Environmental aspects – a business case

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General Manager, Alternative fuels
A FLSmidth case story of:

- Leveraging the great potential developing from the strong global trends of
  - Energy
  - Emissions control & climate change
  - Waste management

- Systematic innovation
  - Business
  - Technology
Lars Skaarup Jensen

- **General Manager, Alternative Fuels**
- Joined FLSmidth in 1996

**Positions in FLSmidth:**
- General Manager of Alternative Fuels (2007 - )
- R&D and emissions specialist (1999-2005)
- PhD (1996-1999) - Low NOx calciners for cement production
Overview

- Environmental issues:
  - Overview
  - Opportunities related to emissions control

- The Alternative Fuels Initiative:
  - A strong trend in the cement industry
  - A strong business innovation case
  - A successfully implemented project

- Summary
Environmental issues & sustainability

Major focus areas in industry and society:
- Global warming
- Preserving resources (e.g., fossil fuel, raw materials, water)
- Recycling and recovery (energy and materials)
- Waste management
- Emissions of harmful species:
  - to air
  - to water
- Nature conservation and quarry rehabilitation
Emissions control & monitoring
Demand for: Technology, knowledge and services

- Global warming
  - Cement production accounts for 8% of global CO2 emissions
  - Landfill methane emissions are substantial (waste dumps)
- Other important emission components:
  - Dust
  - NOx (tax being imposed on industrial emitters in Denmark)
  - SO2
  - CO (strict limits apply in USA)
  - Heavy metals (Mercury is a hot topic in USA)
  - Organics, Dioxins, HCl, HF
- Stricter legislation and monitoring requirements
  - Tightening of legislation
  - When using of waste derived fuel
    (EU Waste Incineration Directive applies)
The alternative fuels initiative

- Launched in May 2007

- **Mission**
  - Ensure FLSmidth a leading position
  - Leverage market potential

- **Today**
  A strong team of 35
  - consolidating and integrating alternative fuels globally in the FLSmidth organisation
Alternative Fuels is the dominating topic at cement conferences & seminars

- A global trend!
- A good indication of future importance
- A competitive parameter
- A strong FLSmidth profile!

London 4-5 February 2008

Most innovative technology for alternative fuel use: FLSmidth for HOTDISC
Growth in an construction downturn!
- German trend will become global

Rapid increase in alternative fuel usage during the past 5 years
- due to focus on lowering production costs in a cement market with excess production capacity
Global cement producers are rapidly increasing use of alternative fuels

<table>
<thead>
<tr>
<th>Cement producer</th>
<th>Alternative Fuels fraction</th>
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</thead>
<tbody>
<tr>
<td>Lafarge</td>
<td>9.8%</td>
</tr>
<tr>
<td>Holcim</td>
<td>11.4%</td>
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<tr>
<td>Heidelberg</td>
<td>17%</td>
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<tr>
<td>Cemex</td>
<td>7%</td>
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Why is Alternative Fuels such a strong trend and bound to become even stronger?

- **Energy**
  Economics of fuel savings

- **Global warming**
  Bio fuels reduces CO2

- **Waste management**
  Developing world needs sustainable waste management systems
## Economic calculation example
(USA plant producing 1 million tonnes cement pr. year)

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>50% Alt. Fuel without production loss</th>
<th>50% Alt. Fuel with production loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative Fuel fraction</td>
<td>0%</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>Fuel cost (daily)</td>
<td>$26,470.59</td>
<td>$13,235.29</td>
<td>$13,235.29</td>
</tr>
<tr>
<td>CO2 quota value</td>
<td>$0.00</td>
<td>-$6,394.74</td>
<td>-$6,394.74</td>
</tr>
<tr>
<td>Extra operating costs</td>
<td>$0.00</td>
<td>$3,000.00</td>
<td>$3,000.00</td>
</tr>
<tr>
<td>Value of lost clinker production</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$6,000.00</td>
</tr>
<tr>
<td>Total fuel related cost (daily)</td>
<td>$26,470.59</td>
<td>$9,840.56</td>
<td>$15,840.56</td>
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<tr>
<td>Total savings (daily)</td>
<td></td>
<td>$16,630.03</td>
<td>$10,630.03</td>
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<tr>
<td>Annual savings</td>
<td></td>
<td>$5,213,514.71</td>
<td>$3,332,514.71</td>
</tr>
</tbody>
</table>
Bio fuels for cement plants

Cement production accounts for 8% of global CO₂ emissions

**WWF vision (yearly by 2050)**
Displace 0.4 Gt CO₂ by using bio fuels
The developing world needs sustainable waste management systems

WWF
Cement kilns can have an extremely positive effect on the waste management chain
Firing waste derived fuel
Results since launching Alternative Fuels in 2007

- The first projects have been successfully implemented
- Projects have been sold and are under implementation
- Many paid pre-engineering and feasibility evaluations shows that customers value the new offering by FLSmidth
  - Whole projects
  - Emissions expertise
A successfully implemented project

Germany 2007/2008

Results
- More alternative fuel
- Lower emissions
- More efficient use of production capacity
- Rapid implementation
A successfully implemented project

Technology installed
- Combustion and calcination system
- Fuel feeding systems (FLSmidth KOCH)
- Emission control installation
Project being installed in 2009

- Setting new standards
  - Flexibility
  - Minimize pre-processing requirements
  - One solution supplier
Customers value the new services and value proposition

- Feasibility evaluations
- Pre-engineering
- Partner during permitting
Summary

- **Many environmental aspects are business drivers**
  - FLSmidth addresses main society and industry needs
  - Emissions control is a strong industry focus area
  - Industry demands *technology, knowledge* and *services*

- **Alternative Fuels**
  - A strong industry trend
  - Driven by energy costs, climate change and waste management
  - Structured business innovation by FLSmidth

- **Results of the new Alternative Fuels business**
  - FLSmidth has established a strong global team of 35
  - Successfully implemented projects
  - Our customers value the new offering
Questions