Reducing the environmental footprint in the industrial minerals sector:
Case studies & Innovation

A. Shtiza, R. Doome, M. Wyart

6th SDIMI conference
IMA-Europe members & mission

Industrial Minerals Association (IMA-Europe) is an umbrella organization which brings together nine European and one international association specific to individual minerals:

CCA-Europe - European Calcium Carbonate Association
EBA - European Borates Association
ESMA - European Specialty Minerals Association
  i.e. andalusite, mica, vermiculite & sepiolite
EUBA - European Bentonite Association
EULA - European Lime Association
EUROFEL - European Association of Feldspar Producers
EUROSIL - European Association of Silica Producers
  i.e. Quartz & cristobalite
EUROTALC - Scientific Association of the European Talc Industry
IDPA - International Diatomite Producers Association
KPC-Europe - European Kaolin & Plastic Clays Association

Promote the interests of the European industrial minerals industry in all non commercial issues
Representative membership

In most of its member association (sections) IMA Europe represents 95-99% of the European producers

28 European Countries
i.e. 23 EU Member States + Croatia, Norway, Switzerland, Turkey and Ukraine

500 companies
(685 mines & quarries, 750 plants)
42,500 employees
180 million tpa,
EUR 10 billion turnover
Europe 2020 Strategy - Flagships Resource Efficiency Europe 
COM(2010) 2020 (03.03.2010):
**Objective:** Resource efficient Europe; Sustainable growth; Greener and more competitive economy; Decoupling; Boost use of renewable energy.

- A Resource Efficient Europe COM (2011) 21;
- Communication on Challenges in Commodity Markets and Raw Materials (02.02.11);
- Roadmap for a resource-efficient Europe (20.09.11);

**Raw Material Initiative**

- Fair and sustainable supply of raw materials from international markets
- Fostering sustainable supply within the EU
- Boosting resource efficiency and promote recycling
Life Cycle Assessment (LCA)

Life cycle thinking is an approach which evaluates the **environmental impacts** in a **holistic approach** (the raw material extraction, material processing, transportation, distribution, consumption, reuse/recycling, and disposal).

LCA helps to **identify hot spots** in the life cycle of a product, therefore **driving management decisions** and action to **minimize** the **environmental impact** for **industrial minerals manufacturing**.
Case study 1: ExPerl research and demonstration FP7 Project along the value chain of Perlite

Case study 2: STOICISM research and demonstration FP7 Project along the value chain of Diatomaceous earth, perlite and clay

Case study 3: Reduce energy and improve resource efficiency of Bentonite

Case study 4: Recycling of seven industrial minerals
**IM concerned**

Perlite

**Scope**

Develop sustainable and innovative solutions for the extraction, processing, use and re-use of minerals, **along the entire value chain**;

The development of micro-sized closed structure perlite (CSP) and similar micronized perlite based particles.

Development of **breakthrough perlite expansion technologies** with special insulating and mechanical properties highly exceeding those of conventional perlite;

**Improve functionality of perlite**: durability; weight

**Lower**: Cost

**Applications of concern**

**Construction** products (panels, boards and bricks), mortars and functional fillers, **Manufacturing** and **Chemical industry**.
ExPerl Consortium

Leader: **S&B Industrial Minerals**

12 consortium members: Universities; Applied technology; Research institutes; Specialized companies & SME; End user companies (3);

EU coverage: **Five EU countries + Israel**

**Budget:**

Project Cost: **8.1 Mill EURO**
Project Funding: **5 Mill EURO (FP7)**

**Timeline:**

Launched: 1.05.2009
Finalized: 30.4.2013

**Weblink:** [http://www.experl.eu/](http://www.experl.eu/)
Efficient exploitation of EU perlite resources for the development of a new generation of innovative and high added value micro-perlite based materials for the chemical, construction and manufacturing industry.

09.11.11
30 Month Technical Meeting (GA/EB/WP/IMP)
9 - 10 Nov 2011
S&B Industrial Minerals S.A.,
Athens, Greece

08.11.11
Exploitation Strategy Seminar (ERS)
8 Nov 2011
S&B Industrial Minerals S.A.,
Athens, Greece

07.01.10
6 month technical meeting:
22 January 2010
D’APPOLONIA SPA
Head Offices

http://www.experl.eu/
### Case study 1: ExPerl
Research and demonstration FP7 Project along the value chain of Perlite

### Case study 2: STOICISM
Research and demonstration FP7 Project along the value chain of Diatomaceous earth, perlite and clay

### Case study 3: Reduce energy and improve resource efficiency of Bentonite

### Case study 4: Recycling of seven industrial minerals
STOICISM (1)

- **IM concerned:** Diatomaceous earth, perlite and clay

- **Scope**

  Develop sustainable and **innovative solutions** for the extraction, processing, use and reuse of minerals, use of **waste for energy** along the entire value chain.

