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# Technology Transitions for Industry & the Cement Sector

**Steven Lee & Cecilia Tam**

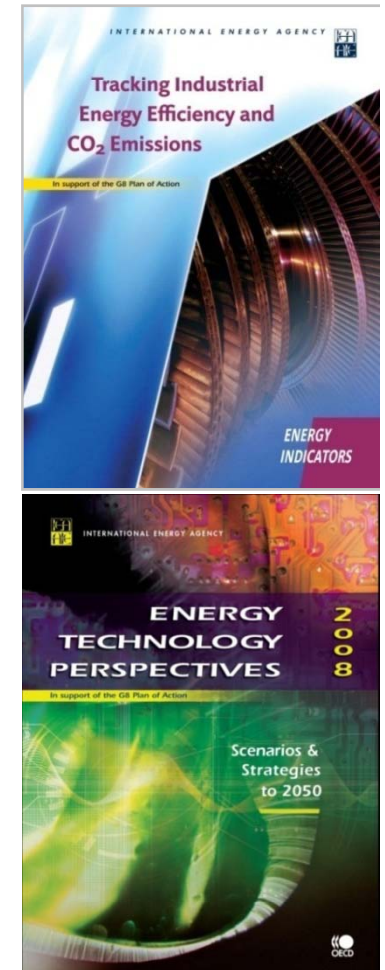
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# Energy Technology Transitions for Industry

- Industry is a key actor in the fight against climate change
- Action to date is commendable, but more is needed
- Technology can help bring about a low carbon industrial revolution
- Global action is needed



