Waste-derived fuels in cement production – a triple-win concept

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Contents

1. Background
2. Substitution of fossil fuels
3. Contribution to waste management
4. Reduction of CO₂ emissions
HeidelbergCement

- 57,000 employees
- Core businesses: Aggregates, cement, and related businesses
- 2,600 locations in 50 countries:
  - 650 sites for crushed stone, sand and gravel
  - 102 cement plants and grinding mills
  - 1,400 concrete plants
  - 134 asphalt plants
- Cement capacity 100 million tons

Northern Europe

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement plants</td>
<td>6</td>
</tr>
<tr>
<td>Cement terminals</td>
<td>45</td>
</tr>
<tr>
<td>Aggregates</td>
<td>36</td>
</tr>
<tr>
<td>RMC</td>
<td>103</td>
</tr>
<tr>
<td>Concrete products</td>
<td>14</td>
</tr>
</tbody>
</table>
Building on Sustainability / Our main focus

- Further reducing other environmental impacts
- Protecting the climate
- Using waste as a resource
- Working for sustainable construction
- Delivering a prominent positive contribution to biodiversity
- Giving highest priority to health and safety

Sustainability is one of our strategic pillars

- HeidelbergCement strategy
  - Mark pro
  - Operational excellence
  - Human Resources
  - Strategic growth
  - Sustainability

57,000 employees working together for our common goals
Co-Processing and reduction of CO₂ emissions

**Conventional approach**
- GHG emissions: CO₂, SO₂, NOx
- Fossil Fuels (Coal, Fuel Oil, Natural Gas)

**Integrated approach**
- GHG emissions: CO₂, SO₂, NOx
- AFR (Waste) + Fossil Fuels (Coal, Fuel Oil, Natural Gas)
- Co-processing of alternative fuels and raw materials

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Cement production

- Raw materials (limestone and additives) are burnt in a rotary kiln
- Flame temperature is above 2200 C°
- Coal is still seen as primary fuel
- Cement kilns are suitable for waste derived fuels
- The output from the process is called clinker
- Clinker is ground in mills to cement
What’s alternative fuel?

- **Hazardous waste**
  - Solvents, paint, oil, glue etc
  - Solid or liquid

- **Non-hazardous waste**
  - RDF (Refuse Derived Fuels; paper, wood, cardboard, textiles, plastics)
  - Animal meal
  - Wood chips
  - Charcoal
  - Tyres

- **Biomass content is important**
Key figures related to type of fuel

- Brevik
- Degerhamn
- Kjøpsvik
- Kunda
- Skövde
- Slite

This is our goal for the next 5-7 years!

CO2 emissions – a great challenge!

- The calcinations process – a chemical reaction we cannot change
- Fuels – here we can make changes:
  - Replace coal with alternative fuels. This will save non-renewable fuels – and at the same time reduce CO2 emissions
  - Increase use of bio fuels
  - Generate part of our own energy needs
    - Wind and co-processing
- Develop new technology (CCS)
CO₂ emissions per ton of clinker, Norcem Brevik

- Calcination
- Fuel

CO₂ emissions per ton of clinker, Norcem Brevik

- Calcination
- Fossil
- Biomass
The cement of tomorrow

- HeidelbergCement has set goals for reducing limestone based clinker:
  - Decrease CO₂ emissions per ton cement
  - Optimize the use of natural resources
  - New technology brings possibilities of new cement qualities
  - Increased consumption of natural minerals

- Fly ash, slag and natural minerals are already used in our cement production.

- Research and development focusing on new cement qualities with lower amount of clinker is a must and is in progress.

A good example

- Submerged tunnel in Oslo, Norway:
  - 70 000 m³ concrete in tunnel elements
  - 26 660 ton cement with 30 % fly ash
  - 8 000 ton reduction of CO₂ emissions compared with conventional concrete

- 60 million cars passing the tunnel equals the CO₂ reduction!
- **Economic performance**
  - We reduce our energy costs considerably when increasing the use of waste derived fuels
  - Alternative fuels with a high biomass content contribute to a surplus of CO₂ allowances

- **Substitution of fossil fuels**
  - A contribution to save limited resources
  - Reduction of our carbon footprint

- **Contribution to solve the waste challenges in society**
  - Safe handling of hazardous waste
  - Reduced volumes to landfills
  - Energy recovery part of a good waste management