  Reduce the **carbon footprint** of several calcined industrial minerals

  Test for the **beneficiation, drying, and calcination** of industrial minerals

  Evaluate new technologies for **energy efficiency in processing**

  **Transfer and/or implement** the knowledge acquired to other industrial minerals

  **Resource efficient:** Use less use better

- **Applications of concern**

  Paints; Brewery
STOICISM Consortium

Leader: IMERYS

17 consortium members: Universities; Applied technology; Research institutes; Specialized companies & SME; End user companies (2); Industry association (1)

EU coverage: Eight EU countries

Budget:

Project Cost: 8.6 Mill EURO
Project Funding: 5.8 Mill EURO (FP7)

Timeline:

Launched: 1.01.2013

Weblink: http://www.stoicism.eu
STOICISM: a FP7 research & innovation project

Major innovative research project (STOICISM) launched under FP7 for the “New environmentally friendly approaches to mineral processing”

In mid 2011, as a response to the shortage of some minerals in global markets and the sky rocketing of commodity prices, the European Seventh Framework Programme for Research (FP7) launched its bids for large projects under the umbrella of Nanosciences,
Case study 1: ExPerl research and demonstration FP7 Project along the value chain of Perlite

Case study 2: STOICSIM research and demonstration FP7 Project along the value chain of Diatomaceous earth, perlite and clay

Case study 3: Reduce energy and improve resource efficiency of Bentonite

Case study 4: Recycling of seven industrial minerals
IMA Award: S&B industrial minerals

Scope

Natural drying of bentonite in open fields in Milos: Reduce energy consumption; resource efficiency; reduce CO₂.

In comparison to industrial drying, the natural/mild drying results in:

1. 3.5% energy savings,
2. Reduce CO₂ emissions by 24,000 t/a,
3. Resource efficiency since does not destroy the crystalline structure of bentonite and allows blending of variable qualities.
IMA 2012 Award: S&B Minerals

IMA-Europe 2012 Resource Efficiency Award:

Independent Award Jury:

• Prof. Panayotov MEP (European Parliament)
• Prof. Martens (RWTH Aachen - Academia)
• T. Pataridze (IUCN – NGOs & Towns)
• B. Johnson (Parliament Magazine - EU media)

“Simplicity of natural drying of bentonite in S&B project results in significant and measurable results” which assist to meet the sustainable development goals and set the vision for the industry.

Award Ceremony

European Parliament
November 2012

http://conferenceandaward2012 ima-europe.eu/award
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Case study 3: Reduce energy and improve resource efficiency of Bentonite

Case study 4: Recycling of severm industrial minerals
IMA recycling sheets

Scope

Calculate the recycling rate of various industrial minerals via different end use applications.

Industrial Minerals can be and are recycled

- Bentonite (50%);
- Calcium Carbonate (58%);
- Feldspar (67%);
- Kaolin & Clay (49%);
- Lime (68%);
- Industrial Silica (73%);
- Talc (60%).

Weblink:

IMA recycling sheets: Lime

EUROPEAN LIME CONSUMPTION BY MARKET

Lime market by use category [Industry estimate]

LIME RECYCLING RATE

The overall recyclability rate of lime can be evaluated as follows:

<table>
<thead>
<tr>
<th></th>
<th>Lime Markets</th>
<th>Application Recycling Rate</th>
<th>Lime Recycling Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel</td>
<td>40%</td>
<td>95%</td>
<td>38%</td>
</tr>
<tr>
<td>Environmental Applications</td>
<td>14%</td>
<td>90%</td>
<td>13%</td>
</tr>
<tr>
<td>Concrete and Bricks</td>
<td>5%</td>
<td>65%</td>
<td>3%</td>
</tr>
<tr>
<td>Soil Stabilisation and Mortars</td>
<td>12%</td>
<td>75%</td>
<td>9%</td>
</tr>
<tr>
<td>Chemistry</td>
<td>8%</td>
<td>70%</td>
<td>6%</td>
</tr>
<tr>
<td>Other Uses</td>
<td>21%</td>
<td>68%</td>
<td>68%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
<td>68%</td>
</tr>
</tbody>
</table>
IMA recycling sheets: Silica

EUROPEAN SILICA CONSUMPTION BY MARKET

Silica market by use category [industry estimate]

SILICA RECYCLING RATE

The overall recyclability rate of silica can be evaluated as follows:

<table>
<thead>
<tr>
<th>Silica Markets</th>
<th>Application Recycling Rate</th>
<th>Silica Recycling Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction and Soil</td>
<td>39%</td>
<td>85%</td>
</tr>
<tr>
<td>Container Glass</td>
<td>17%</td>
<td>75%</td>
</tr>
<tr>
<td>Flat Glass</td>
<td>17%</td>
<td>80%</td>
</tr>
<tr>
<td>Glass (Other)</td>
<td>5%</td>
<td>25%</td>
</tr>
<tr>
<td>Foundry</td>
<td>12%</td>
<td>80%</td>
</tr>
<tr>
<td>Ceramics</td>
<td>4%</td>
<td>60%</td>
</tr>
<tr>
<td>Other Uses</td>
<td>6%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>
Thank you for your attention

Thanks to:
Maretva Baricot & David Moseley
(IMERYS)

Michalis Stefanakis; Karalis Thanasis
(S&B Industrial Minerals)

Various IMA-Europe sections

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