## ETP 2008 BLUE scenarios

- -50% energy related CO<sub>2</sub> in 2050, compared to 2005
- This could be consistent with 450 ppm
- Options with a marginal cost of up to USD 200/t CO<sub>2</sub> needed (*model outcome*)
- BLUE is uncertain, therefore a number of cases needed
- BLUE is only possible if the whole world participates fully
- This implies a completely different energy system

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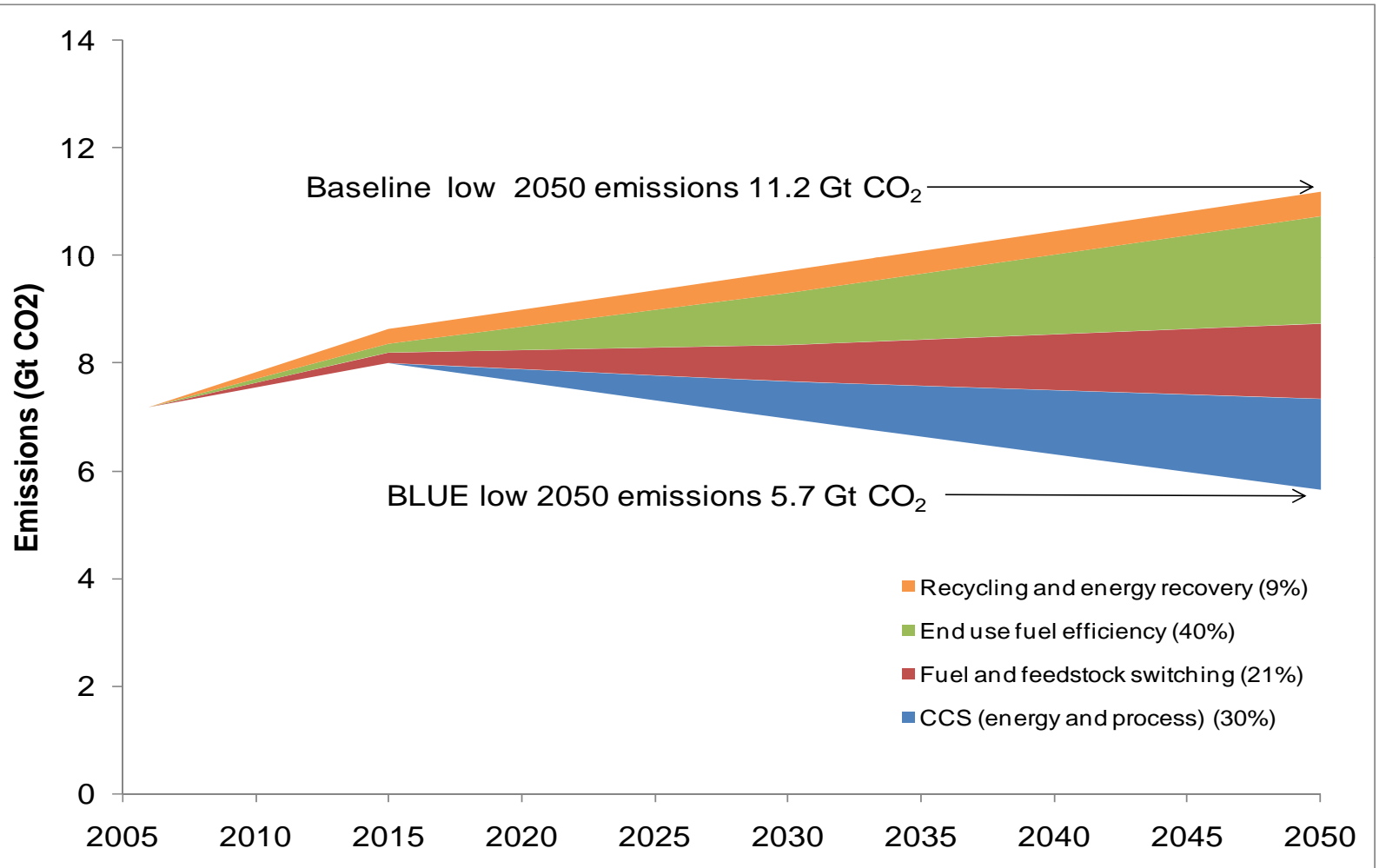


