



RHI MAGNESITA

Optimization of feedstock for CCU (mineral carbonation)

NEFI Technology Talk

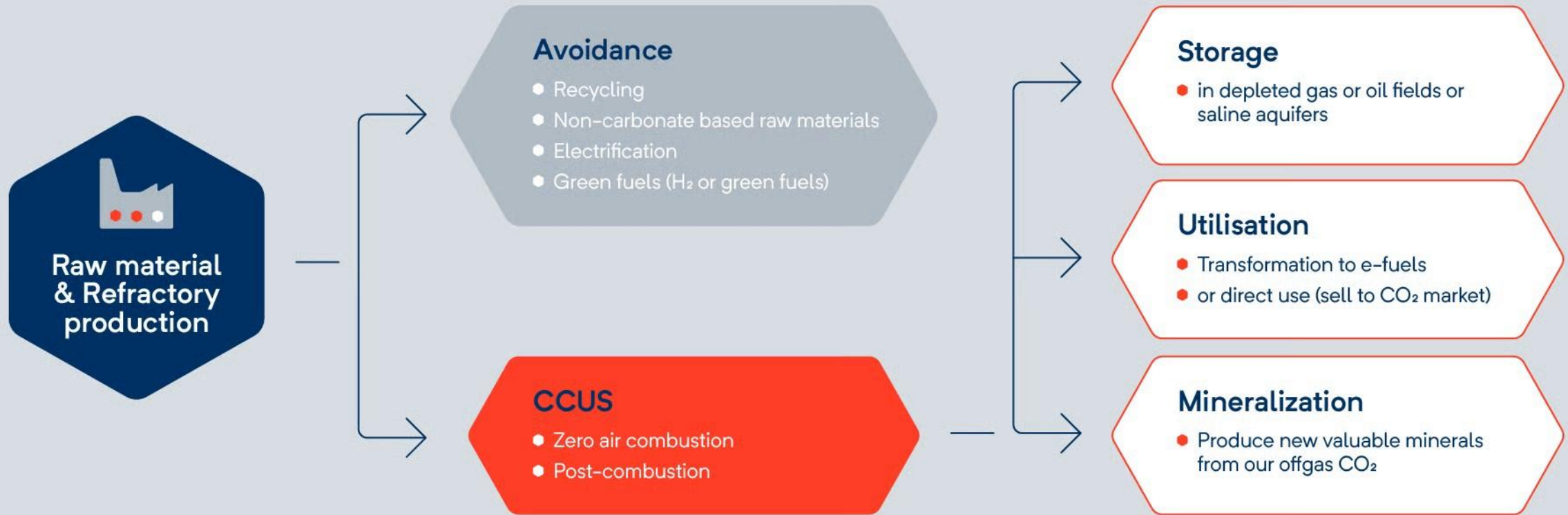
Leoben, 18th September 2026

Dr. mont. Lucija Pustahija

RHIM Decarbonization Options

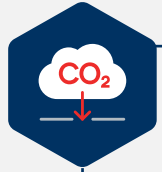
Infrastructure is KEY

The applied technological options will depend on the specific site parameters



Options for Decarbonization

RHIM's Activities in CCUS



CCS

Bilateral cooperation Austria - China
Funded project **AbateC**

- CCS applicability in the Anhui Province of China
- Geological pre-screening and detailed scenario development
- Numerical simulation and experimental validation of CCS scenario for Chizhou plant

 Bundesministerium
Klimaschutz, Umwelt,
Energie, Mobilität,
Innovation und Technologie

 中华人民共和国科学技术部
Ministry of Science and Technology of the People's Republic of China



FFG
Forschung wirkt.



RHI MAGNESITA



CCU (Mineralization)

Australia-Austria – Industrial Decarbonisation
Funded project **CCUpScale**

- Scalable industrial integration of MCI's technology
- Optimized energy management
- Development of carbon embodied materials



FFG
Forschung wirkt.



