LCA applied for Alternative Resources (AR) Management as a “Sustainability act”

A Vision ...

Jean-Pierre Degré
SVP SD / Alternative Resources
July 2011
Holcim is present on all continents in over 70 countries

- 151 cement plants
- 415 aggregate plants
- 1'217 concrete plants
- 125 asphalt plants
Holcim resources need ….

In 2010

- **Energy**
  - Holcim thermal energy consumption was 398'562 TJ
    - Our global thermal substitution rate was 12.5%
    - This TSR corresponds to 49'800 TJ.

- **Mineral resources**
  - Holcim consumed 182.3 million tons of natural raw materials (2009: 179.2)
  - and 27.8 million tons of alternative raw materials (2009: 26.7)
  - to produce 156.7 million tons of cement (2009: 149.7).
Sustainable Development (SD) is a fundamental element of Holcim strategy, vision and mission

**Vision**

Our vision is to provide foundations for society's future.

**Mission**

Our mission is to be the world's most respected and attractive company in our industry – creating value for all our stakeholders.

**Strategy House and the Triple Bottom Line**

Creation of Value

- Goal
- Strategy
- Mindsets
- Base

- Strategy House
- Product Focus
- Geographic Diversification
- Local Management Global Standards
- Mindsets
- Sustainable Environmental Performance
- Better Cost Management
- Permanent Marketing Innovation
- Human Resources Excellence
- Base
- People
- Corporate Social Responsibility

Holcim Group Support@2010  ACR-Holcim LCT – July 5 2011
Holcim’s specific net CO₂ emissions compared with main global competitors

- The Holcim Group average is 5.7% better than the GNR industry average and 2.8% better than Lafarge;

Consolidated values for China (39.9%) and Guatemala (20%). Source: CO₂ inventory 2009 and websites of main competitors
Worldwide cement demand increases 2% p.a. leading to further increases in energy and raw material demands.

New strategies are needed to cope with increased resources need and increasing CO₂ emissions.

toe = tons of oil equivalent (42 GJ) ; trm = tons of raw material ; CAGR = Compound annual growth rate
We are literally eating away our planet and leaving a huge waste pile
..we’re well on this way… it’s time to reverse it

by Quino
Current waste management practices leave a substantial part of the resource potential of waste unused.

Theoretical energy from waste including waste that can be recycled:
- Paper & pulp: 16%
- Steel industry: 34%
- Chemical industry: 25%
- Cement industry: 6%
- None ferrous industry: 5%
- None metal industry: 14%

Potential energy from waste excluding waste that can be recycled:

<table>
<thead>
<tr>
<th>Year</th>
<th>EU25 Energy Consumption (Mtoe)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AY2005</td>
<td>458</td>
</tr>
<tr>
<td>E2005</td>
<td>149</td>
</tr>
<tr>
<td>E2030</td>
<td>248</td>
</tr>
</tbody>
</table>

Estimates indicate that worldwide up to 8.5 billion tons of waste is discarded each year. Despite all the efforts to minimize waste, more than 80% is currently landfilled, dumped or burned illegally, contributing to pollution and not being accessible for resource-intensive industries.
Co-processing is a **THE** alternative to save our environment and improve industry ecological footprint

**Co-Processing** is…

…the use of waste materials in RII’s (Resources Intensives Industrial processes) such as cement, lime, steel, glasses, power generation etc. instead of fossil fuels & natural resources

**Applied locally** Co-processing benefits to:

- Upgrades waste management within the waste hierarchy
- Reduces wastes health & environmental impacts
- Maintains and improves the industrial sector's competitiveness
- Decreases (largely) the costs of waste management
- Improves all human and technical-economical factors
Holcim vision for wastes management hierarchy.

Main drivers:
- Life Cycle Assessment
- Decision tree process

1. **Reduce**
   - When reduction / reuse is not feasible

2. **Reuse**
   - When re-processing is not feasible

3. **Recycle - Re-processing**
   - Recycling of end-of-life products
   - CI: Wastes as AMICO and/or AR and/or AG

4. **Resources Co-processing in existing RII’s**
   - Process specific guidelines
   - Pre-processing is key

5. **Wastes disposal activities**
   - For organics: Incineration
     - Wastes-to-energy programs
     - Energy efficiency is key
   - For minerals: Land filling
From Wastes to AR: HOLCIM STRATEGY

Direct access to clients & Pre-processing facilities

- Each Holcim GPC’s must create a specific AR business, unit, services oriented with a specific brand
- Objectives:
  - interface between the wastes markets and the cement factory
  - For wastes pre-processing: marketing, identification, control, conditioning
  - and AR delivery to the cement facility