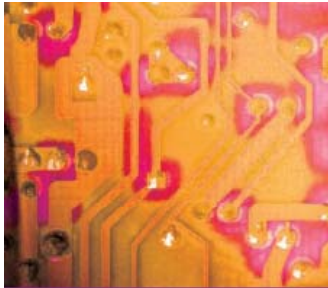
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# CO<sub>2</sub> Emissions in Industry

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## Key Findings

- **Global deployment of BAT could improve energy efficiency by 20 to 30%**
- **... but this is not enough – demand will double or triple by 2050**
- **New technologies are needed for deep CO<sub>2</sub> reductions**
  - **CCS is a key option of the sector**
  - **Biomass will play an important role**
- **De-carbonised power sector is critical**
- **Total additional investments needed for BLUE are estimated at USD 2 – 2.5 trillion**

# Key Findings Cement

- CO<sub>2</sub> reduction in the Cement sector is very challenging
- Current options (BAT, clinker substitutes and alternative fuels) are not sufficient
- New technologies are needed – carbon capture and storage will be key
- A halving of current emissions by 2050 means cement will need to reduce emissions by 18%
- Total additional investments needed for BLUE are estimated at USD 350 – 840 billion

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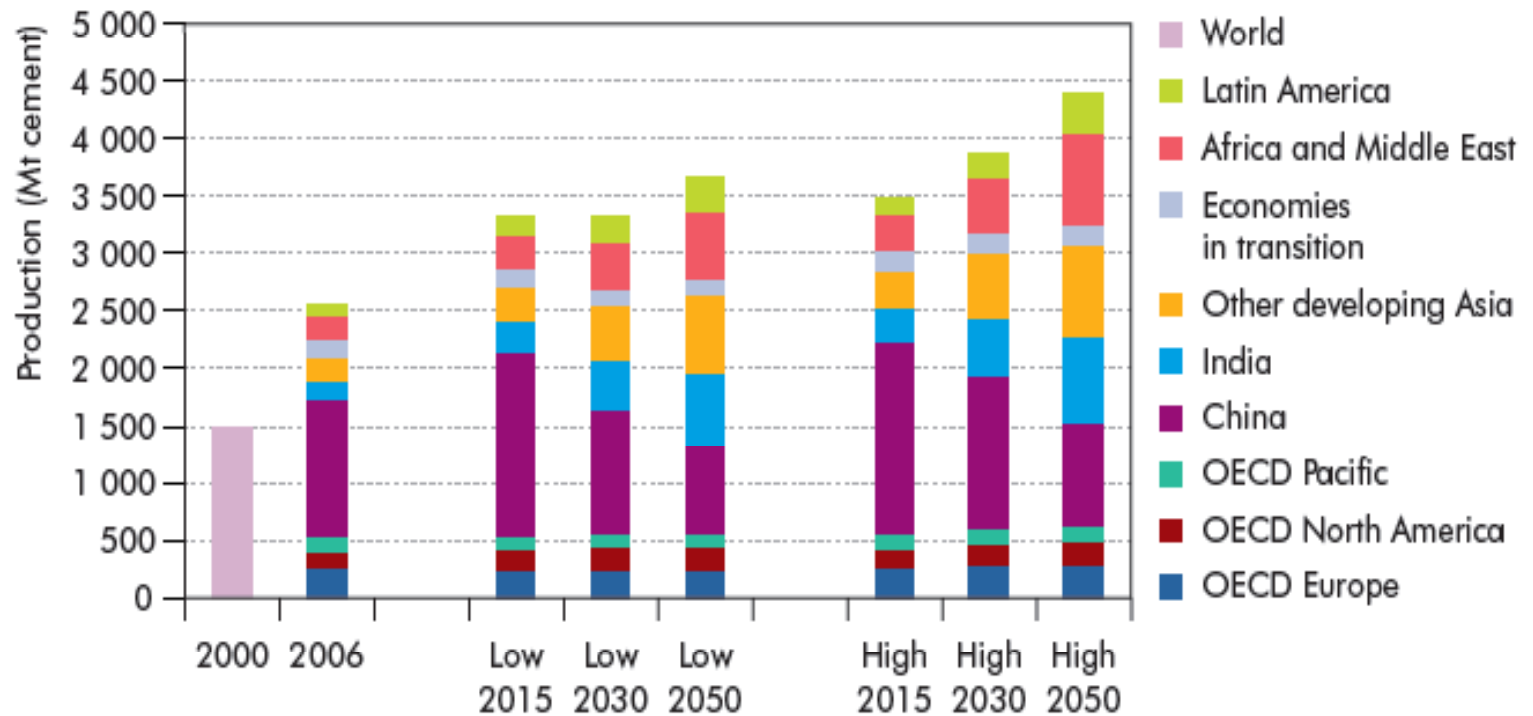


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# Regional cement production

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Sources: USGS and IEA.