RHI MAGNESITA



Australian Government
Department of Industry, Science,
Energy and Resources



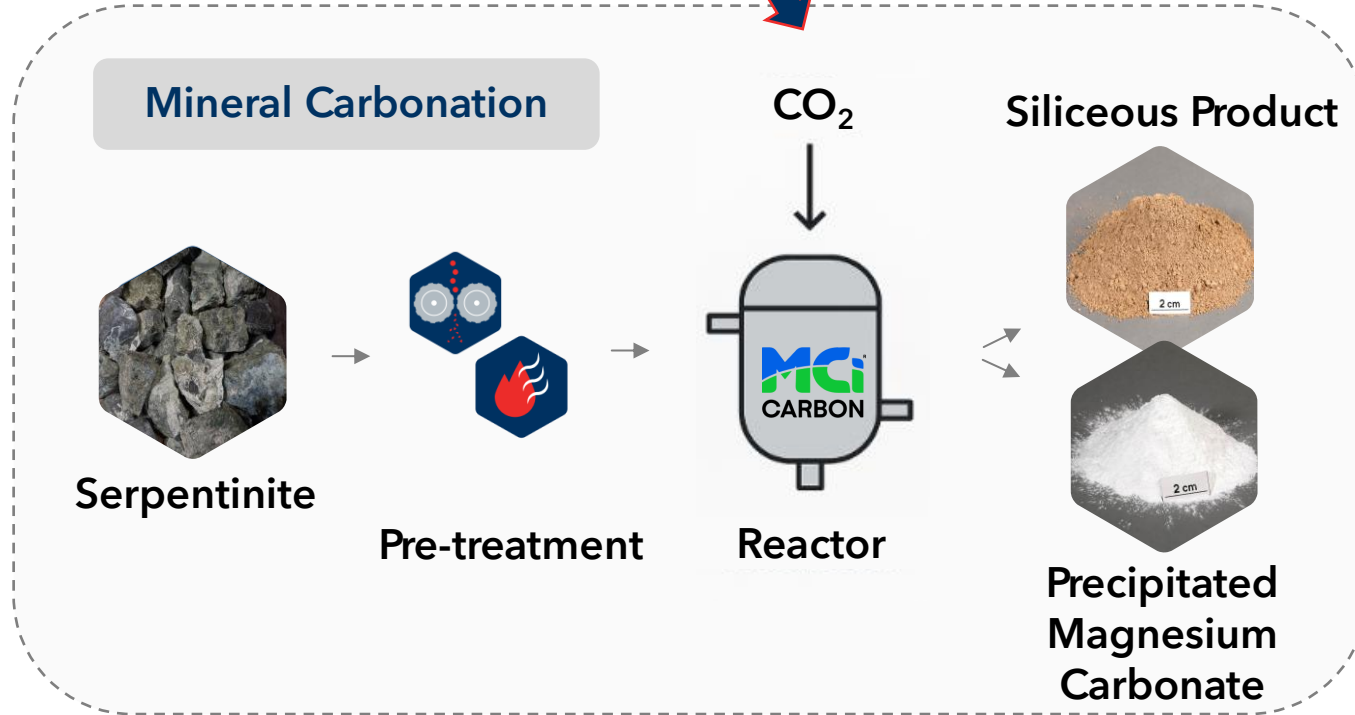
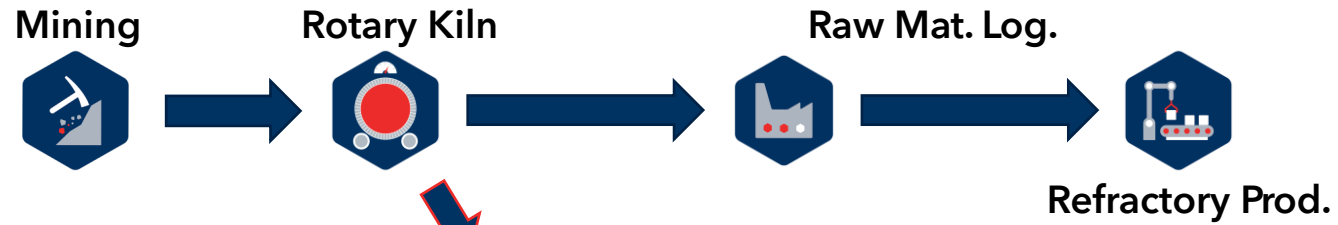


