

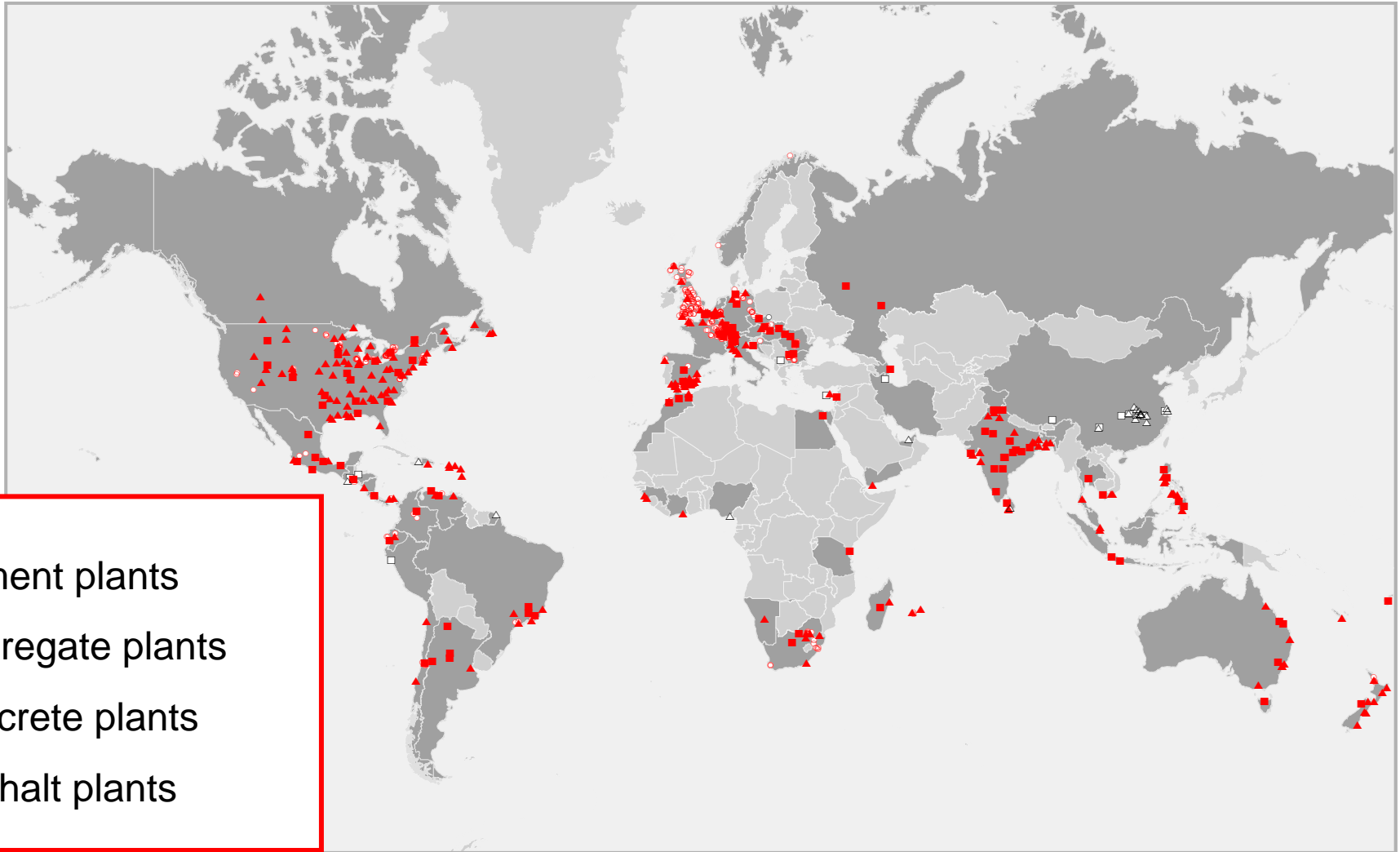
LCA applied for Alternative Resources (AR)
Management
as a
“Sustainability act”
A Vision



Jean-Pierre Degré

SVP SD / Alternative Resources
July 2011

Holcim is present on all continents in over 70 countries



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

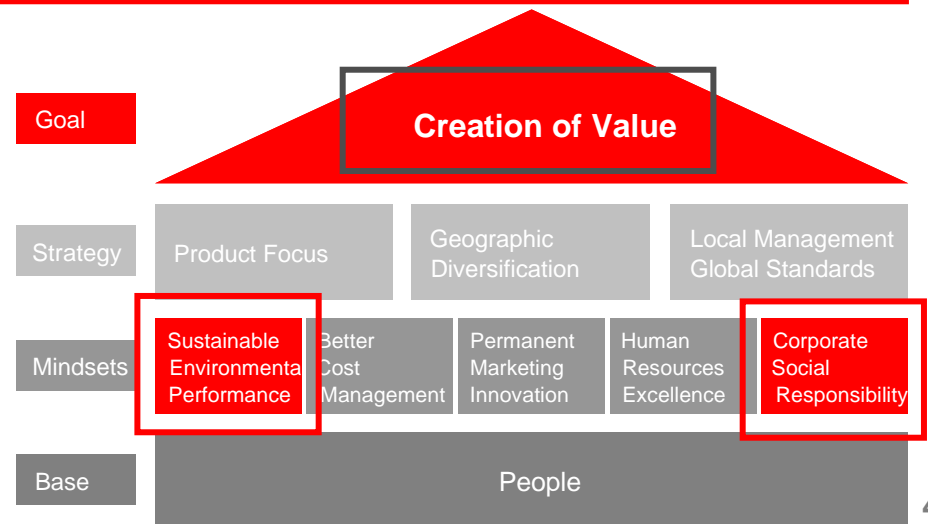
Vision

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

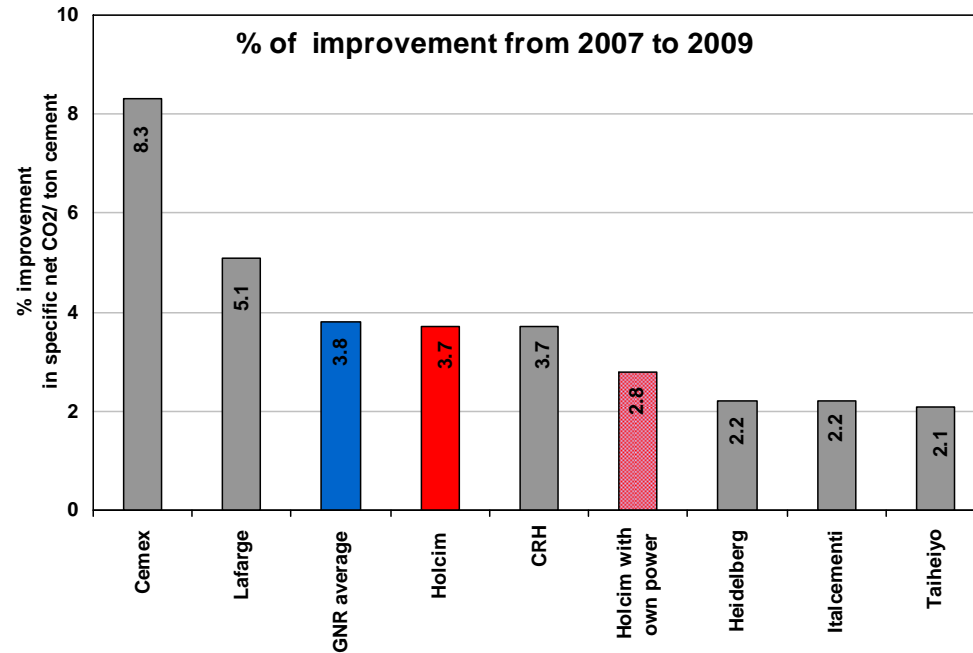
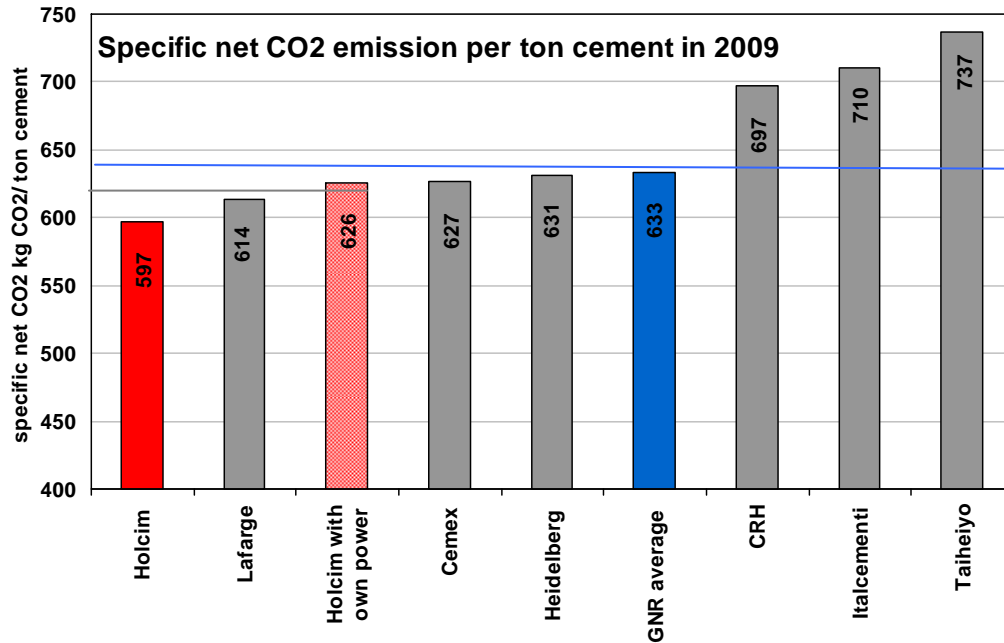
Mission