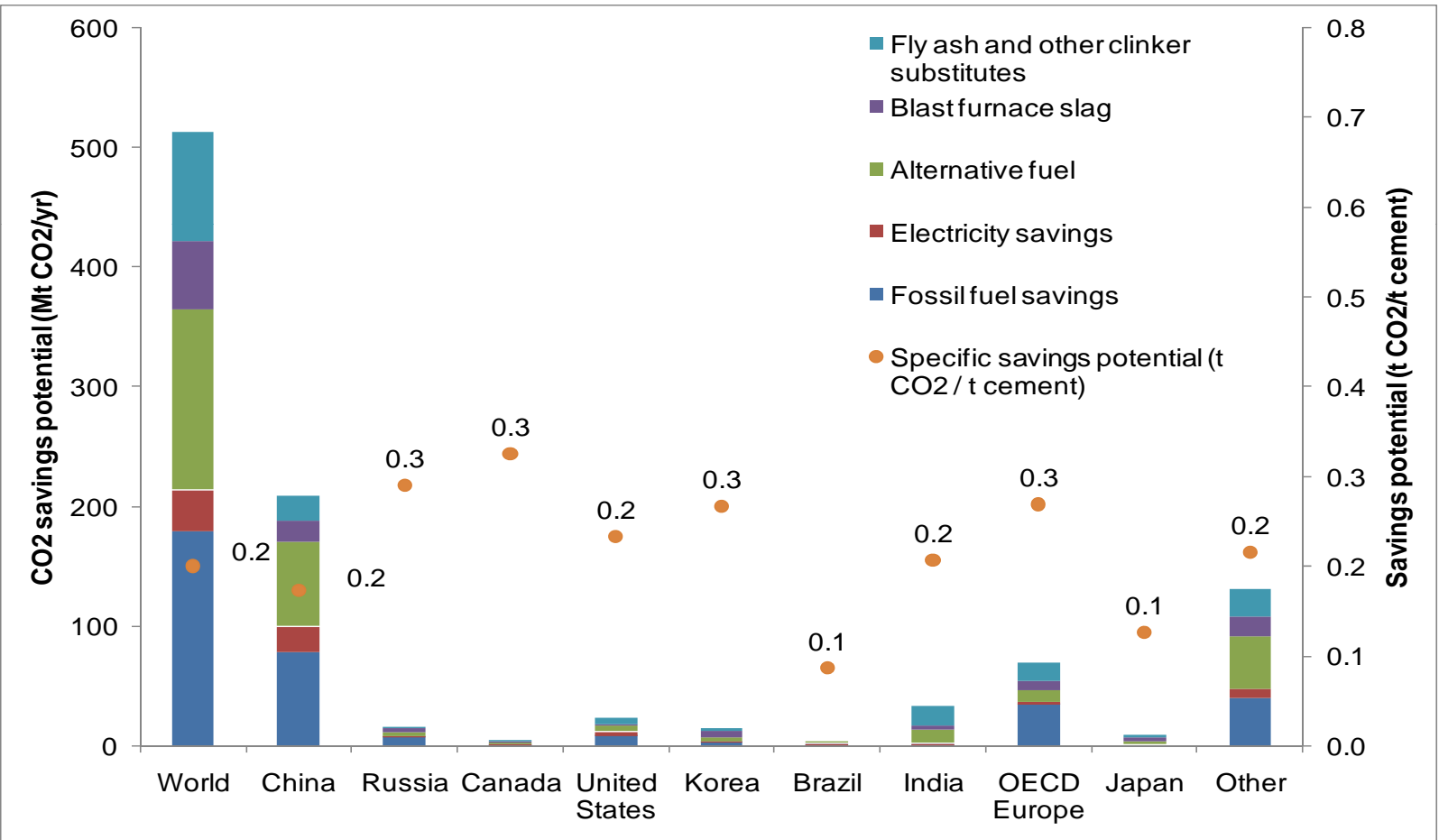
# BAT CO<sub>2</sub> savings potential 2006

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# Key Options for Cement

- **BAT everywhere (energy efficiency measures)**
- **Alternative Fuels**
- **Clinker Substitutes**
- **CO<sub>2</sub> Capture and Storage CCS**