CCU

Mineral Carbonation

General Process Overview

Mineralization of CO₂



MCi's technology at a commercial scale

Technical highlights



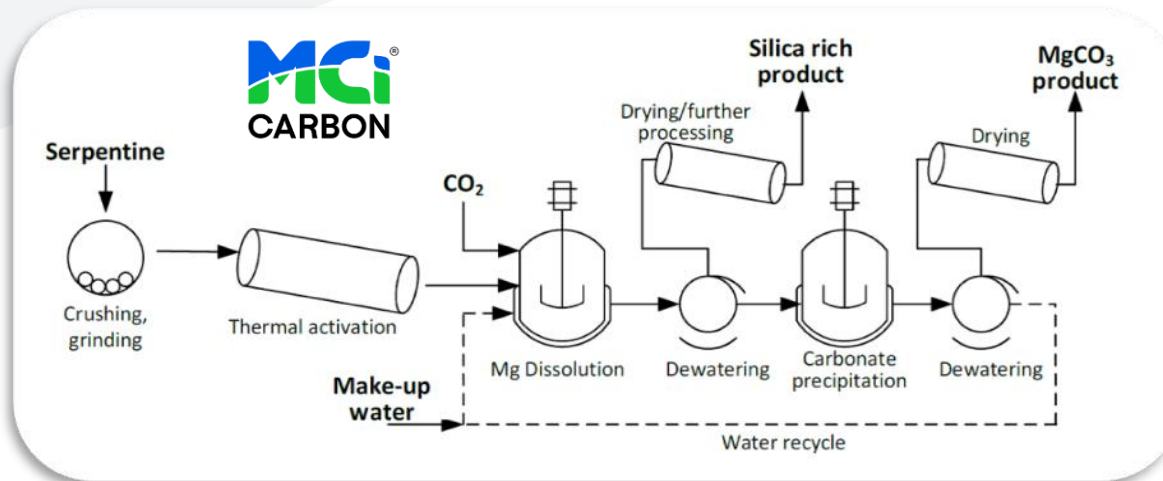
- **Unavoidable CO₂ emissions can be captured and utilized**
- **No need for purification** as CO₂ is captured directly from flue gas
- **Energy-efficient reactor conditions** at low temperatures and pressures
- **Output of 2 products for industrial re-sale:**
Silica rich product + MgCO₃ product to use in building materials, fillers, thermoplastics, paints & coatings,...



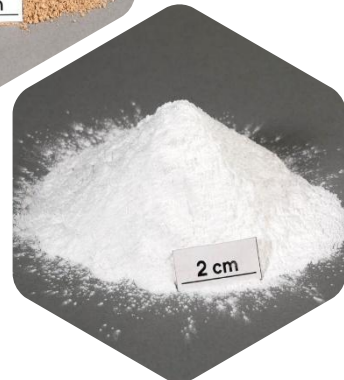
Existing demonstration plant "Myrtle" in Australia



Serpentine



Silica rich product



MgCO₃ product

Mineral Carbonation Products

Low carbon embodied materials

2 new industrial minerals:

- **Siliceous material**

For cement and concrete industry – to be used as supplement for cement clinker to reduce the CO₂ footprint of concrete

- **Precipitated Magnesium Carbonate (PMC)**

Chemically harmless, very fine white powder, flame-retardant and lightweight materials with many possible uses: Fireproof material, filling material for plastic, rubber, detergents; extinguishing material, etc.