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

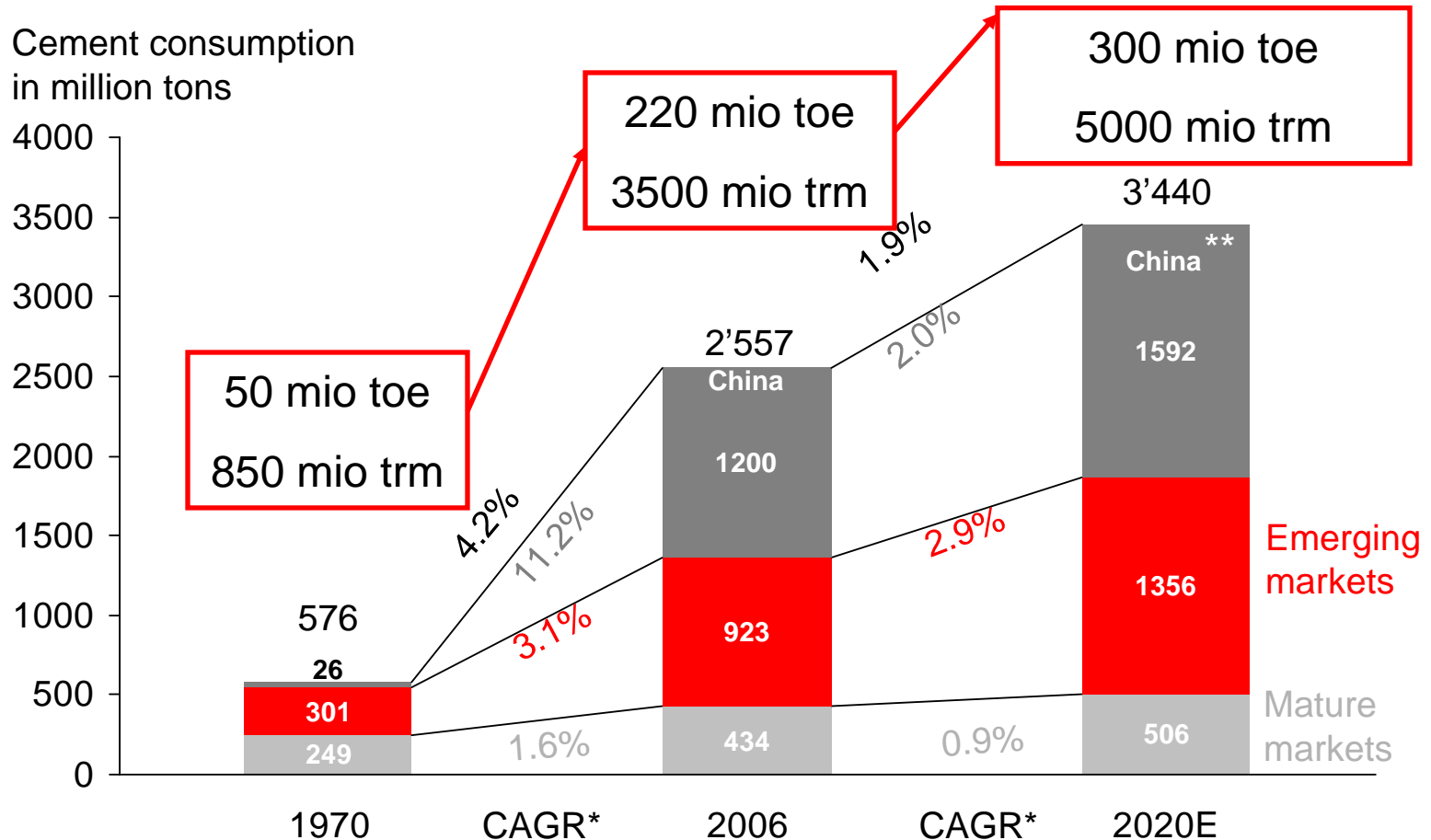


Holcim's specific net CO₂ emissions compared with main global competitors



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

Worldwide cement demand increases 2% p.a. leading to further increases in energy and raw material demands



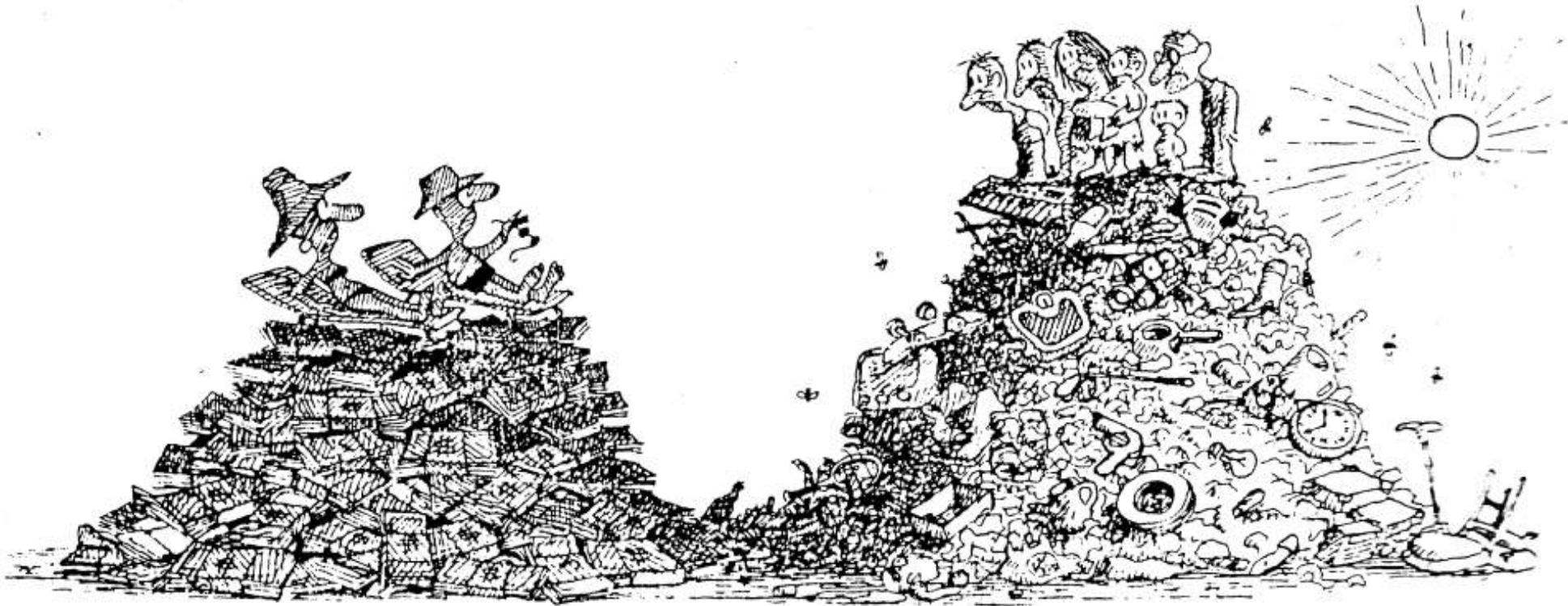
New strategies are needed to cope with increased resources need and increasing CO₂ emissions.

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

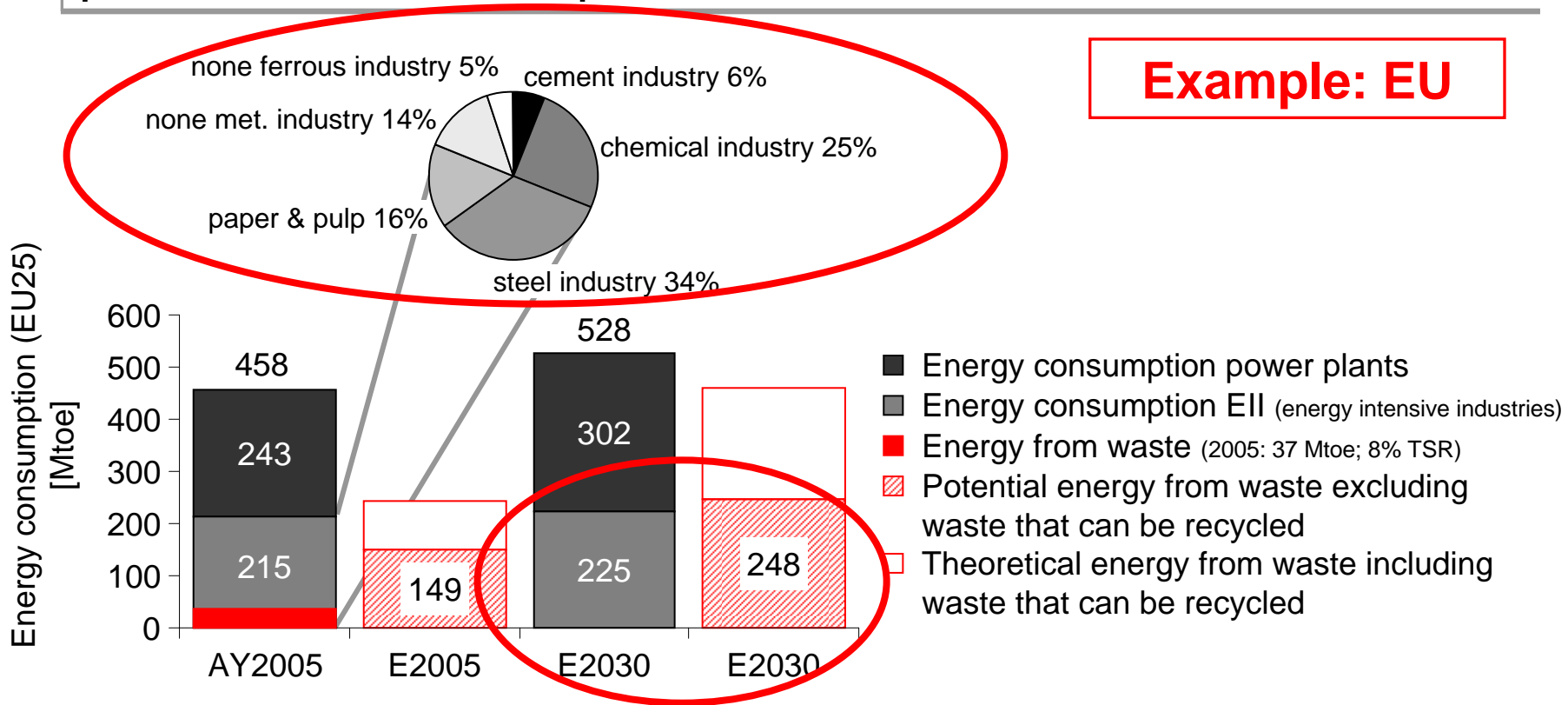


..we're well on this way... it's time to reverse it



by Quino

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



Estimates indicate that world-wide 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 Resources intensive industries.