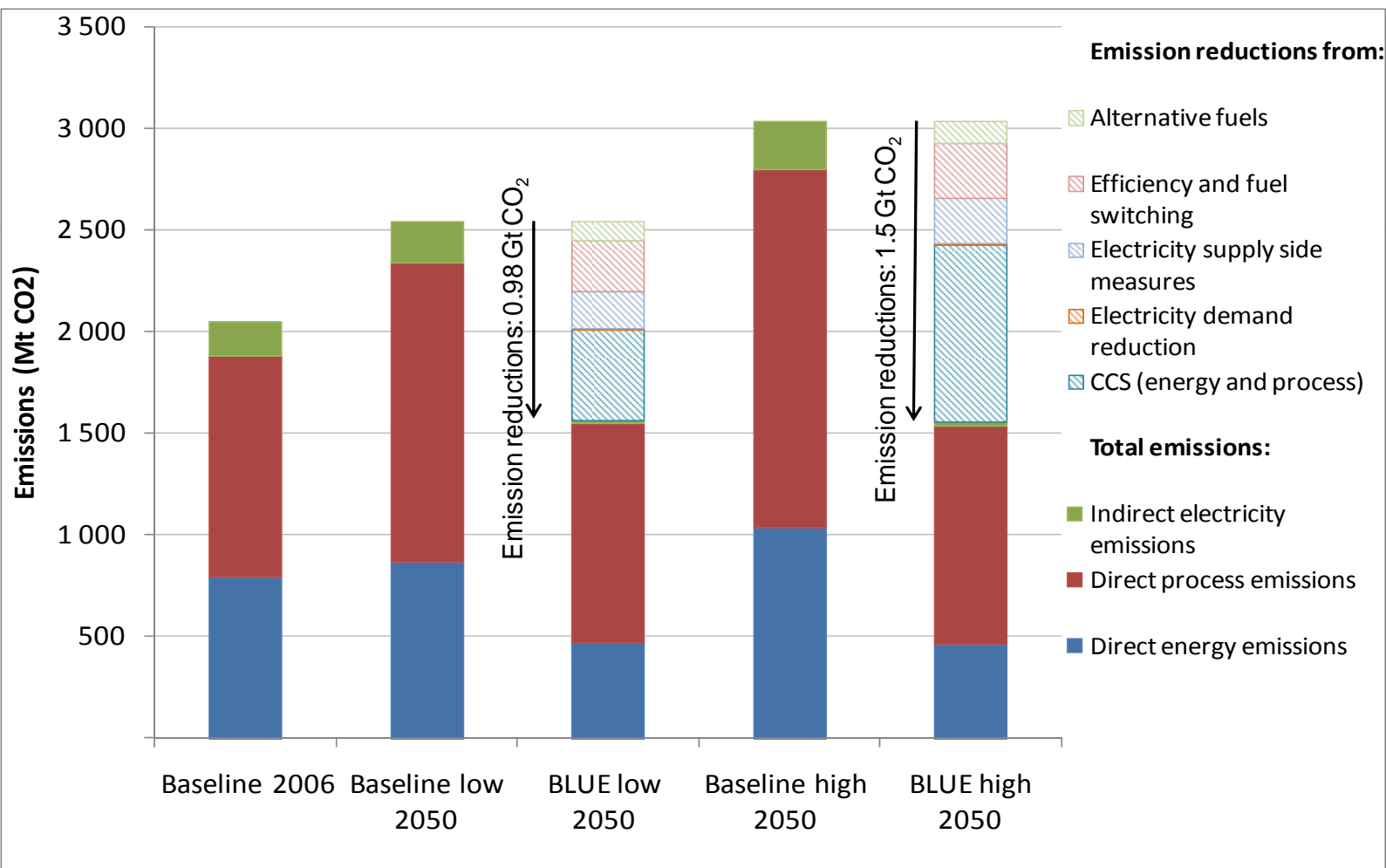
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# CO<sub>2</sub> emissions