Key Developments

First commercial pilot plant in Europe



Pilot Plant 2016 - now

University of Newcastle

~10-20 tones of CO₂/year

Validate global customers
through pilot
studies and materials
development



Demonstration plant 'Myrtle' Under commissioning

Orica's Kooragang Island
manufacturing plant, Australia

~1,000 tones of CO₂/year

Test customer scenarios &
trial output materials



First Commercial Pilot Plant Future

RHI Magnesita, Austria, Hochfilzen

~50,000 tones of CO₂/year

CAPEX > €150m for small-scale

Need for feedstock optimization

Why & How

→ The abatement performance is directly connected to the feedstock quality.

Both initial characterization and later sorting/optimization contribute to the material performance when considering CO₂ capture.

Characterization → Geochemistry, mineral assemblage, polymorph quantification, texture

Optimization → Mineral liberation, magnetic separation, Cr removal, sieving, density separation

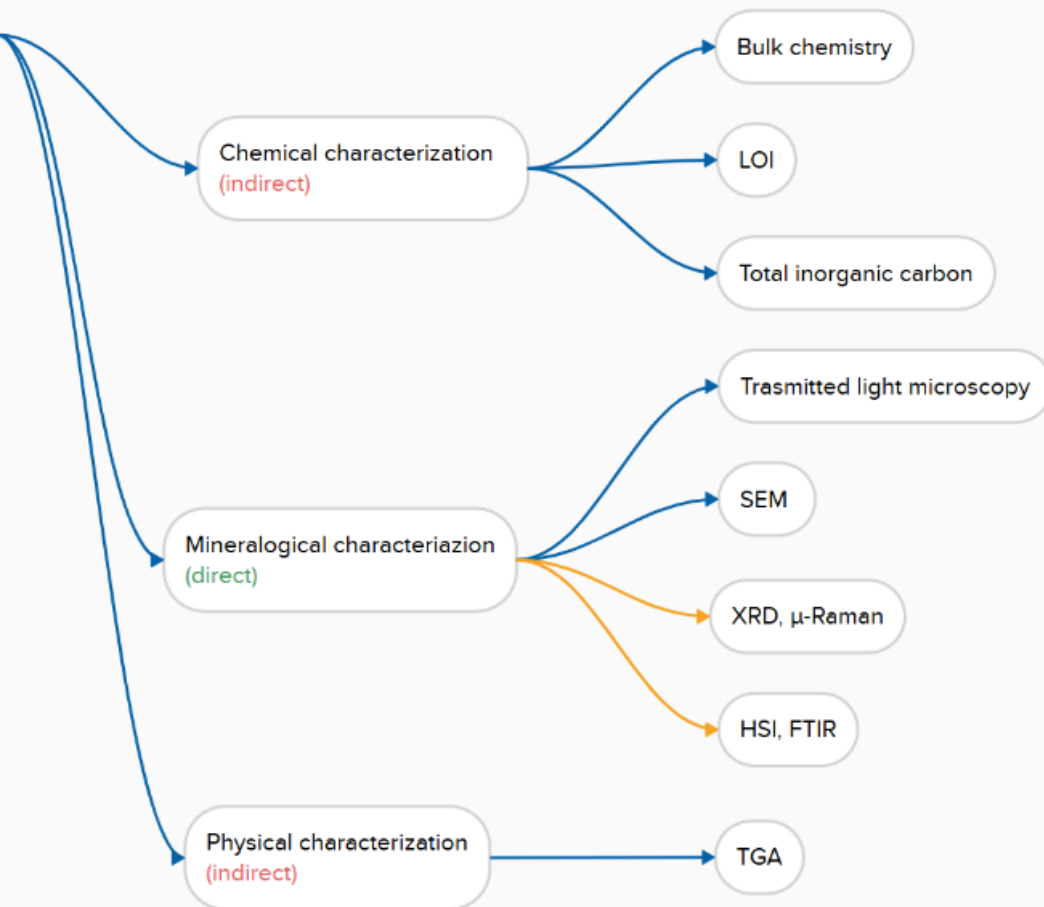
Establishment → Standardized, fast quality control and sorting process, both at lab scale and in the mine