Co-processing is a **THE** alternative to save our environment and improve industry ecological footprint

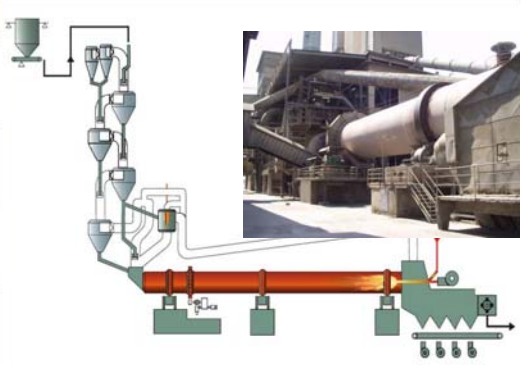
Co-Processing is...

...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

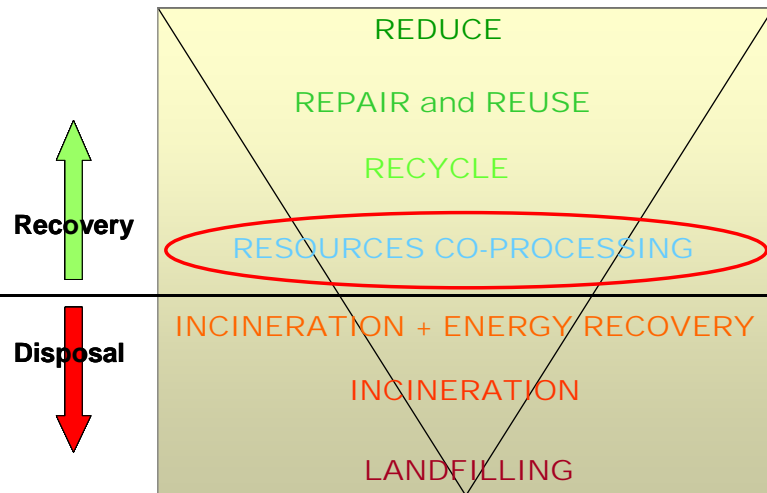
Characteristics	Temperature and time
Temperature at main burner	>1450°C: material >1800°C: flame temperature.
Residence time at main burner	>12-15 sec and >1200°C >5-6 sec and >1800°C
Temperature at precalciner	>850°C: material >1000°C: flame temperature
Residence time at precalciner	>2 - 6 sec and >800°C



Holcim vision for wastes management hierarchy.

Main drivers:

- Life Cycle Assessment
- Decision tree process



1. Reduce

2. Reuse

- ▶ When reduction / reuse is not feasible

3. Recycle - Re-processing

- ▶ Recycling of end-of life products
- ▶ CI: Wastes as AMICO and/or AR and/or AG

- ▶ When re-processing is not feasible

4. Resources Co-processing in existing RII's

- ▶ Process specific guidelines
- ▶ Pre-processing is key

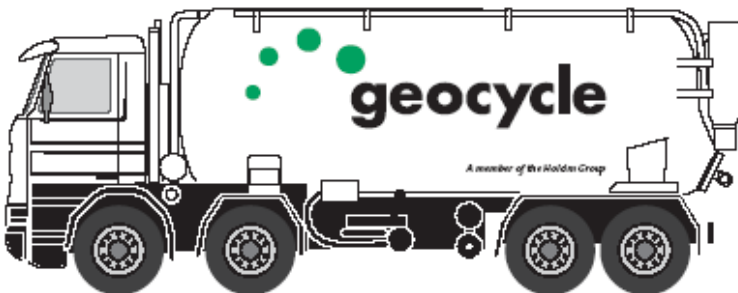
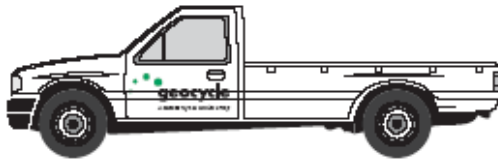
- ▶ When co-processing is not applicable

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

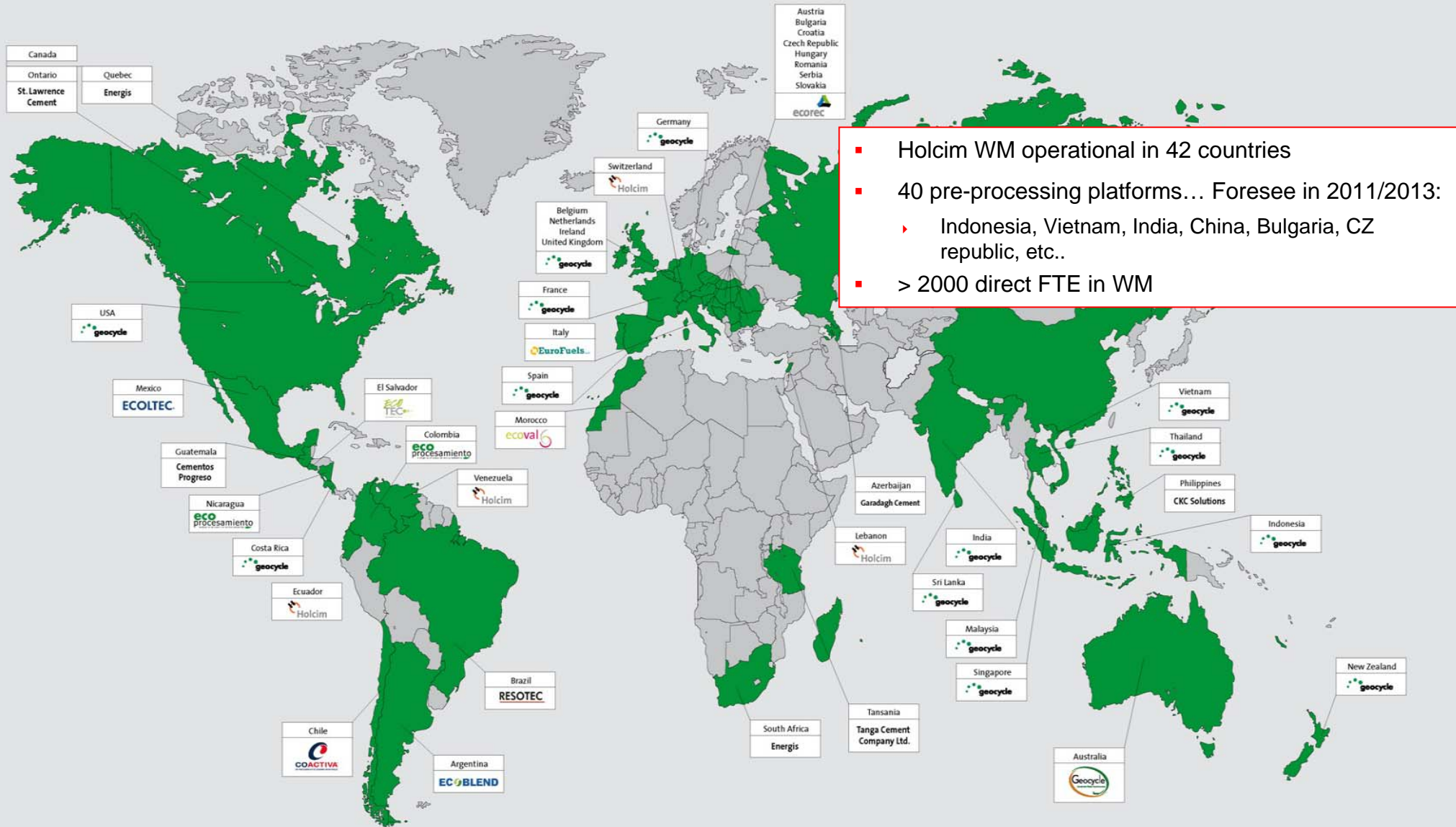


- Each Holcim GPC's must create a specific AR business, unit, **services oriented** with a specific brand
- Objectives:
 - ➔ interface between the wastes markets and the cement factory
 - ➔ For wastes pre-processing: marketing, identification, control, conditioning
 - ➔ and AR delivery to the cement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

- Target: a Commun brand:

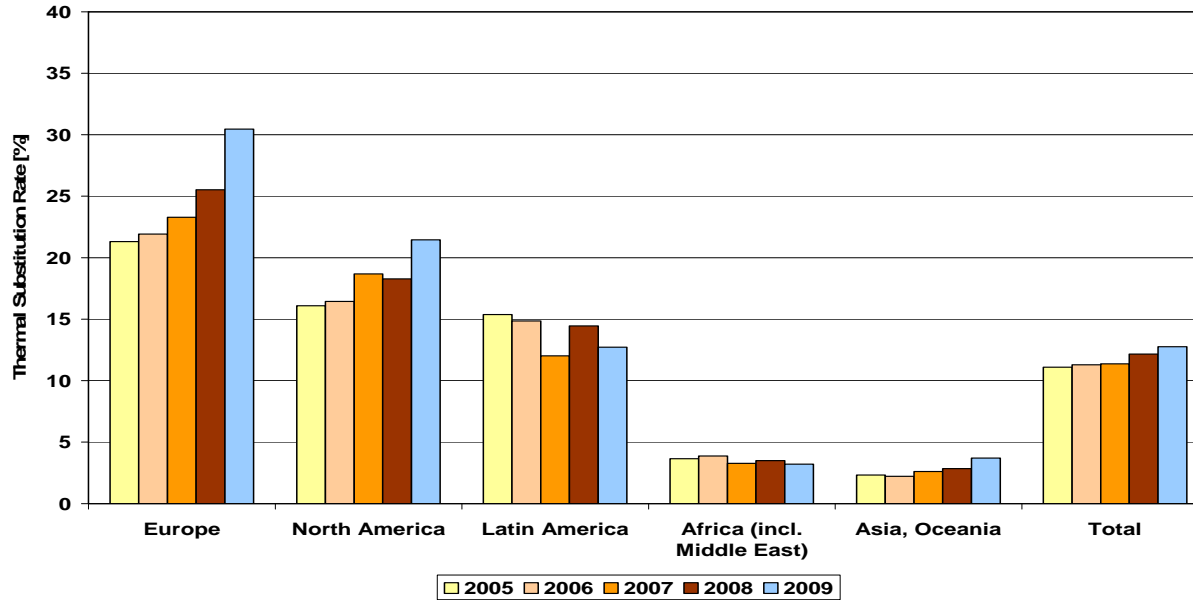


The global Holcim waste management network, with Geocycle as the dominant brand



Holcim steadily increases its thermal substitution rate (TSR)