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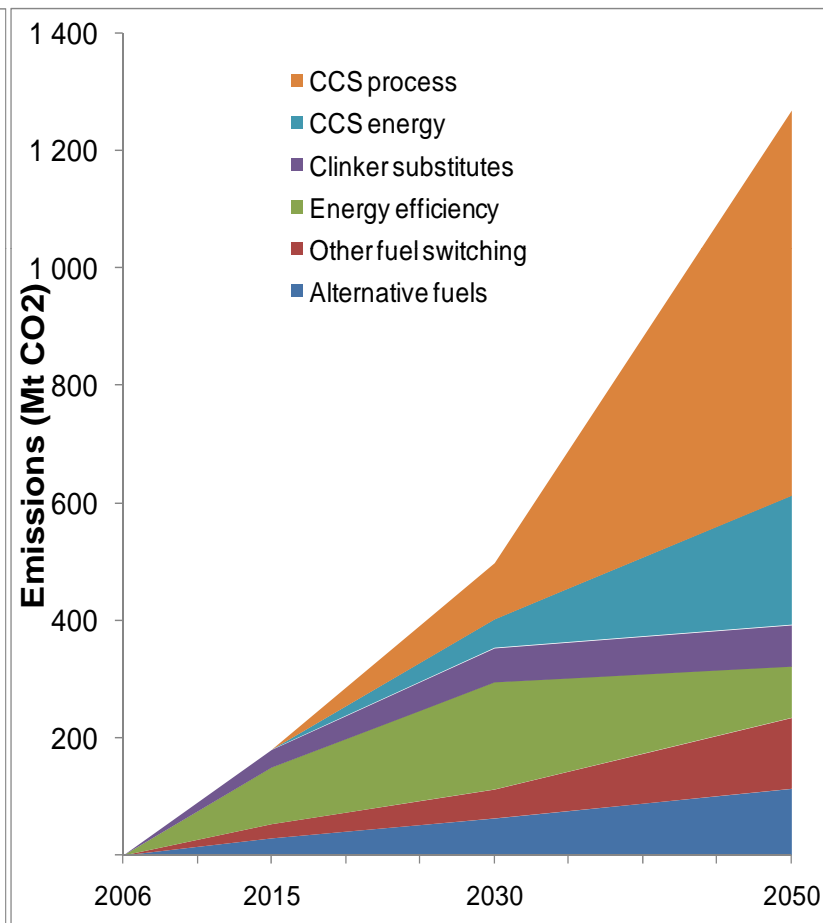
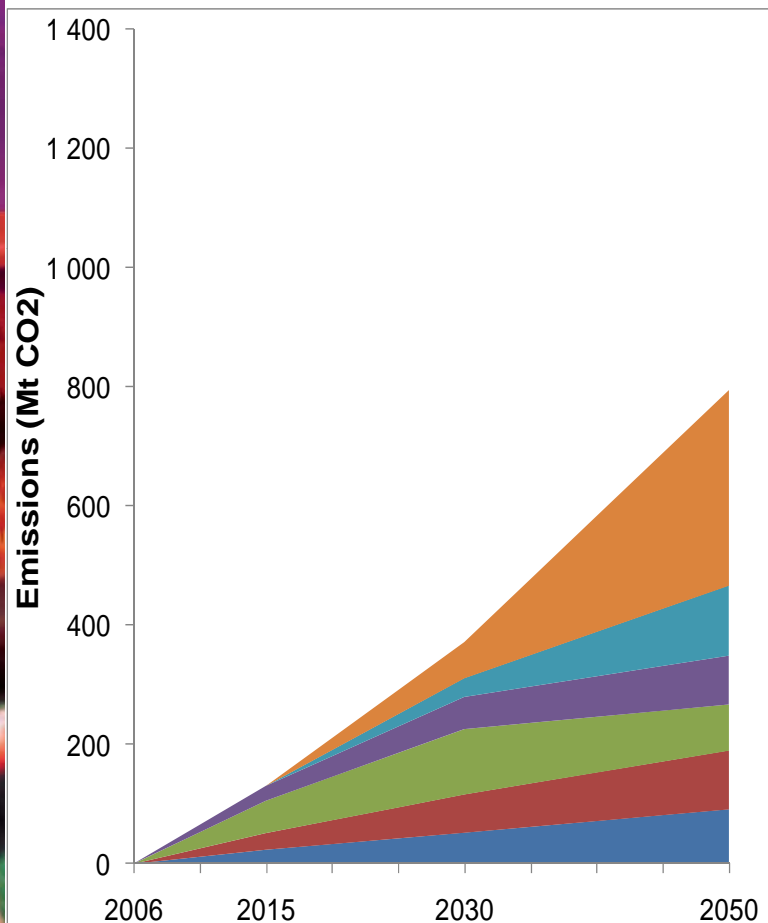
# CO<sub>2</sub> Reduction Potentials