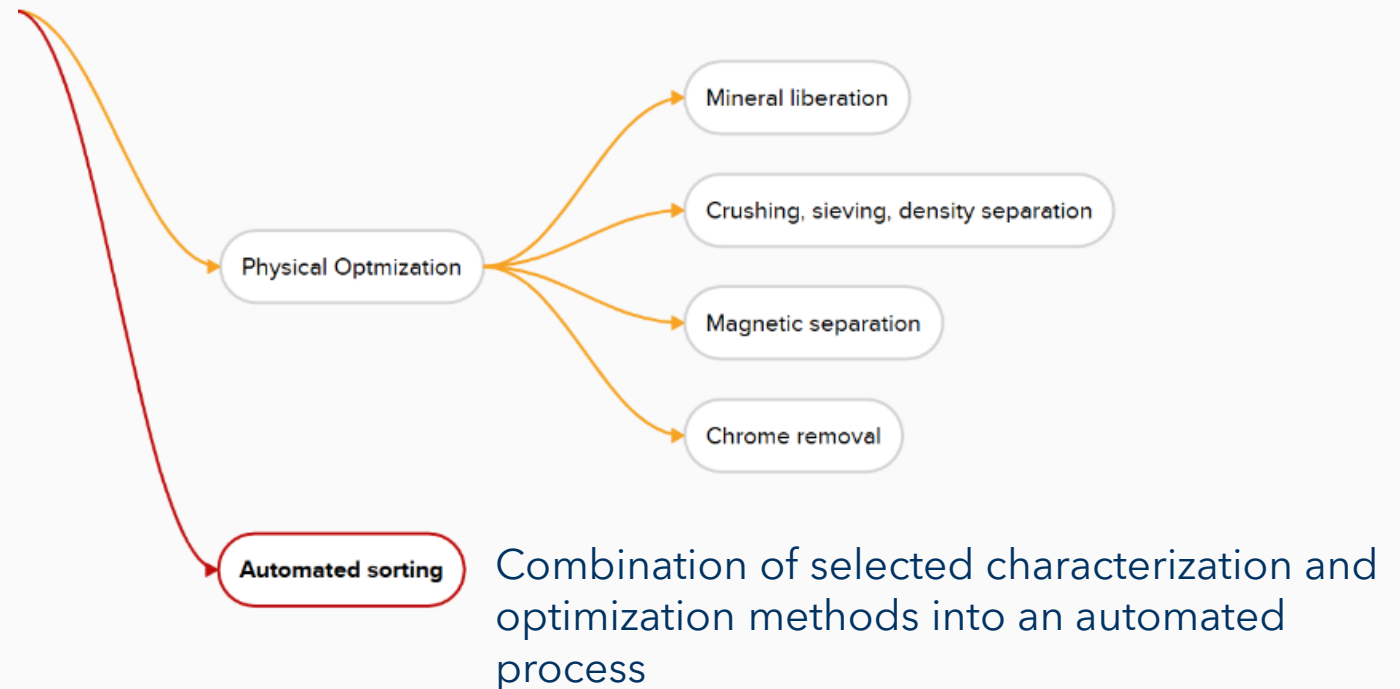
Strategy for feedstock optimization

Multilayer
analytical
approach

Characterization



Optimization

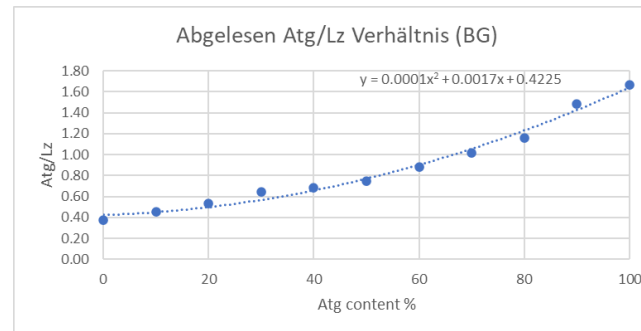
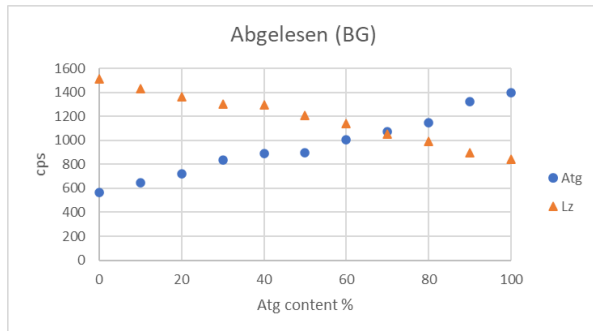
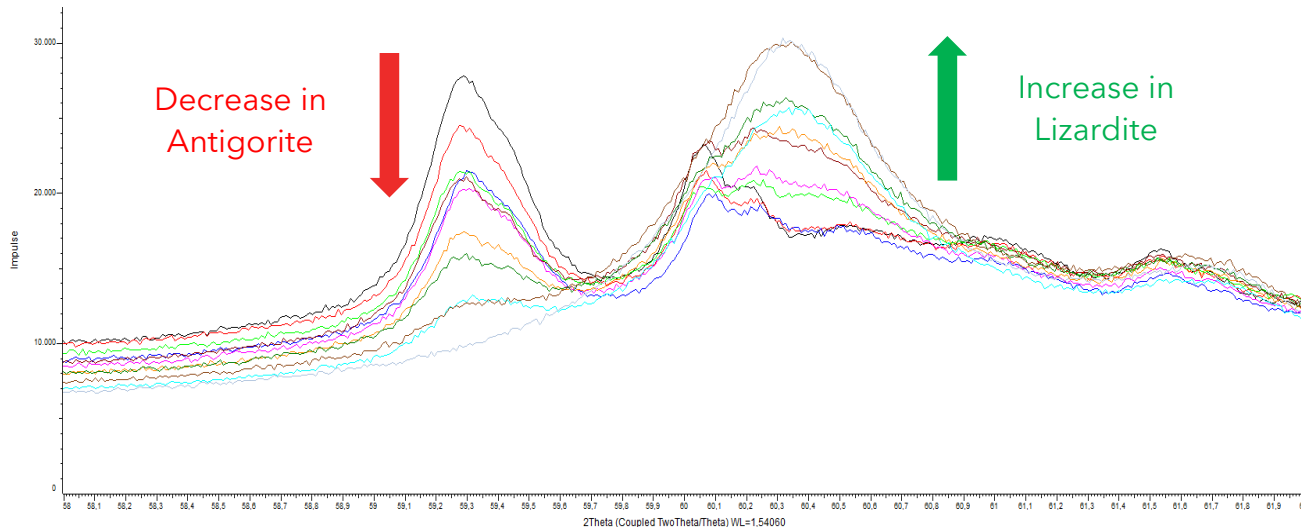




SerpXRD: Unlocking reliable polymorph differentiation and quantification in serpentinites

Collaboration between Pioneer Research and
Mineralogy Department, with the UNI Graz

SerpXRD - The Solution



Long-term vision

The establishment of a reliable quality control method for the assessment of the potential of new investigated serpentinite feedstocks.



Search for reference samples



Creation of a calibration curve based on synthetic mixtures



Application to unknown samples and assessment of reliability.