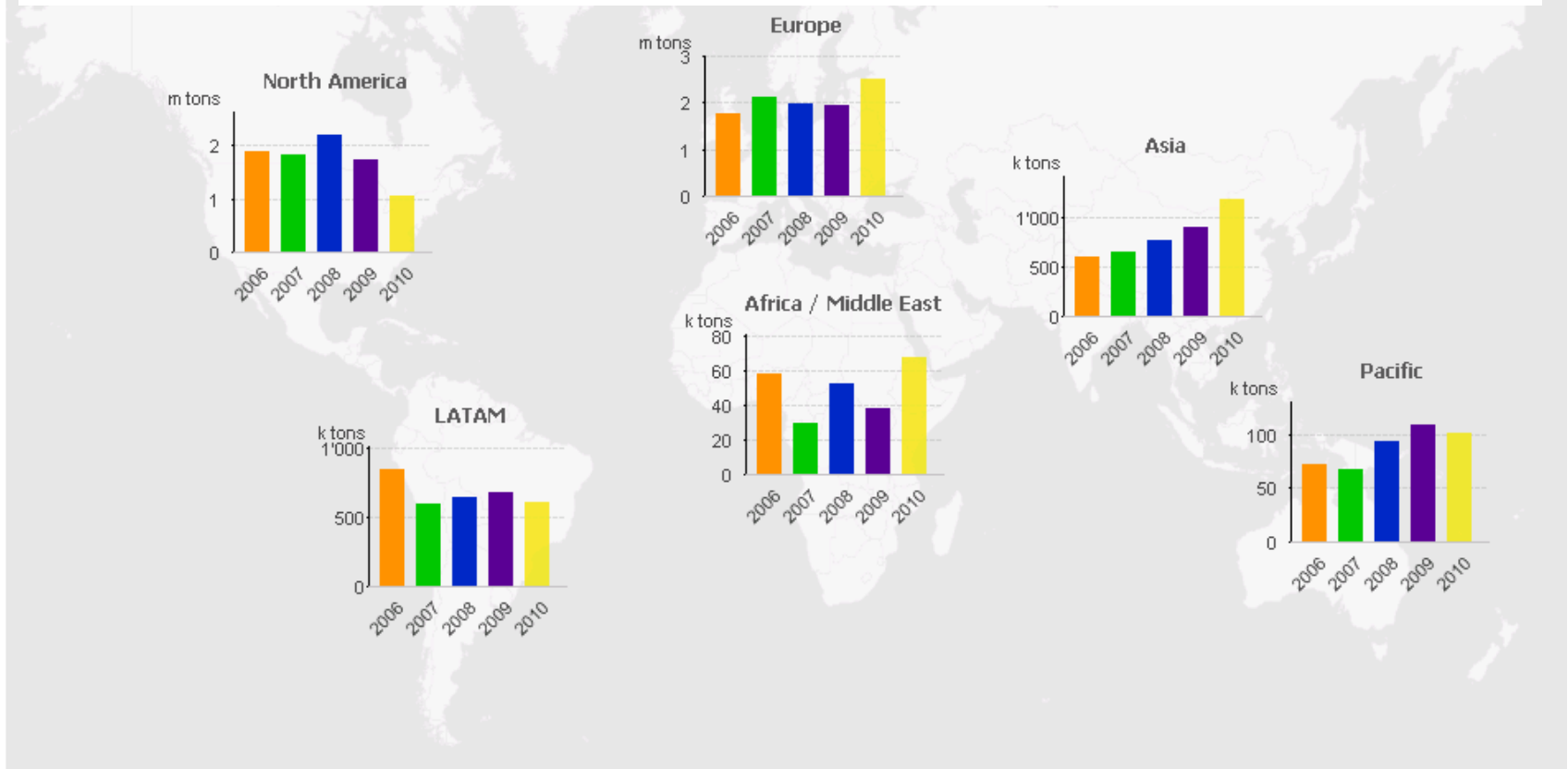
Thermal Substitution Rate 2005 - 2009
Like for Like, All Holcim Plants (MEDOS)



Waste volumes Co-processed last 5 years...

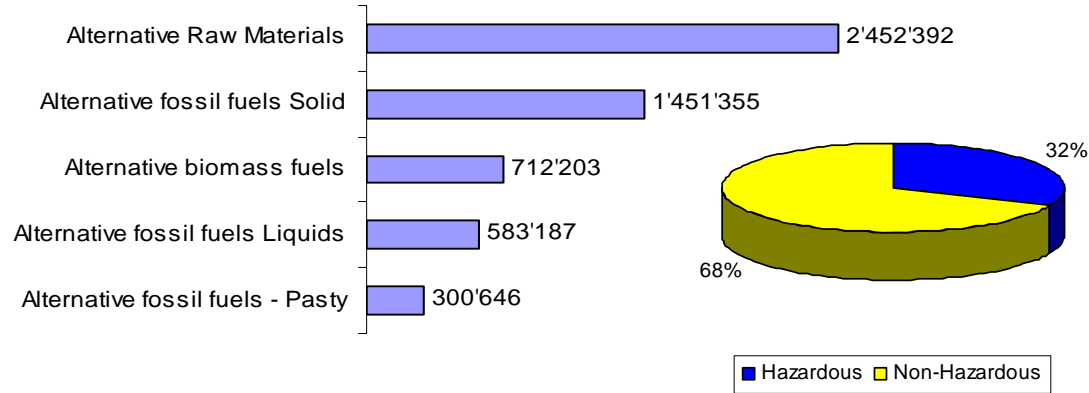
Wastes as AFR co-processed 2010 last 5 years....

>> 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

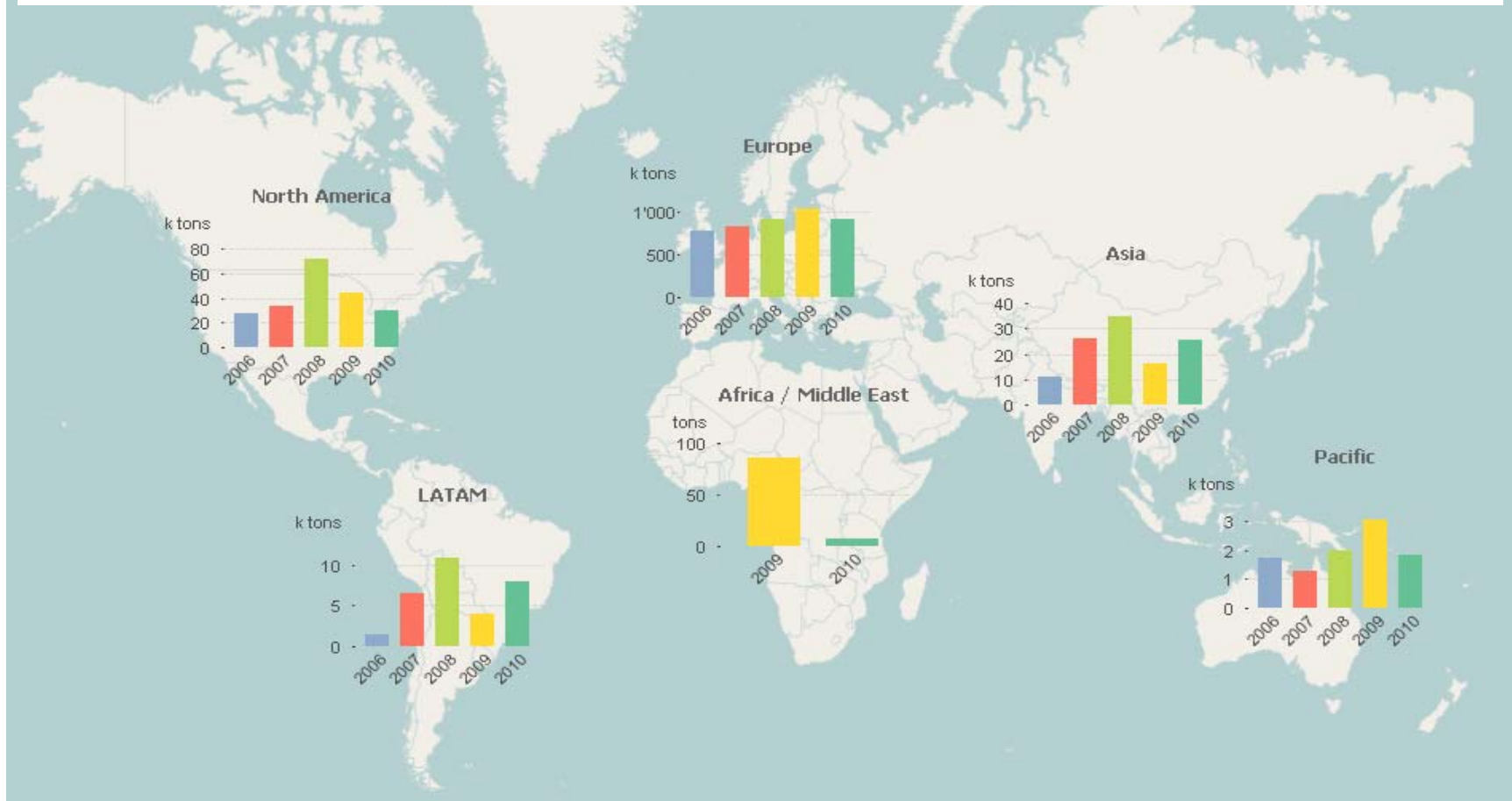


- Paint wastes
- Used oil & grease
- Scrap tires
- Wood chips
- Solvents
- Carbon fines
- Oil filter fluffs
- Coking wastes
- Shipping wastes
- RDF fluff & pellets
- Blasting grit
- Refinery catalyst
- Filter cake



