Minerals recovery and secondary raw materials

- Basics
- Actual Challenge
- Opportunities/Possibilities/Ideas
Basics
v-type raw materials = virgin raw materials

r-type raw materials = raw materials based on used products being recycled
Bentley r-type (1954)

Is it really clear, that something used has automatically a less value?

How important is the effort somebody is willing to invest in a used thing?
Sliding plate

Nozzle

Glue, adhesive
Downcycling: R-type raw materials or recycling products used in low-cost applications, far away from their original use.

Example: AMC-Brick from a ladle, higher cost than a magcarbon brick when it’s new, less value as r-type raw material (mostly used in metallurgical application).

Upcycling: R-type raw materials or recycling products used in higher value applications than before or maybe they even have properties which v-type raw materials do not have.

Example: Some v-type raw materials are only available as sand. The r-type raw material, recycled from high dense zircon from glass industry, can be milled to standard grain-size.
**Life Cycle Assessment (LCA):**

LCA is a tool for the systematic evaluation of the environmental aspects of a product or service system through all stages of its life cycle.

**Cradle to Grave:** Actual most common way regarding the lifetime of a product.
Sustainable, Sustainability, sustainable development

Brundtland Report 1987 “Our common future”
(from World Commission on Environment and Development (WCED), founded by the UN)

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. (discussed from the day it was published)

Three pillars are fundamental: Economic, Social and overall Environmental sustainability.

That means, even if the cradle to grave lifetime of a product, now as the most common fact in our throwaway society, is cheaper, easier and comfortable, it is the opposite of sustainable development!
Cradle to cradle:

Also very much discussed, because main idea is a zero waste concept...

Basic idea:

The possibility and the way of recycling of a product is an essential part of its development, design, composition and the way how it is produced.
Processing of refractory break-outs

The next processing steps are:
- Sieving into fractions 0/10, 10/70, >70 mm
- Sorting into different qualities
  - Manuel method
  - Spectroscopy method (LIPS)

This might be the first product or is the input for the next processing steps

High quality sorting process (qualified workers)

Recycling rate > 98.5%

Every single processing step is quality controlled
- Input (Break-outs)
- During all sorting and processing steps
- End products
- 1 Analysis per 75 to production amount
- Analysis average of 4-5 samples / product

Fundamental step: clean sorting
Actual Challenge
Disposal Material flow

Continuous:
- Ladles
- Converters
- EAF...
- Blast furnace, cowper
- Glass-tank

Discontinuous:
- stock
- Land fill

Recycling company

Recycling Material flow

Metallurgical reagents
- Recycling raw materials
- mixes

Product
Possible Reasons:

- Actual market situation
- Transferring production of refractory outside Europe
- Less acceptance regarding r-type raw materials
- Actual price of v-type raw materials
- No care about sustainability
Opportunities/Possibilities/Ideas
Why not giving the user of raw materials (R&D) the opportunity to choose between different qualities of

- **v-type** raw materials and
- **r-type** raw materials

without the influence what has to be used „primary“ and what „secondary“ ??

Any kind of raw material as a component has to fullfill a particular specification with critical and non critical parameters to be able performing in the ready product. Is it essential to specificate if it is a v-type or r-type raw material?
Using one of the basic ideas of „cradle to cradle“:

That means that the end user implements in his development the usage of r-type raw materials, before the product is on the market. Once on the market it can be sold with adding the argument that it can be returned (directly or indirectly through the recycling partner) for being recycled.

How is it now?
Who decides in which product and in what kind of scale r-type raw materials are used?
In which significance the r-type raw materials are considered by R&D while creating new products.
Important: Assistance and know how of the recycling company in giving advice
Responsibility of the recycling company:

- Fully and permanent meeting the quality requirements
- Reliable availability of the offered r-type raw materials
- Assistance in developing and establishing new products based on r-type raw materials
Linking the material flows

Disposing of the used material without caring about usage of r-type raw materials is not up to date.

The disposal must be linked with products containing r-type raw material.

This has to be done constructively and jointly between the recycling company and the producer of the waste, most prefered also together with the refractory company.
We cannot solve our problems with the same thinking we used when we created them.

Albert Einstein
Thank you for your attention!