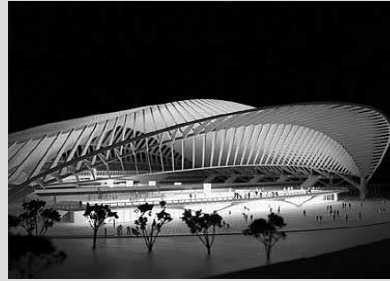


Cement industry and climate action

Pro active approach

Rob van der Meer
13th October 2016



Index

- 1. Challenges from the politics**
- 2. EU Cement industry roadmap 2050 (CEMBUREAU)**
- 3. HeidelbergCement activities**
- 4. Conclusions**

Challenges from the politics in the EU

2005	<ul style="list-style-type: none"> ■ 2005 Start of Phase I ■ 2005 Most NAPs approved, allocations delayed
2006	<ul style="list-style-type: none"> ■ 2006 Additional NAPs approved ■ 2006 New targets for NAPs phase 2
2007	<ul style="list-style-type: none"> ■ 2007 Verdict on German ex post adjustments ■ 2008 Most NAPs for Phase II approved, allocations delayed
2008	<ul style="list-style-type: none"> ■ 2009 Change on CDM / JI emission rights ■ 2010 Benchmark decisions phase 3
2009	<ul style="list-style-type: none"> ■ 2011 Compensation for CO2 costs in electricity ■ 2011 NAPs 2 Poland and Estonia approved
2010	<ul style="list-style-type: none"> ■ 2013 Cross Sectoral Correction factor valid in 2013 ■ 2012 /2013 Backloading / Set aside discussion
2011	<ul style="list-style-type: none"> ■ 2013 / 2014 Structural reforms EU ETS ■ 2013 /2014 Delay and delay in allocation decisions <u>and</u> allocations
2012	<ul style="list-style-type: none"> ■ 2014 New 2030 target: -43% ■ 2014 Re assessment carbon leakage
2013	<ul style="list-style-type: none"> ■ 2015 Market Stability Reserve ■ 2015 Structural EU ETS reform again
2014	<ul style="list-style-type: none"> ■ 2016 ECJ decision on Cross Sectoral Correction factor 2013 ■ 2016 Carbon leakage tiering / new Cross Sector Correction f
2015	<ul style="list-style-type: none"> ■ 2016
2016	<p>10 years of EU ETS: Every half a year a new challenge</p>

Low Carbon Technology Platform initiative for cement (2015)

Cement LCTPI

A **WBCSD**-led movement as the voice of business on sustainability issues

- Building up towards the **UNFCCC COP21 meeting in Paris** (Dec 2015)
- Elaborating sectoral statement of ambition and an action plan of technical solutions to reduce CO₂ emissions through partnerships
- The **CSI** is coordinating input from the **cement sector**

Ambition: Scale up emission reduction in the range of 20 to 25% CO₂ in 2030 compared to business as usual

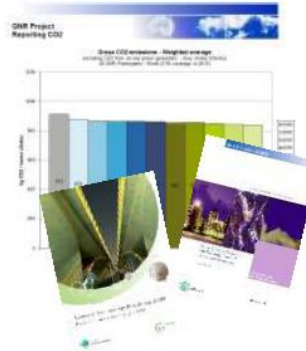
Enhancing **energy efficiency** of the cement manufacturing process



Reducing **clinker / cement ratio**



Scaling up use of **alternative fuels**



Scaling up coverage and implementation of the **CSI tools** (GNR, technology roadmaps) globally, with a focus on China

Engaging the full value chain to maximize **avoided emissions** by usage of concrete



Evaluating **cross-sectoral initiatives** to scale up capture, use & storage of carbon