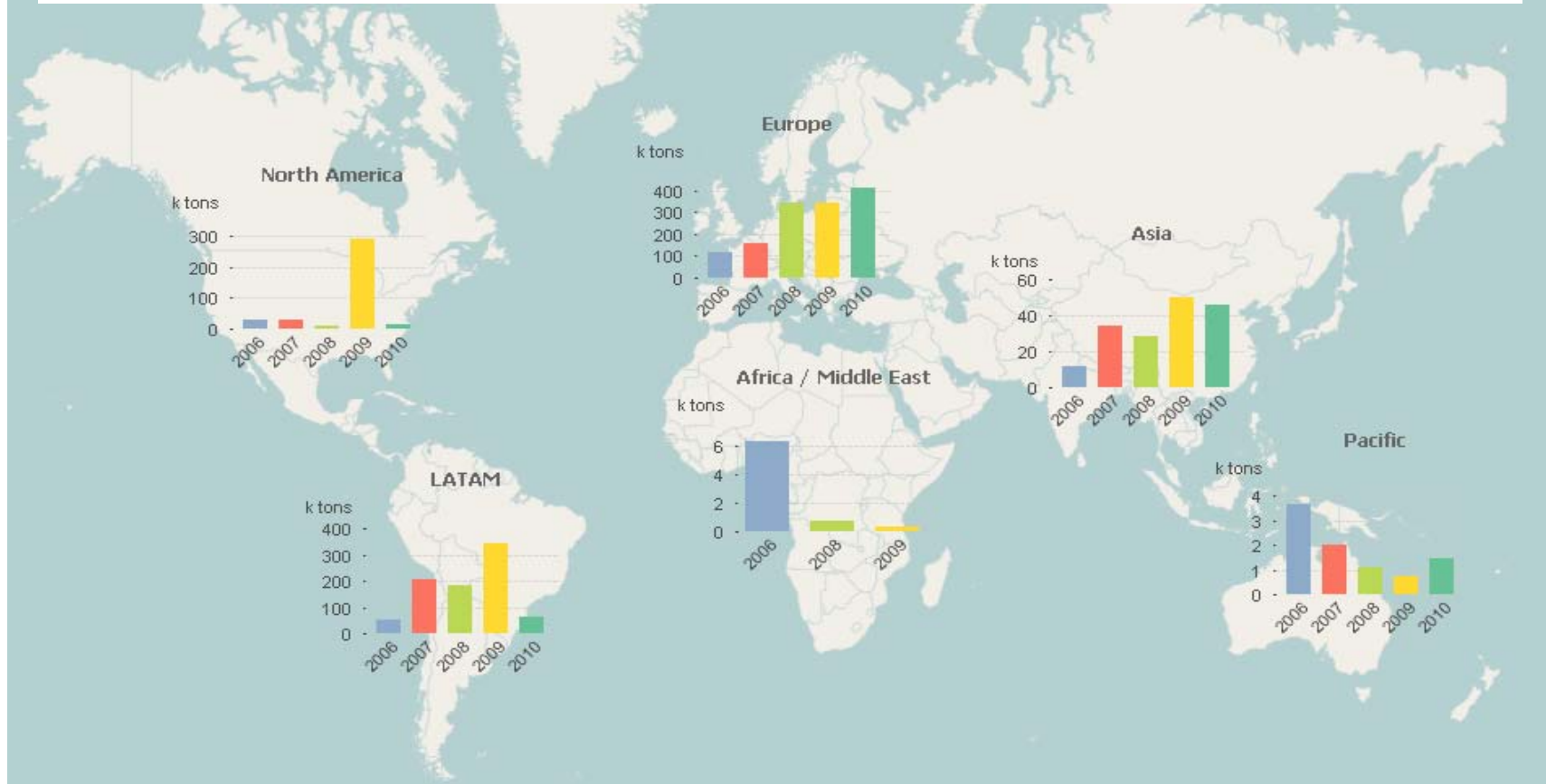
"RDF" related wastes: 2010, Holcim World

723605 tons



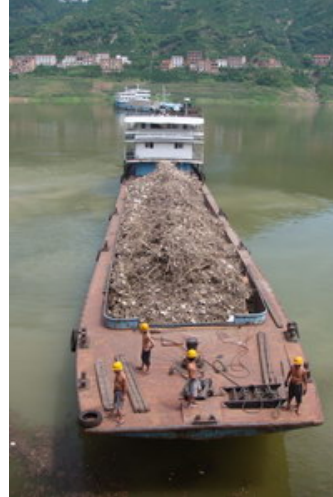
Sludge's related wastes: 2010, Holcim World

355652 tons



Example - Holcim / Huaxin China Three Gorge Dam Floating Material

The Three Gorges Dam corporation and Huaxin finalized a long-term commitment for cleaning the Yanktze 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 – Obsolete Pesticides & PCB

Treatment of pesticides in Australia ...



The Chinese Government ordered a complete disposal of approx. 300 tons of Obsolete Pesticides by 31 Dec. 2007



Sri-Lanka... ■ pure pyralene oil with 56-62% of PCBs



■ 10,000 liters of mixture co-processed at 2 feed rates under well controlled process conditions

■ Accredited 3rd party monitors emissions and samples all materials

Results

- DRE > 99.9999%
- Emissions unaffected by PCB
- External report available

Stack measurements	Baseline 2 August		Test Burn 3 August		Test Burn 4 August	
	Kin	By-pass	Kin	By-pass	Kin	By-pass
Air flow Nm ³ /h	125040	53500	98760	54120	93060	49690
Oxygen %	14.9	20.6	14.3	20.6	15	20.6
CO mg/Nm ³	13.8	na	na	na	na	na
Stack temperature °C	152.8	89.8	194.8	93.7	192.9	90.7
Sampling time th:mm	5:02	5:37	5:22	5:23	5:21	0:48
PCDD/PCDF I-TEQ ng/h	0.019	0.0095	0.016	0.0057	0.0087	na
PCB I-TEQ ng/Nm ³	0.0046	0.00012	0.0069	0.00031	0.0051	na
HCB ng/Nm ³	<7	<7	<8	<7	<8	na
HCl mg/Nm ³	5	<2	20	<2	2.8	na
Total VOC mg/Nm ³	23	na	14	9.7	na	6.9
Benzene mg/Nm ³	<1	na	<1	<1	na	<1

Holcim co-processing experience

26.05.2009/LDS

- China
- Colombia
- Australia
- Sri Lanka
- El Salvador
- Vietnam
- Phillippines
-



Holcim Group Support

Holcim co-processing experience

26.05.2009/LDS

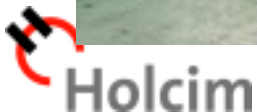
▪ MSW

Example: Holcim Eastern EU

Romania

Platform

(August 18th, 2009)