## BLUE low demand

## BLUE high demand

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Direct energy and process emissions only



# IEA Roadmap Definition

*“A technology roadmap is a dynamic set of technical, policy, legal, financial, market & organizational requirements identified by all stakeholders involved in its development. The effort shall lead to improved and enhanced sharing and collaboration of all related technology-specific RDD&D information among participants.*

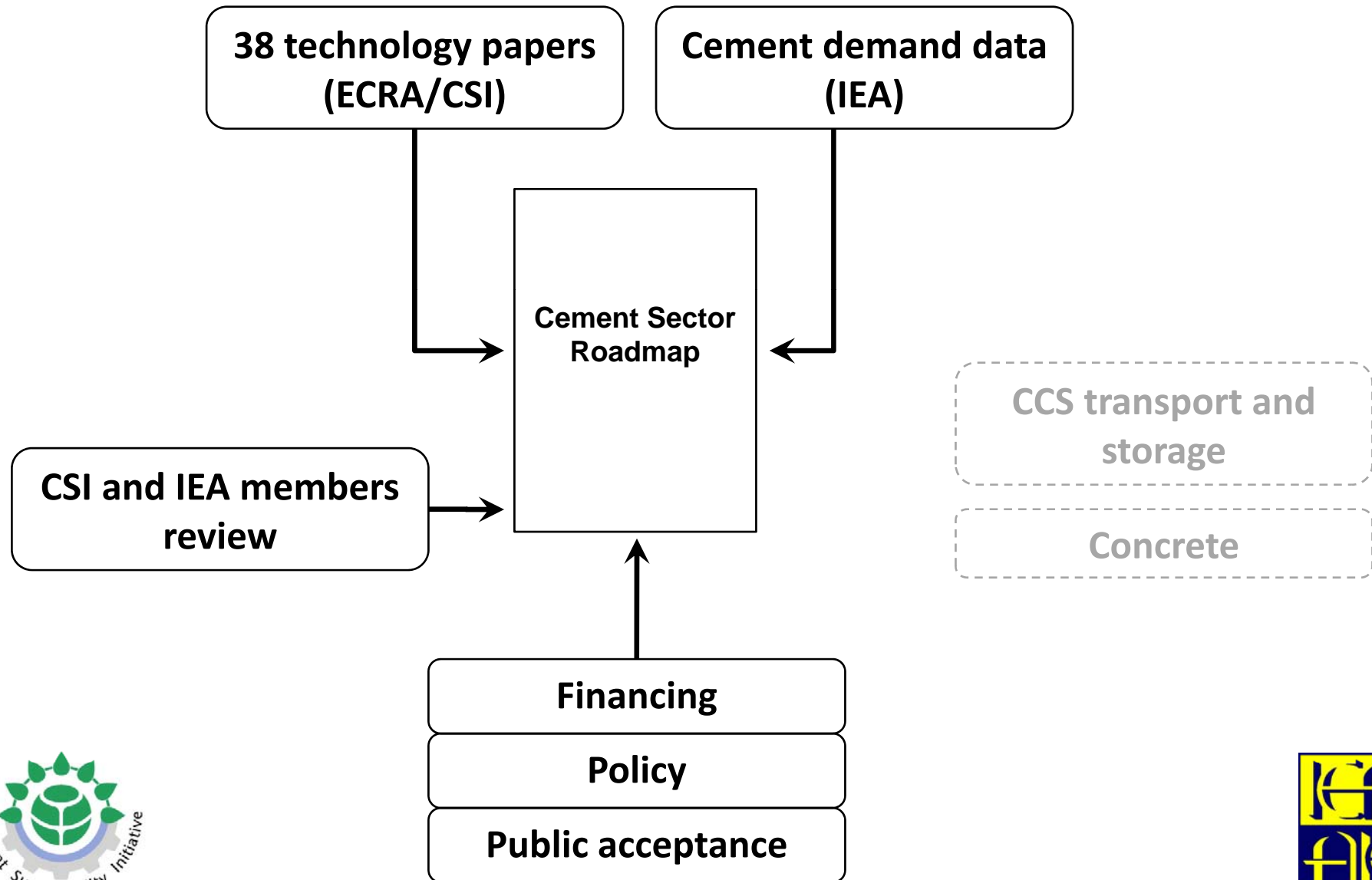
*The goal is to accelerate the overall RDD&D process in order to deliver an earlier uptake of the specific energy technology into the marketplace”.*

