

Cement industry

Inclusion of Consumption

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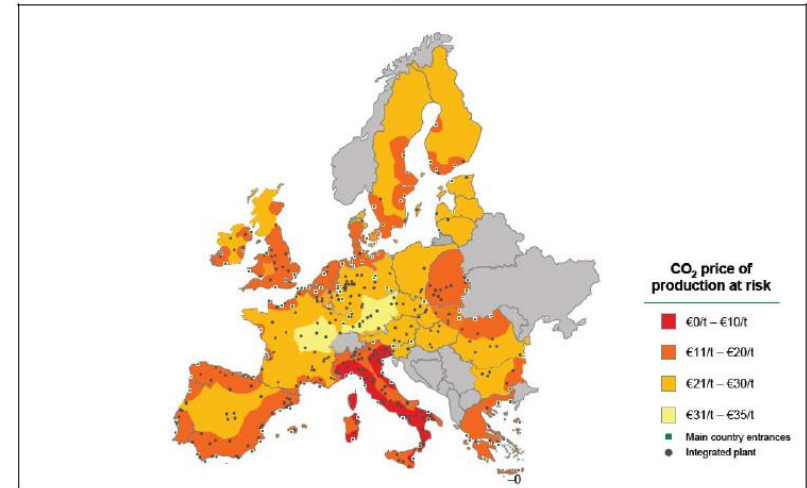


Challenges for energy intensive industries

Competitiveness of EU industry

Challenges from the politics in the EU Key: predictability

Year	Event
2005	Start of Phase I
2005	Most NAPs approved, allocations delayed
2006	Additional NAPs approved
2006	New targets for NAPs phase 2
2007	Verdict on German ex post adjustments
2008	Most NAPs for Phase II approved, allocations delayed
2009	Change on CDM / JI emission rights
2010	Benchmark decisions phase 3
2009	Compensation for CO2 costs in electricity
2011	NAPs 2 Poland and Estonia approved
2010	Cross Sectoral Correction factor valid in 2013
2012	Backloading / Set aside discussion
2011	Structural reforms EU ETS
2013	Delay and delay in allocation decisions <u>and</u> allocations
2012	New 2030 target: -43%
2014	Re assessment carbon leakage
2013	Market Stability Reserve
2015	Structural EU ETS reform again
2014	ECJ decision on Cross Sectoral Correction factor 2013
2015	Carbon leakage tiering / new Cross Sector Correction f
2016	10 years of EU ETS: Every half a year a new challenge



Predictability of legislation

Carbon prices

Economic incentives to unlock mitigation (Climate Strategies, 2014)



Carbon price for consumers !

CO₂ Emissions reductions in cement industry

Direct	1st order (at stack)	2nd order (per ton of product)	3rd order (per ton of product)
■ Clinker production	<ul style="list-style-type: none"> ■ 1. Alternative raw materials ■ 2. Biomass fuels ■ 3. Energy efficiency of kilns, including fuel preparation ■ 4. Fuel switch ■ 5. Alternative clinkers 		
■ Cement production			
■ Concrete production	■ 6. Energy efficiency of slag dryer	■ 7. Clinker substitution	
		■ 8. Reduction of cement content	
		■ 9. Cement substitution	
		■ 10. Cement alternatives	

Indirect	1st order (directly related to cement)	2nd order (indirectly related to cement)	
■ Clinker production	<ul style="list-style-type: none"> ■ 11. Alternative fossil fuels (secondary non biomass fuels) ■ 12. Electrical efficiency (co generation of power) 	<ul style="list-style-type: none"> ■ 15. Carbon Capture & Storage ■ 16. Carbon Capture & Use ■ 17. Emissions Trading, offsets 	
■ Cement production			
■ Concrete production	■ 13. Grinding efficiency		
	■ 14. Recarbonisation of concrete products	■ 18. Absorption by concrete waste: recarbonation	<ul style="list-style-type: none"> ■ 19. Energy efficiency buildings: thermal mass, etc. ■ 20. Efficient transport infrastructure

HeidelbergCement's 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's activities

- 1. Innovation:** 50% of R&D budget for low carbon solutions
 1. Development low carbon cements
 2. Development of new clinkers: BCT, others
 3. Active participation in ECRA projects on oxyfuel clinker production
 4. Etc.
- 2. Clinker substitution**

Global strategy, differentiated approach based on availability
- 3. Alternative fuels including biomass**
- 4. Carbon capture:** CCS and CCU projects
 1. Feasibility study of Norcem CCS project (Norway) finalized
 2. EU funded projects in Belgium, Italy, Germany, and more
 3. 10 – 15 CCU projects in different phases of development: algae, microbes, biofuels, mechanization, bio-ethanol, etc.

Conclusions

1. Predictability of legislation is key for investment decisions

- Current “trend” of every half a year a (major) change does not support
- Different approaches over the world: EU28, USA, China, etc.

2. Key for mitigation measures are

1. Competitiveness for EU industry
2. Carbon price for consumers
3. Economical and technical feasibility

To be based on whole lifecycle

3. Cement is used in constructions: **C⁴**

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|--|-------------------------------------|
| – Clinker = 1 st intermediate product | High CO ₂ emissions |
| – Cement = 2 nd intermediate product | Lower CO ₂ emissions |
| – Concrete = basic construction material | Nearly no CO ₂ emissions |
| – Construction <u>with</u> concrete (final) | Zero emissions ?????? |

Thank you for your attention !



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