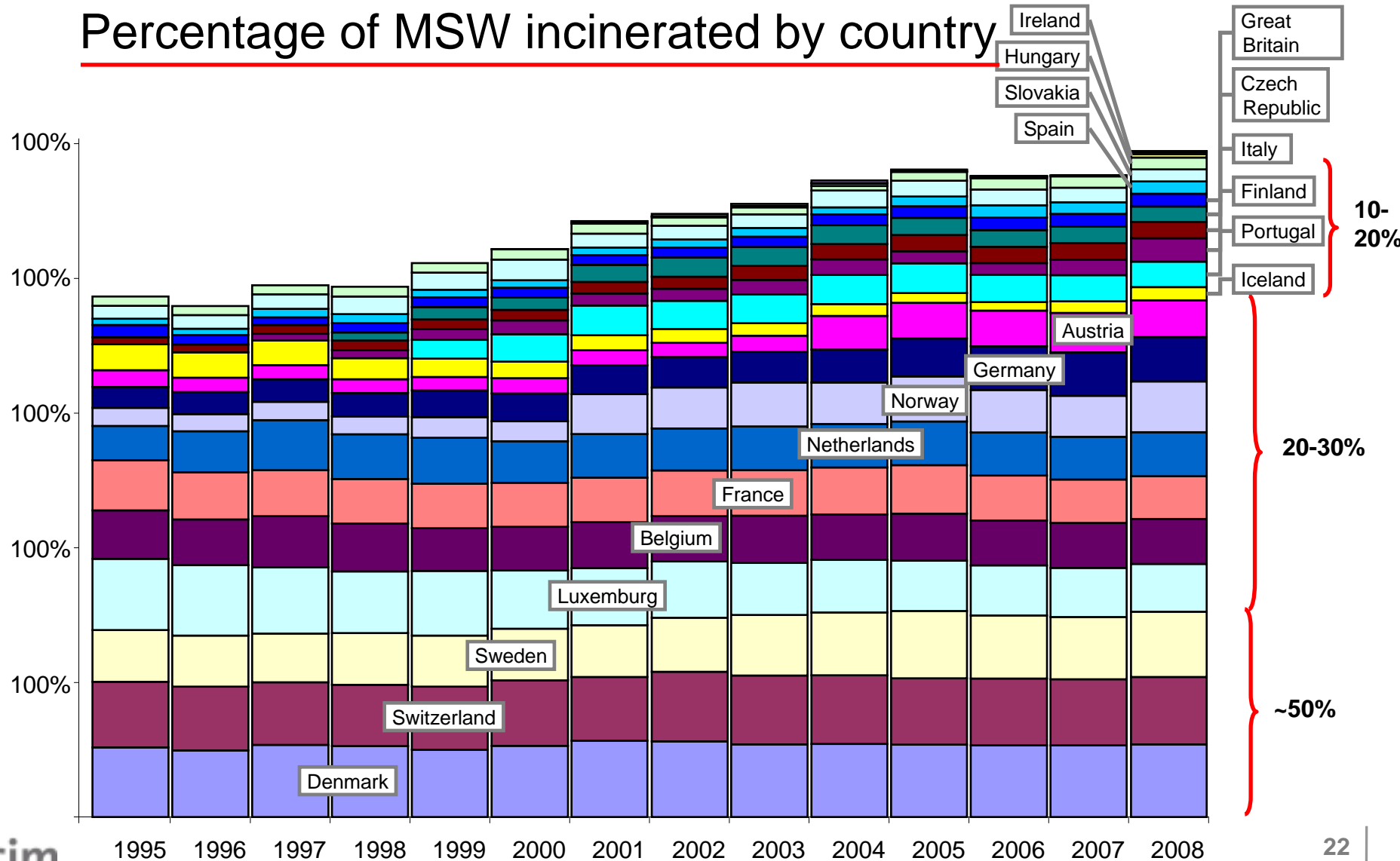


Bulgaria / Sofia

- 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 Izvor₂₁

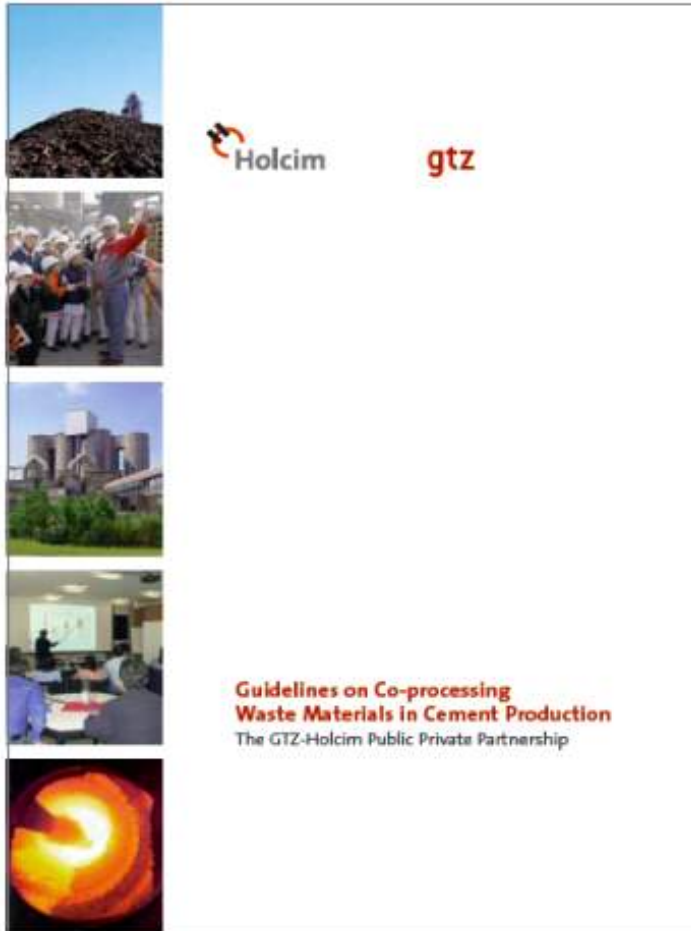
EU – About MSW co-processing potential....