# Cement Roadmap Process

- 2 Roadmap sessions held on technology and model analysis (Nov 2008 and Jan 2009)
- Foundation of the roadmap are 38 technology papers prepared by ECRA
- Policy and finance session held Mar 2009
- Technology papers posted on WBCSD/CSI website April 2009
- Roadmap drafting March-July 2009
- Draft roadmap circulated to stakeholders Summer 2009



# Cement roadmap process

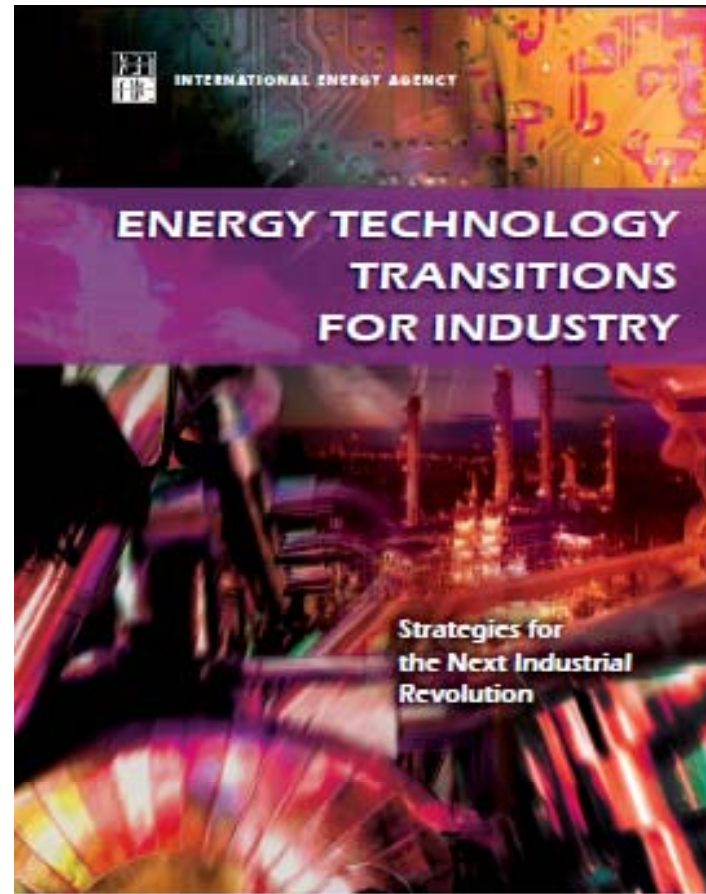


# Roadmap Messages

- Cement is a key material. Demand reduction / substitution is not an option.
- Options today (BAT, alternative fuels and clinker substitutes) are not sufficient
- New technology is needed – CCS and new cement types
- Step increase in RD&D needed, a very long term solution is required
- Deep emission cuts are costly (USD 50-100/t CO<sub>2</sub>) and capital intensive
- Policy should address economic implications
- Cement will become twice as expensive – a challenge and an opportunity



# Thank You!



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