- Target: a Commun brand:

geocycle
A member of the Holcim Group

geocycle
A member of the Holcim Group
The global Holcim waste management network, with Geocycle as the dominant brand

- Holcim WM operational in 42 countries
- 40 pre-processing platforms... Foresee in 2011/2013:
  - Indonesia, Vietnam, India, China, Bulgaria, CZ republic, etc..
- > 2000 direct FTE in WM
Holcim steadily increases its thermal substitution rate (TSR)

Thermal Substitution Rate 2005 - 2009
Like for Like, All Holcim Plants (MEDOS)

- Acid tar deposit
- Landfilling
- Industrial wastes
- Hydrocarbon sludges
- Used tires
- Plastics mixtures
Waste volumes Co-processed last 5 years…

Wastes as AFR co-processed 2010 last 5 years….>> 30 000 000 tons
Wastes portfolio: pre- and co-processed 2010

- Diaper trimmings
- Expired corn seed
- Damaged beans
- Plastics
- Expired products
- Bleaching earth
- Mill scale
- Rubber wastes
- Textile waste
- Refinery wastes
- Expired food/health products
- Lime sludge from water treatment
- Fly ash & bottom ash from power plants
- Packaging material
- Calcium gypsum from sulfur scrubber
- Sorted municipal solid waste
- Aluminum production waste
- POPs
- Sewage sludge
- Contaminated soil
- Foundry sand

- Paint wastes
- Used oil & grease
- Scrap tires
- Wood chips
- Solvents
- Carbon fines
- Oil filter fluffs
- Coking wastes
- Shipping wastes
- RDF fluff & pellets
- Blasting grit
- Refinery catalyst
- Filter cake

Holcim Group Support@2010
ACR-Holcim LCT – July 5 2011
“RDF” related wastes: 2010, Holcim World

723605 tons
Sludge’s related wastes: 2010, Holcim World

355652 tons
The Three Gorges Dam corporation and Huaxin finalized a long-term commitment for cleaning the Yangtze River.

- Thousands of tons of FM are collected annually to avoid the risk of blockages/damages at the Three Gorges ...
- Holcim / Huaxin just starts co-processing last July
- Estimated volumes are > 30000 t/y of floating materials
Example – Obsoletes Pesticides & PCB


- China
- Colombia
- Australia
- Sri Lanka
- El Salvador
- Vietnam
- Phillipines
- ...
Example: Holcim Eastern EU

**Bulgaria / Sofia**

- Over some 4 – 5 years Sofia was facing a problem without solution
  - Generating 1000 t.d MSW
  - the old landfill that should be closed in 2005
- Holcim / Ecorec agreement to develop co-processing – contract signed in September 2008
- With the EU support, some additional Capex needed by municipality of Sofia… mainly to improve the moisture content…
- Start Co-processing at Beli Izvor

**Romania**

- Platform (August 18th, 2009)
EU – About MSW co-processing potential....

Percentage of MSW incinerated by country.

- Ireland
- Hungary
- Slovakia
- Denmark
- Sweden
- Switzerland
- Belgium
- Luxemburg
- Netherlands
- France
- Austria
- Germany
- Norway
- Germany
- Portugal
- Iceland
- Great Britain
- Czech Republic
- Italy
- Finland
- Spain

~50%
20-30%
10-20%
The Co-processing concept
Moving to specific legal framework

- Strategic alliance with GTZ (2003 – 2009)
  - International guidelines for the co-processing of waste materials in the cement production commonly proposed

- From those guidelines, specific legal frames on co-processing are implemented or under implementation in around 12-15 countries
  - More advanced: Mexico, Salvador, Costa Rica, Colombia, Ecuador, Brazil, Chile, China, Lanka, Philippines, South Africa...
Following the Holcim – GTZ guidelines: Countries in favor of the implementation of specific guidelines for co-processing

Guidelines used as reference in stakeholder’s dialogues

Agreement signed

Under discussion

April 2008 / JPD
EU... Recognition of Co-processing .... On its way

- Study by J. Lohse providing recommendations for legal recognition of co-processing
  - Integration in waste hierarchy (Art 4, WFD)
  - Additional recovery operation (Annex II, WFD)
  - Guidelines for interpretation recovery, recycling (Art 38.1, WFD)

- The co-processing of waste has been officially recognized by the European Commission as a resource efficient best practice under its flagship initiative for a resource-efficient Europe under the Europe 2020 strategy (EU publication January 26 – 2011)
Co-processing to be positioned in the Waste Management Hierarchy as a **combined** option to recover mineral and organic parts of the wastes.