Percentage of MSW incinerated by country



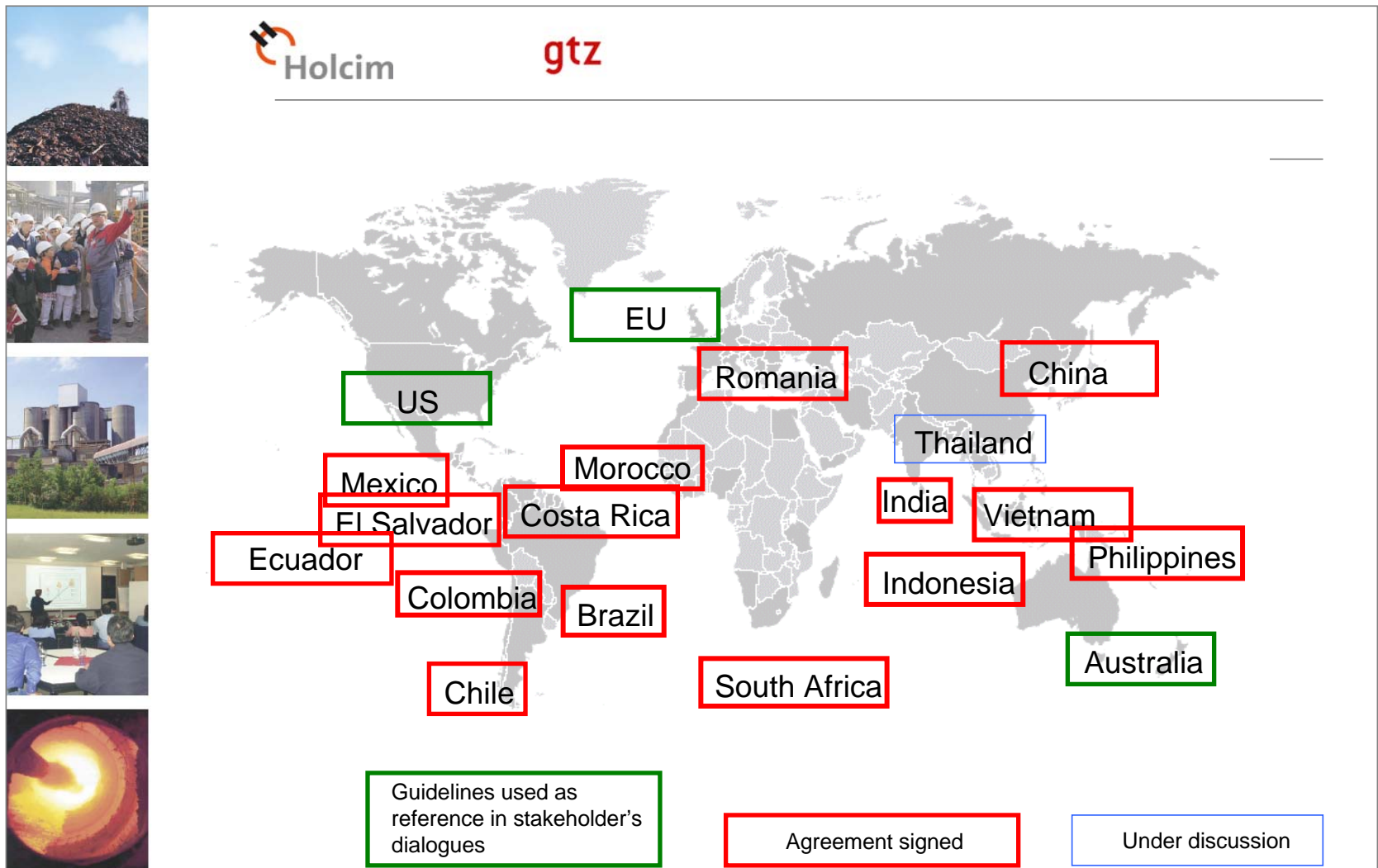
The Co-processing concept

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

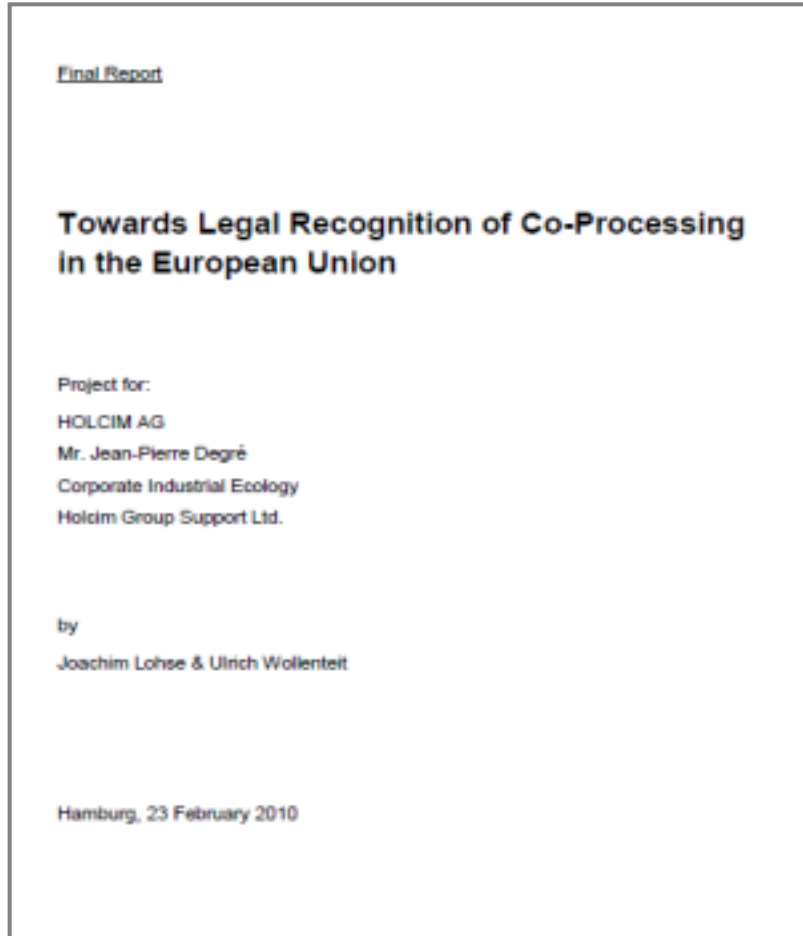


The GTZHolcim Public Private Partnership

▪ April 2008 / JPD

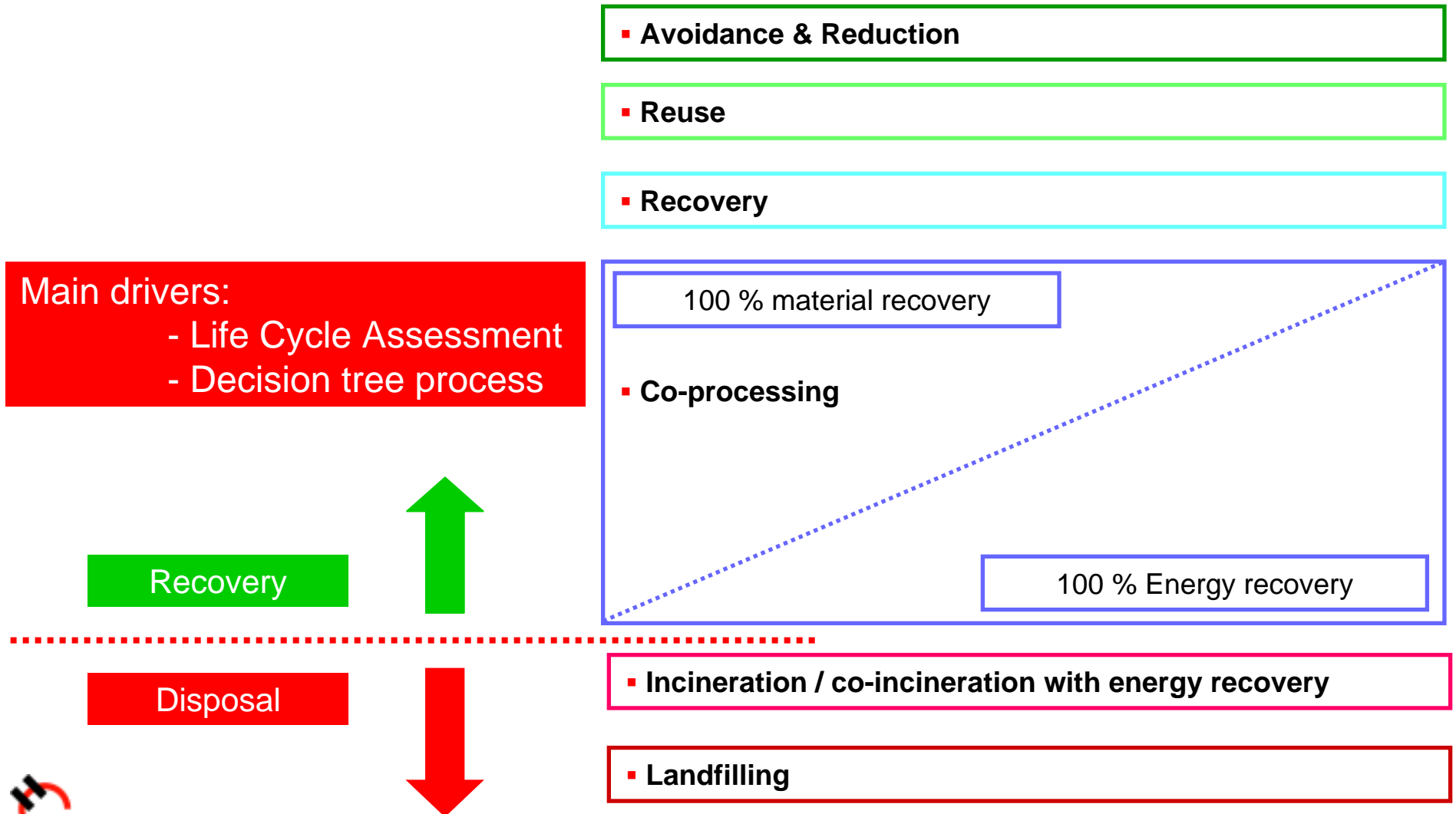
EU...

Recognition of Co-processing On its way

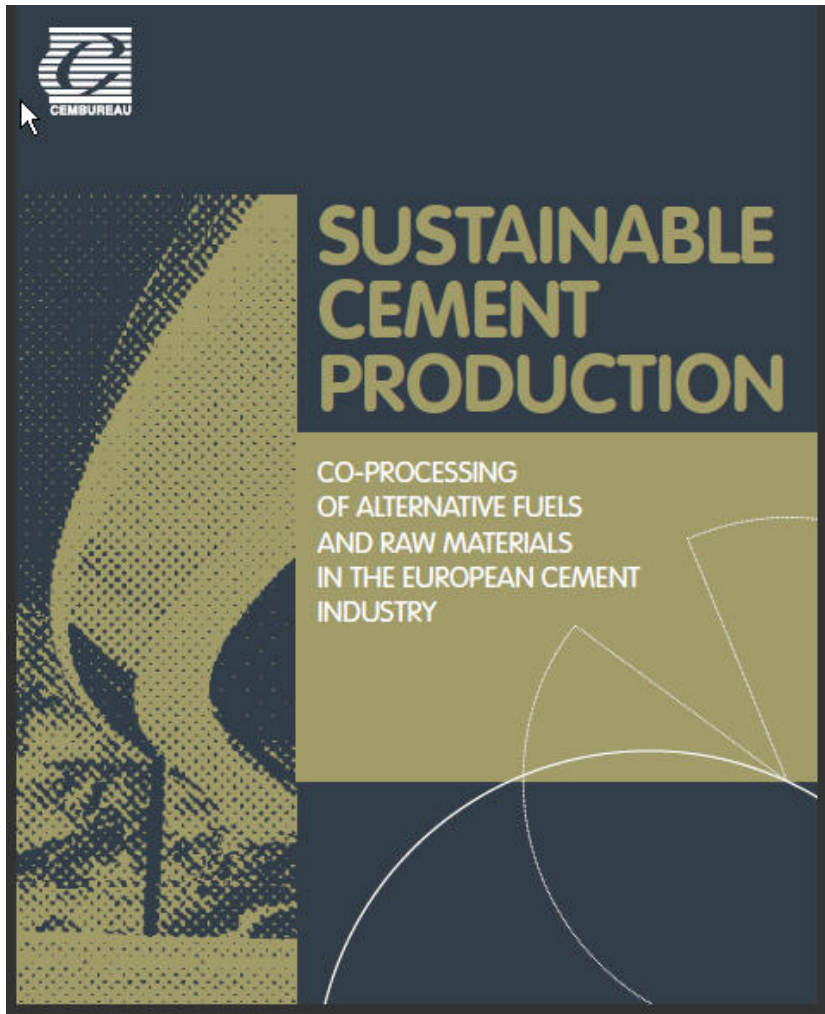


- **Study by J. Lohse providing recommendations for legal recognition of co-processing**
 - Integration in waste hierarchy (Art 4, WFD)
 - Additional recovery operation (Annex II, WFD)
 - Guidelines for interpretation recovery, recycling (Art 38.1, WFD)
- **The co-processing of waste has been officially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



Co-processing now systematically advocated by Cembureau and EU cement industry ...



The slide content is presented in a light grey box with a white border. It features a blue vertical bar on the left side. The text is as follows:

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

Martin Oerter, Düsseldorf

European Union Sustainable Energy Week
Brussels, 09 February 2009

vdz.

India

Co-processing concept extended to more RII's

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

February 2010



Central Pollution Control Board

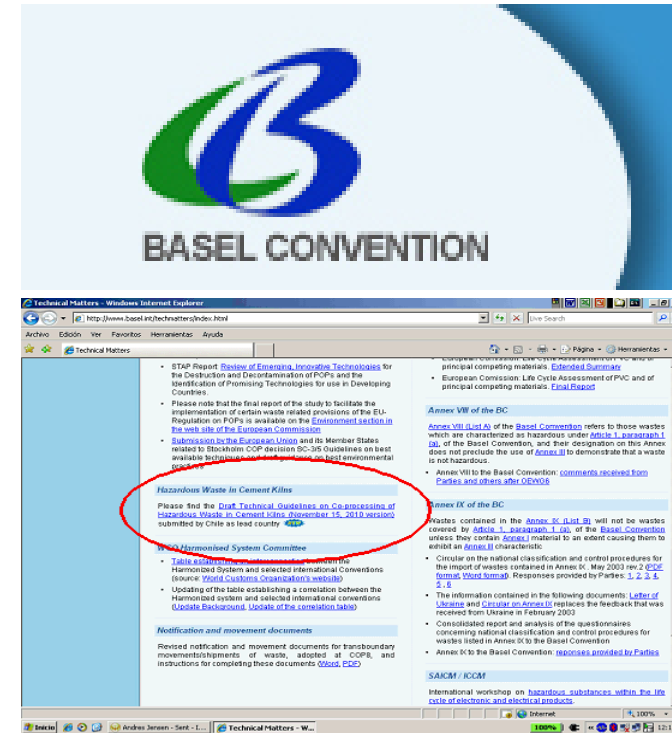
(Ministry of Environment & Forests, Govt. of India)