Refinement and creation of an automatic evaluation



Implementation in the Mineralogy Department



Ongoing steps

Physical characterization

Enrichment of serpentine minerals

- **Mineral liberation in both fine and coarse fractions**
 - separation of 0-20mm and >20mm fraction is already standard in the mine, but 0-20mm makes out only the 10% of a 30kton blast
 - separation of serpentine from olivine
- **Density separation of serpentine from olivine**
 - Serpentine and olivine have ~1g/cm³ density difference

Separation of impurities

- **Magnetic separation**
 - To separate magnetic particles (magnetite, chromite) which could result problematic for the process and/or aimed quality of the two green minerals material streams
- **Chrome removal**
 - Chemical method to prevent the formation of Cr(VI) during the process

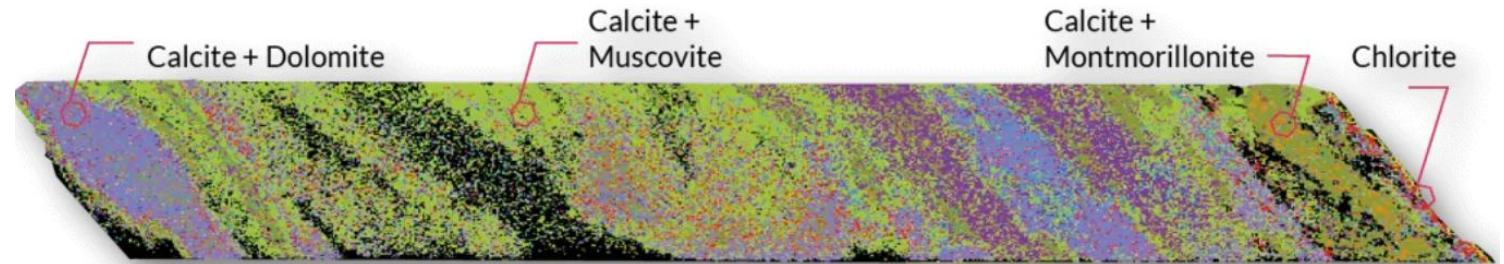


Hyperspectral imaging (HSI)



Traditional methods (e.g. microscopy, chemical analyses, XRD) are accurate but slow and destructive methods

→ HSI acts as a screening tool to decide where deeper testing is needed



Source: Breeze by Prediktera ([Discover Minerals Faster with Breeze Geology modules](#) | [Prediktera](#))

No required
sample
preparation

Fast
evaluation

Non-destructive
analysis

Full-surface
scanning

Detection of
differences not
visible by eye

Detection of
compositional
variations of
large scale

Application Areas for RHI Magnesita

HSI in optimization of serpentinite feedstock

Investigation of HSI application in Serpentinite Characterization (BGR institute, Hannover, DE → Bundesanstalt für Geowissenschaften und Rohstoffe)



Reference
materials

Drill cores

Natural
samples

Application Areas for RHI Magnesita

HSI in optimization of serpentinite feedstock

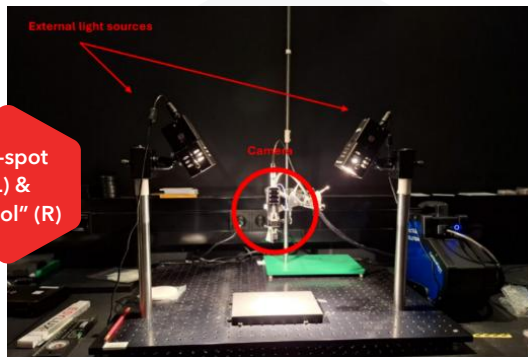
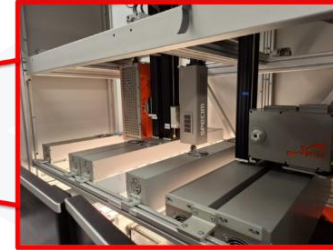
Investigation of HSI application in Serpentinite Characterization (BGR Hannover, DE & HySpex NEO (Breeze by Prediktera), NO)



