Cement industry and climate action
Pro active approach

Rob van der Meer
13th October 2016
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Challenges from the politics in the EU

- 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
- 2011: Compensation for CO2 costs in electricity
- 2011: NAPs 2 Poland and Estonia approved
- 2013: Cross Sectoral Correction factor valid in 2013
- 2012/2013: Backloading / Set aside discussion
- 2013/2014: Structural reforms EU ETS
- 2013/2014: Delay and delay in allocation decisions and allocations
- 2014: New 2030 target: -43%
- 2014: Re assessment carbon leakage
- 2015: Market Stability Reserve
- 2015: Structural EU ETS reform again
- 2016: ECJ decision on Cross Sectoral Correction factor 2013
- 2016: Carbon leakage tiering / new Cross Sectoral Correction factor

10 years of EU ETS: Every half a year a new challenge
Low Carbon Technology Plattform Initiative for cement (2015)

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
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

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

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

Endorsed by 18 CSI member company CEOs incl. HeidelbergCement
**Multiple paths to emissions reduction**

<table>
<thead>
<tr>
<th>Description</th>
<th>1990 Emissions</th>
<th>Kiln efficiency and fuel mix</th>
<th>Clinker substitution and novel cements</th>
<th>Transport efficiency</th>
<th>Non CO₂ GHG</th>
<th>Decarbonisation power</th>
<th>Breakthrough technologies</th>
<th>2050 emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>170</td>
<td>136</td>
<td>125</td>
<td>123</td>
<td>123</td>
<td>113</td>
<td>34</td>
<td>34</td>
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<tr>
<td>Carbon capture will be a key element</td>
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Group performance 2015

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

EU target 2030 43% gross emissions compared to 2005

HC 2015 performance EU28 38% / 8% gross emissions compared to 1990 / 2005

45% / 13% net emissions compared to 1990 / 2005

29% / 9% 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 CO\textsubscript{2} 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€ CO\textsubscript{2}-separation at process

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

Followed: 2015 / 2016
Feasibility study demo plant amine absorption
Norcem Carbon Capture project into new phase

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

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

- 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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