Developing **new cement clinkers** with lower energy & calcination requirements



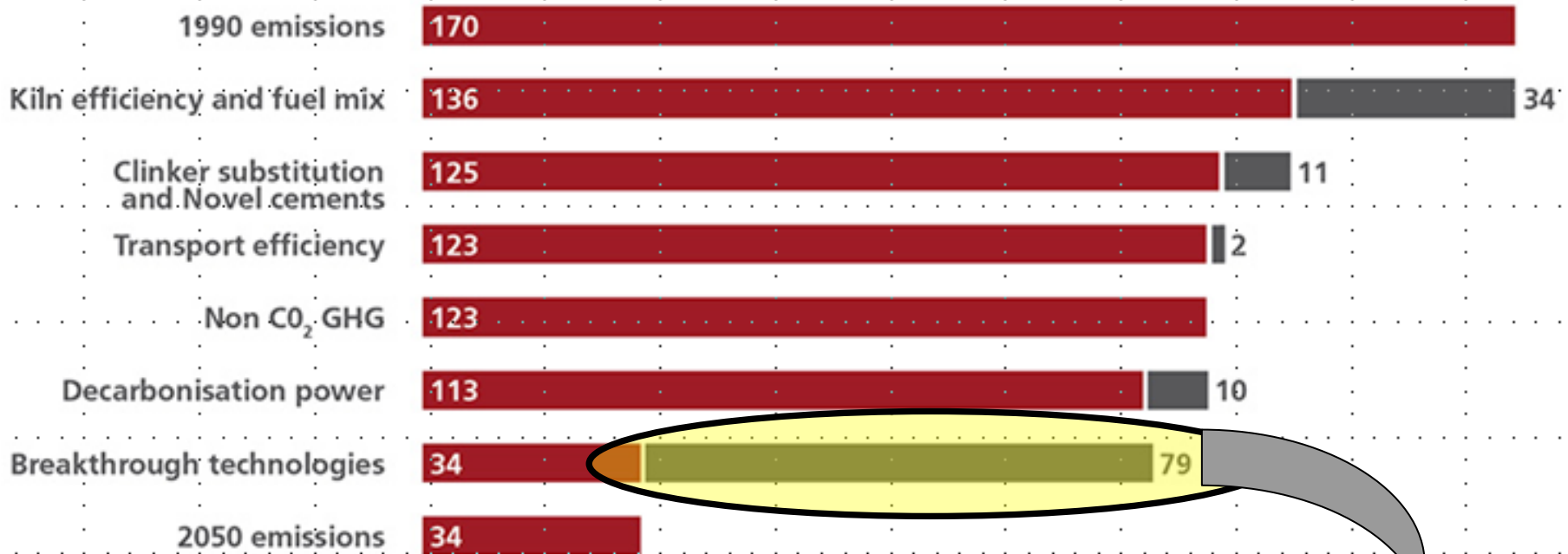
Key partners: International Energy Agency (IEA), International Finance Corporation (IFC), national trade associations

Endorsed by 18 CSI member company CEOs incl. HeidelbergCement



OUR CONTRIBUTION TO THE LOW CARBON ECONOMY

Multiple paths to emissions reduction



<http://lowcarboneyconomy.cembureau.eu/>

Carbon capture will be a key element



HEIDELBERGCEMENT

Group performance 2015

HC Consolidated	1990	2000	2005	2010	2011	2012	2013	2014	2015
Clinker production (Mtons)	58.6	50.9	52.9	54.5	59.8	60.9	60.8	62.7	62.3
Cementitious products (Mtons)	69.0	62.7	67.7	71.5	78.9	80.7	80.5	84.0	83.7
Gross CO2 (Mtons)	53.9	45.2	45.9	47.0	51.9	52.2	52.0	53.9	53.2
Net CO2 (Mtons)	53.3	44.0	44.1	45.0	49.7	49.9	49.7	51.5	50.8
Kg net CO2/t cementitious	773	702	652	629	630	618	617	613	606
Improvement rate (%)	0.0%	-9.2%	-15.7%	-18.7%	-18.6%	-20.0%	-20.2%	-20.7%	-21.6%
Clinker to Cementitious ratio (%)	84.8%	81.4%	78.8%	76.5%	76.3%	76.1%	76.2%	75.7%	75.0%
AF ratio (biomass + fossil) (%)	2.9%	8.8%	14.4%	18.8%	18.3%	18.7%	19.5%	19.4%	19.3%

EU target 2030

43%

gross emissions compared to 2005

HC 2015 performance EU28 38% / 8%
45% / 13%
29% / 9%

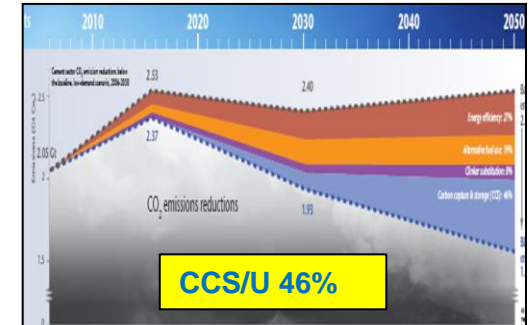
gross emissions compared to 1990 / 2005
net emissions compared to 1990 / 2005
net emissions/ton cementitious to '90 / '05

■ Voluntary targets HeidelbergCement (global, exc.Italcementi)

