The future of refractories in Europe.

26th September 2018

Can we stand the heat?
Why do refractories matter?
Essential for almost everything surrounding us!

Concrete 1.500°C
Copper 1.350°C
Plastics 1.200°C
Steel 1.760°C
Glass 1.650°C
Aluminum 1.250°C
Refractories

€ 20 bn
world wide industry

3% COGS
in Steel manufacturing

14%
Global market share

- Glass 7%
- Cement 8%
- Non-ferrous 10%
- Steel 60%
- Energy, chemicals 15%

RHI Magnesita 14%
RHI Magnesita – from raw materials to refractories

The global player in the refractory industry

- 13 Raw material sites
- 35 Main production sites
- 180 Countries shipped to worldwide
- € 2.7 bn 2017 pro forma revenue
- 10,000 Customers
- >14,000 Employees
- 70 Sales offices
- >120,000 Individual products
Customized product range

We keep thousands of customers in steel, cement, glass and other industries

Highly individualized products for each customer and each application

>120,000 Individual products
A value chain from mining to the final product – and beyond

Security of supply
Implementing innovations along the value chain
With a strategic approach to recycling

From raw material to recycling: RHI Magnesita stands for the entire cycle
Unrivalled competitive advantage through vertical integration, in multiple sites

1.6 million tonnes of raw materials produced per year

70%+ vertical integration in basic raw materials and 50%+ for all raw materials

- Certainty of supply
- High quality materials
- Cost competitiveness
Our raw materials

What do we mine?

**Raw materials**
- Magnesite
- Sea Water
- Dolomite

**Intermediary products**
- Dead burned magnesia
- Fused magnesia
- Dead burned dolomite
- Calcined caustic magnesia

**Final products**
- Bricks
- Monolithics & pre casts
- Functional products
Various approaches to raw materials

How do we mine?

Open pit

- Brumado (Brazil)

Underground

- Uberaba (Brazil)
- Breitenau (Austria)

Sea water

- Drogheda (Ireland)
70% of Global magnesia capacity concentrated in China, DPRK and Russia, though production focused in CN

Global Magnesia resources and production capacity
Do we still want Mining in Europe?
Do we still want Mining in Europe?

Security of supply

Digitization

Competitiveness

Independence for Europe

Regulatory framework

Long-term perspective
Digitization – Where we are heading to

- E-2-E Collaboration
- Big Data
- Mining Control
- Production Control
- Automated Relining & Maintenance
- Tracking and Best Practice

Digitization – Where we are heading to
Example Digitization: Digital Fingerprint

Idea:
- Full traceability
- Connection of products and production process

Benefits:
- Deep understanding of product quality
- Improved production processes
- Live-monitoring of product quality
- Digital Twin
- Long-term vision: Self learning value chain from mine to recycling
Regulatory Framework

Are we just a collateral damage?

Example CO\textsubscript{2}

- Natural geogenic emissions are unavoidable by nature
- Recycling cannot replace mining
- Europe has to make a choice: Do we want a strong industry in Europe or somewhere else?

\[ \text{MgCO}_3 \rightarrow \text{MgO} + \text{CO}_2 \]
Regulatory Framework

High regulatory burden – a barrier to resource efficiency

Potential

1t = -1t

In general, each ton of recycled refractory products would save approx. 1 ton of CO₂.

Three topics

End of waste
Harmonized interpretation of the end-of-waste criteria in the member states for the refractory industry, similar to the area of construction waste.

Cross-border waste shipments
Inclusion of carbon-bonded refractories in the “Green List” for non-hazardous waste.

Ecotoxicity assessment - HP14
Uniform application of the calculation method for the assessment of ecotoxicity and uniform bio-test throughout the EU - or at least mutual recognition of the methods of the member states.

Uniform regulations for a single market.

For effective recycling and an optimized value chain, a harmonization of the legal framework conditions is urgently needed.
Can Europe stand the heat?
Get in touch

Luis Bittencourt
CTO RHI Magnesita
Wienerbergstrasse 9
1100 Vienna Austria
www.rhimagnesita.com

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