**Main drivers:**
- Life Cycle Assessment
- Decision tree process

- **Avoidance & Reduction**
- **Reuse**
- **Recovery**
- **Co-processing**
  - 100 % material recovery
- **Incineration / co-incineration with energy recovery**
  - 100 % Energy recovery
- **Landfilling**
Co-processing now systematically advocated by Cembureau and EU cement industry …

Experiences in co-processing alternative fuels in the German Cement industry

Martin Oerter, Düsseldorf

European Union Sustainable Energy Week
Brussels, 09 February 2009
India …..
Co-processing concept extended to more RII’s

Guidelines on Co-processing in Cement/Power/Steel Industry

February 2010

Central Pollution Control Board
(Ministry of Environment & Forests, Govt. of India)
Parivesh Bhawan
East Arjun Nagar, Delhi – 110 032
Co-processing: moving to an **UN legal frame**

- **June 2008:** Co-processing is presented in Basel Convention COP 9 Decision: To review incineration guidelines portfolio, including co-processing
- **Nov 2008:** Chile volunteer to draft Technical **Guidelines for Co-processing of Hazardous Waste in Cement Kilns**
- **Nov 2009 – March 2011:** process led by Chile with different rounds for comments (EU, NGO's, Latam countries, Cembureau, Canada, etc.....)
- **March 2011:** 4° and last draft issues
- **Oct 2011:** COP 10 – Cartagena / Colombia
  - Presentation & discussion
  - Endorsement
The business impact for cement is higher than for competing products (Why is CO₂ so important for the Cement Industry?)

CO₂ emission per unit of production:
CO₂ emission per tonne cement and per per m³ concrete is relatively low

CO₂ emission per US $ of Revenue
CO₂ emission per sales revenue is high for cement and lime (and relatively low for concrete). CO₂ emission per sales revenue is low for aluminum and steel due to the high price per tonne

(Ref.: cement 100$/t, steel:1000$/t, aluminum 3000$/t)

CO₂ is likely to become the single most important part of the marginal production cost.
JPD Challenge ..... 
Holcim / Cement Industry Ambition to AR .....???
The Holcim value chain offers opportunities to integrate many types of LGR and wastes

**Target:**
To integrate LGR and wastes in our end-products portfolio.
For lowering (Getting 0 ???) environmental footprint.

- **AFR**
  - Advanced waste processing
  - BAT
  - Thermal (gas/py)
  - Upgraded pre-proc.
- **AMICO**
  - Synthetic MIC from LGR & waste
  - New binders AR & waste-based with low CO2
- **AAgg.**
  - Alternative aggregates
    - Urban quarrying
    - CDW
    - IBA
- **Clinker Manufacturing**
- **Binder Manufacturing**
- **Concrete and Building Products Production**
JPD Message
Cement Sector Ambition to AR … Potential !!!

- Under LCA and Decision tree umbrella’s, Mandatory for Cement producers and other RII’s to use wastes and low grade resources
  - Innovation – R/D – New products and processes portfolio etc…

- The production of Cementitious binder at 0 % clinker and from 100 % W/LGR management is possible……

- Joining NGO’s to target the cement industry for a CO2 reduction of 80 % per ton of end-product…..Credible dead-line: 2030 ….
The training is split into an introduction module and seven thematic modules (modules 2 to 8) which cover the different topics of co-processing waste in cement kilns.

The thematic modules cover the topics stipulated in the "Guidelines on co-processing waste material in cement production".

**Module 1: Introduction**
- Background information on co-processing as a holistic approach

**Module 2: Waste Management**
- Technical, financial, legal and social elements of integrated waste management

**Module 3: Understand Cement Production**
- Basics of cement production and co-processing

**Module 4: Application of Pre- and Co-Processing to Cement Production**
- Environmental basics of emissions, emissions, pollutants and their impacts, emission and waste analysis, BATs

**Module 5: Occupational Health and Safety**
- Basics of occupational health and safety (OHS) management and emergency response planning

**Module 6: Legislation and Permitting**
- Legislative and regulatory environmental framework for applying pre- and co-processing

**Module 7: Corporate Social Responsibility and Communication**
- Corporate social responsibility (CSR) together with tools and instruments to improve communication and dialogue

**Module 8: Life Cycle Assessment in the Cement Industry**
- Comprehensive information on life cycle analysis (LCA) as a useful tool

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