Target year:	- 2010	15%
	- 2015	23%
	- 2030	20 Mtons/a

HeidelbergCement and Carbon Capture

- **CSI cement technology roadmap 2009 indicated the relevance of CCS/U for cement**
- **ECRA initiated a key project for cement industry**
 - Post-combustion absorption and Oxyfuel process
- **Short overview of HeidelbergCement key projects**
 - Norcem project = 4 test installations for post combustion absorption
 - Hannover pilot cooler for oxyfuel process (CEMCAP)
 - Lixhe project on CO₂ separation from new type of calciner (LEILAC)
- **Potential demo scale semi industrial project in Brevik (Norway)**
 - Governmental decisions September 2016



Carbon capture has the potential to move towards serious business

HeidelbergCement driven collaborations in CO₂ capture

Norway funding

9 m€ Carbon Capture for Cement

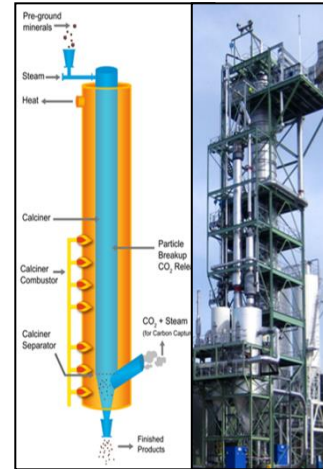


- 4 technologies tested at the kiln stack;
- 2014 – 2016 tests
- May 2015:

www.norcem.no/no/CCS
-conference

EU-funding Horizon 2020

12 m€ CO₂-separation at process



- Australia: commercial MgO; 2012-2014
- HC - Belgium demo plant for cement & lime; 2015-2020

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NORCEM
HEIDELBERGCEMENT Group

GASSNOVA

ecra
european cement research academy

**Followed:
2015 / 2016**

**Feasibility study
demo plant amine
absorption**



HEIDELBERGCEMENT

amec
foster
wheeler



Norcem Carbon Capture project into new phase

Carbon capture and storage, Climate change, European Union

Press Release: Norway breaks vicious cycle of inaction on CCS deployment with concrete plans for industry

Today marks a historic milestone for the deployment of Carbon Capture and Storage (CCS) technology in the EU. Thanks to Bellona's consistent efforts the Norwegian Ministry for Petroleum and Energy today, 30 September 2016, confirmed the Norwegian government's decision to move forward with the country's three CO₂ capture projects from the feasibility study.

■ Next steps

- Further development
- Design of installation
- Development of transport and storage facilities
- Negotiations

NORCEM
HEIDELBERGCEMENT Group

.....and at the same time: oxyfuel

 **ecra**
european cement research academy



- **CemCap projects:** cooler, burner, modelling
- **Pilot project for oxyfuel tests:** 50 – 60 M€
 - Strong commitment EU cement industry
 - Funding is a challenge

Conclusions

1. Predictability of legislation is key for investment decisions

- Current “trend” of every half a year a (major) change does not support

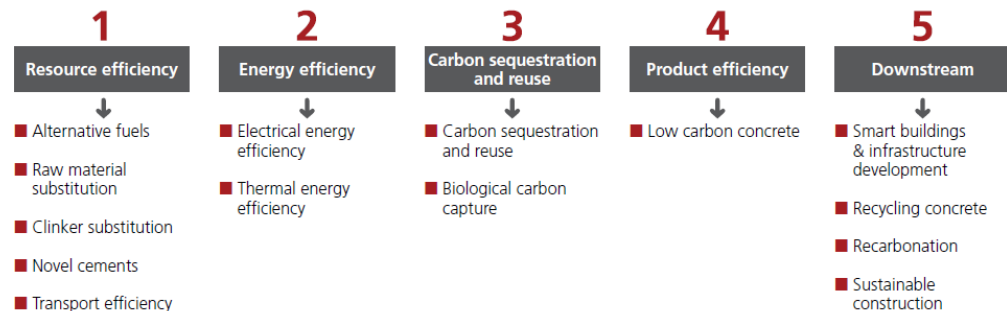
2. Competitiveness of industry in EU28 to be guaranteed

- Relocation of industry does not reduce global CO₂ emissions
- Innovation in cement industry has come always out of Europe

3. There is no single silver bullet

1. Several options to be explored: CCS, CCU, low carbon cements
2. Several policy measures are needed

- Support of innovation, not only for the first project
- Direct emissions reductions versus indirect emissions



4. EU28 cement volume is only < 7% of global



Thank you for your attention !



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