Parivesh Bhawan

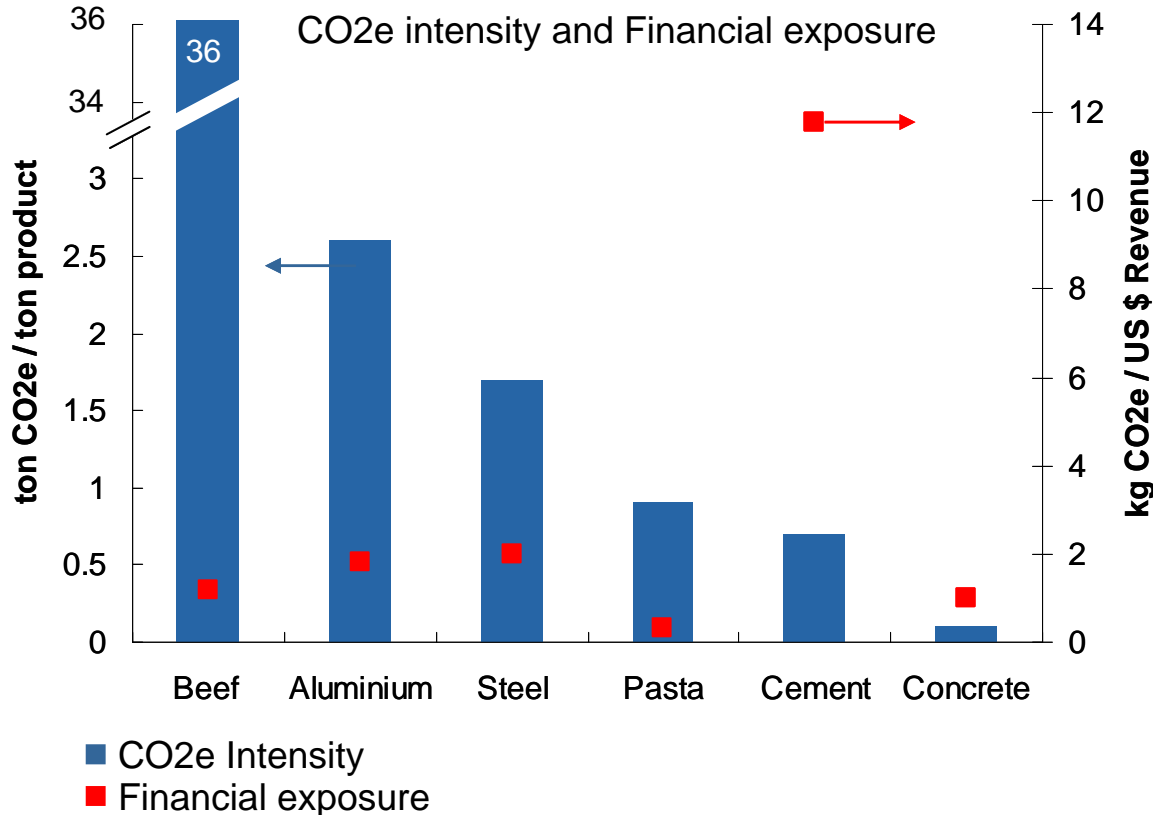
East Arjun Nagar, Delhi – 110 032

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

BUT

CO₂ emission per US \$ of Revenue

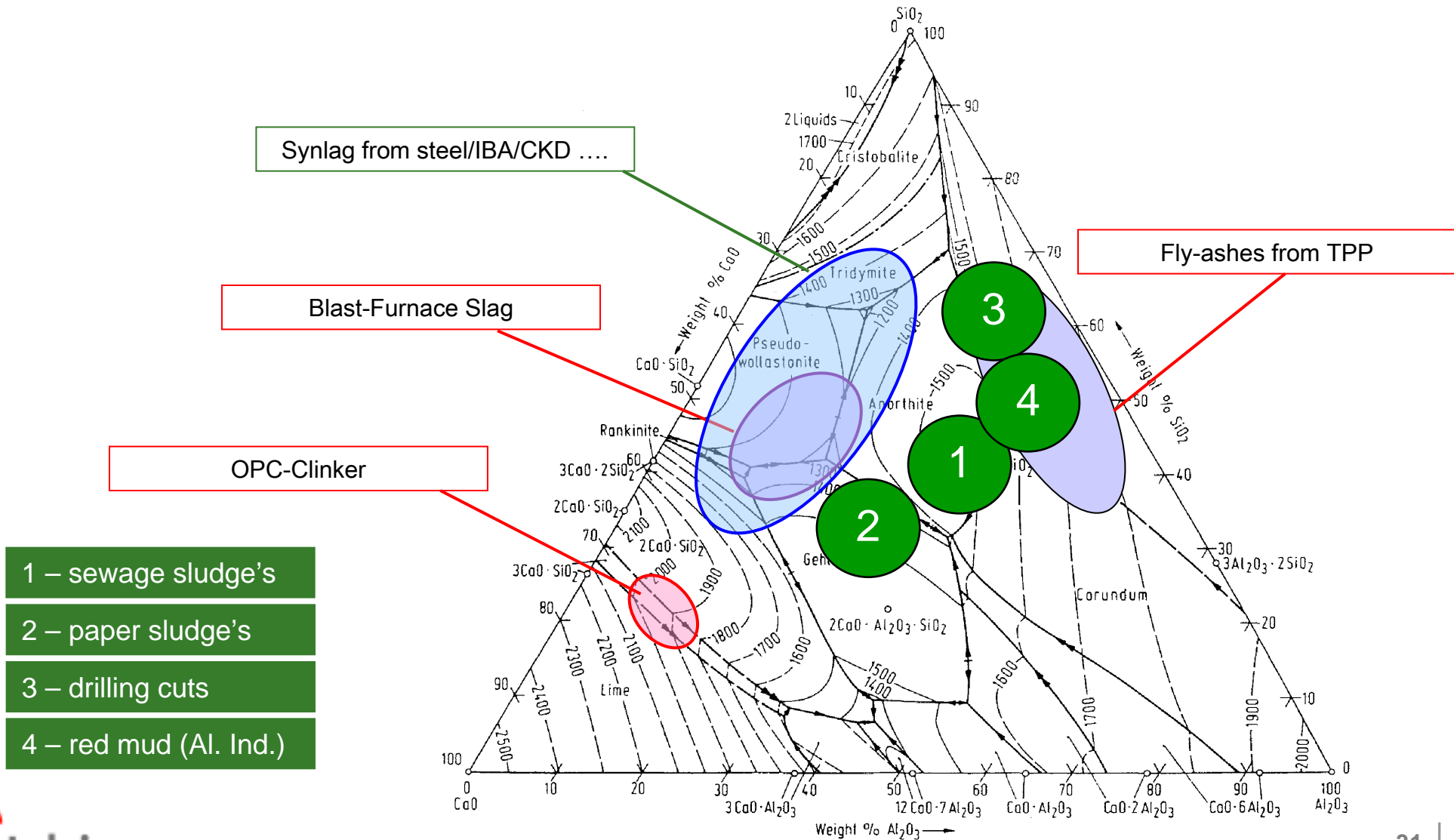
CO₂ emission per sales revenue is high for cement and lime (and relatively low for concrete). CO₂ emission per sales revenue is low for aluminum and steel due to the high price per tonne

(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

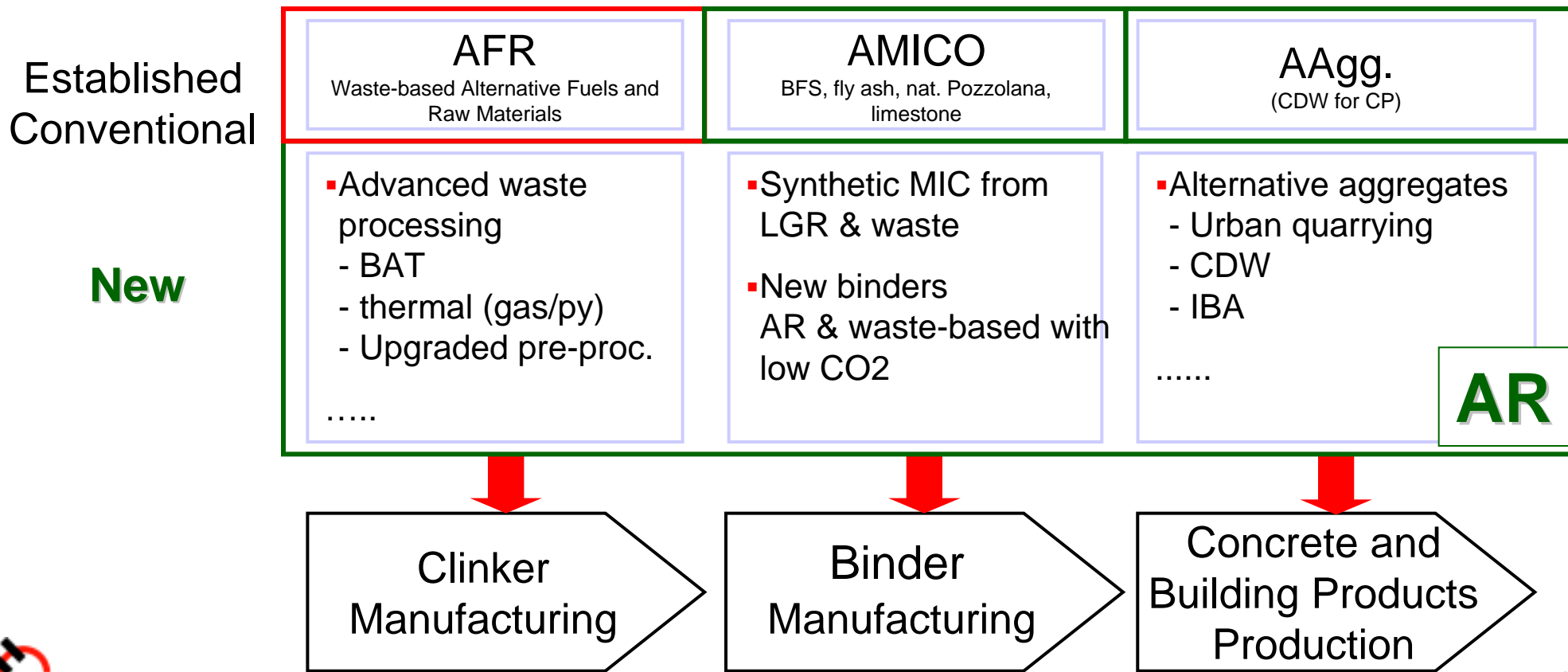
Holcim / Cement Industry Ambition to AR???



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 foot print....



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

Thank You and Visit www.coprocem.com

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The Concept of Co-processing Waste Materials in Cement Kilns

The GTZ-Holcim Public Private Partnership of Applied Sciences Northwestern Switzerland

Dear user,

On this homepage you will find various topics on the topic "Co-Processing Waste Materials in Cement Kilns". This is the joint result of a strategic alliance in the field of co-processing waste materials between the Deutsche Gesellschaft für Technische Zusammenarbeit (German Technical Cooperation) and Holcim, a leading cement supplier.

Waste is generated throughout the world and is increasing in developing countries. In industrialized countries, whereas the management and waste disposal options are often a challenge for developing countries. The cement industry offers a solution known as co-processing, where alternative waste materials generated from waste enter the cement production process. When managed properly, this method can constitute an attractive and safe solution for certain waste materials. This method is becoming more and more recognized and accepted as a waste management concept.

The GTZ-Holcim partnership was formed to develop acceptable guidelines for co-processing waste materials in cement production.

Our two core documents are presented below:

© 2008 - GTZ, Holcim Ltd, FHNW

Training Kit on Co-Processing - A GTZ-Holcim Public Private Partnership - Microsoft Internet Explorer provided by Holcim

Address <http://www.coprocem.com/trainingkit/pages/modules.html>

Home > Modules

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Co-Processing

Modules Overview

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 in Cement Production

- Environmental basics of emissions, immissions, 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

Documents

- Glossary
- Frequently asked questions (FAQ)

Training

For new developments on the training kit and training courses in your region, have a look at www.coprocem.com