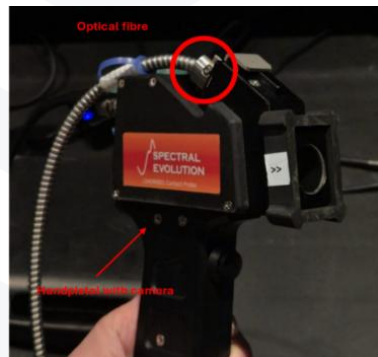
Optical fibre



Sisurock Workstation



On-spot (L) & "pistol" (R)

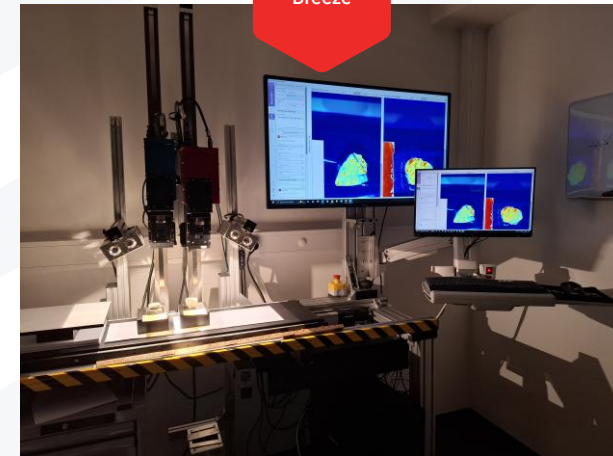


Optical fibre

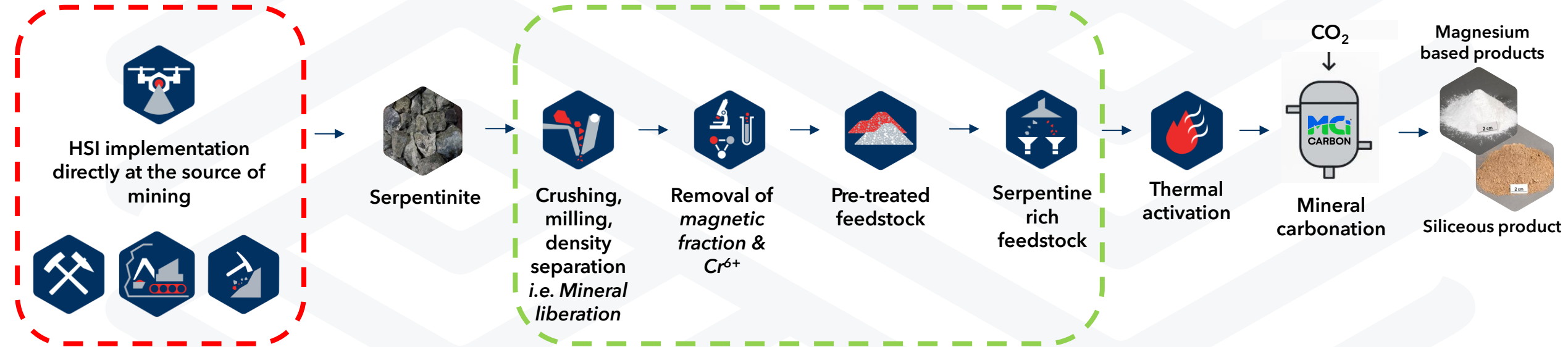
Serpentinite with garnet



Breeze



Integration into Mineral carbonation process



Just The Beginning

What you see is operational - what's behind is transformational

Example



1 lab analysis per 25t batch

vs.



> 100,000 analysis per 25t batch

Raw material
control



Production
monitoring



Fired brick
analysis



Maintenance
inspections





RHI MAGNESITA

Thank you for your attention

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