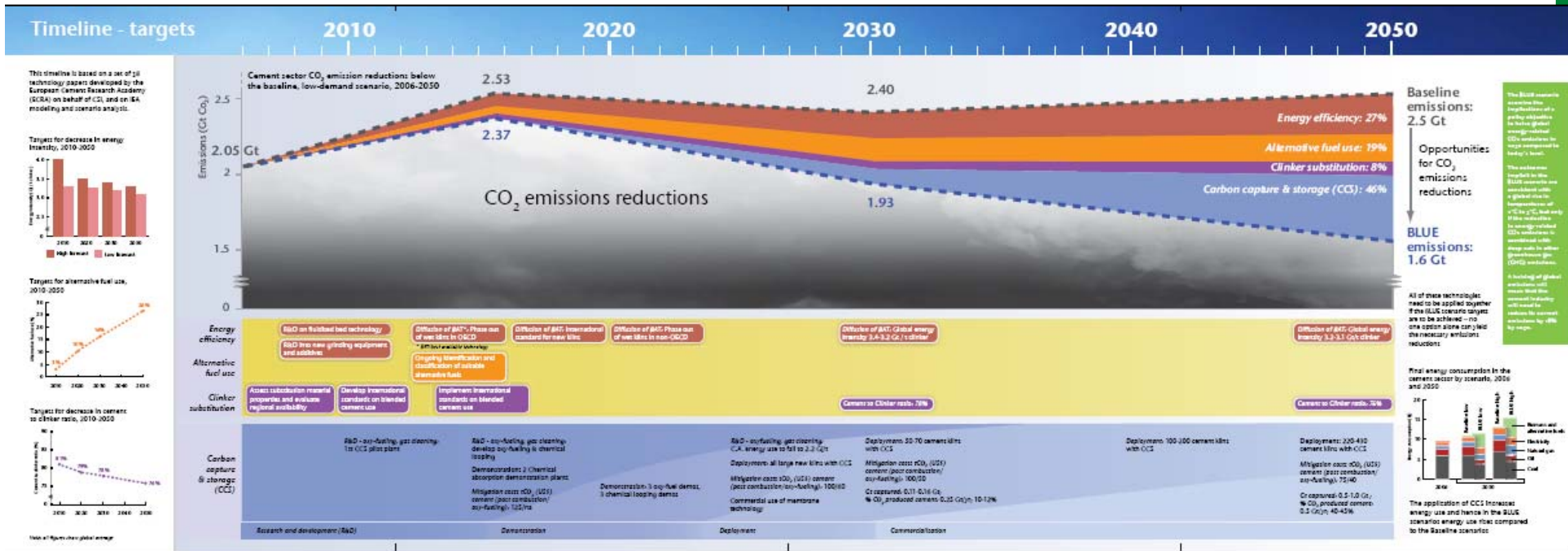
# WBCSD/IEA cement technology roadmap 2009

## 4 Levers for CO<sub>2</sub> emissions reductions

- Energy efficiency 27%
- Alternative fuels (biomass) 19%
- Clinker substitution 9%
- Carbon Capture and Storage 46%



Cement Technology Roadmap 2009  
Carbon emissions reductions up to 2050



# ■ ECRA – European Cement Research Academy

- 2007 Start study on CCS application in cement industry

- 4<sup>th</sup> phase starts in 2013:

## Pilot-scale research activities 2013/2015

- Post combustion trials in Brevik (Norway) scheduled
- **Oxyfuel technology** is promising technology
  - Simulation study (alternative fuels etc.)
  - Further development of advanced cooler design
  - Future air separation systems (membranes) for oxygen production
  - Concept for a pilot plant:
    - Design principle including concept for the integration of a pilot plant into an existing main plant site

- **Cost estimations** for investments

- New oxyfuel plan (2050) 270 – 295 M€
- Retrofitting existing plant (2050) 110 – 125 M€

- **Operational costs** at 40 – 60 €/ton CO<sub>2</sub>

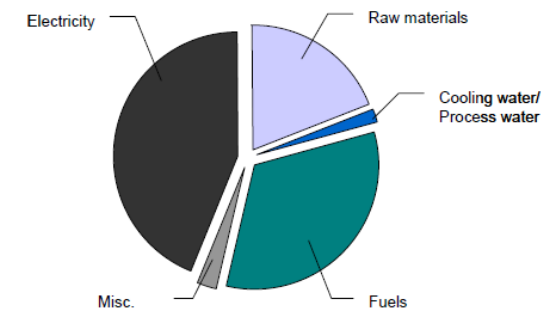


Figure 6-43 Operational cost break-down

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## ■ Key messages from the cement industry

### 1. Technology development

- Oxyfuel as promising new technology, after 2020 / 2025
- Post combustion absorption as intermediate solution ?

### 2. Funding for R&D and demonstration plants needed

### 3. Global policies / CO<sub>2</sub> price needed for commercial implementation

### 4. Legislative framework

- Legislation needed at global
- Public acceptance will be key