

# From cradle to grave - a sustainable approach to recover critical raw materials applying the concept of circular economy

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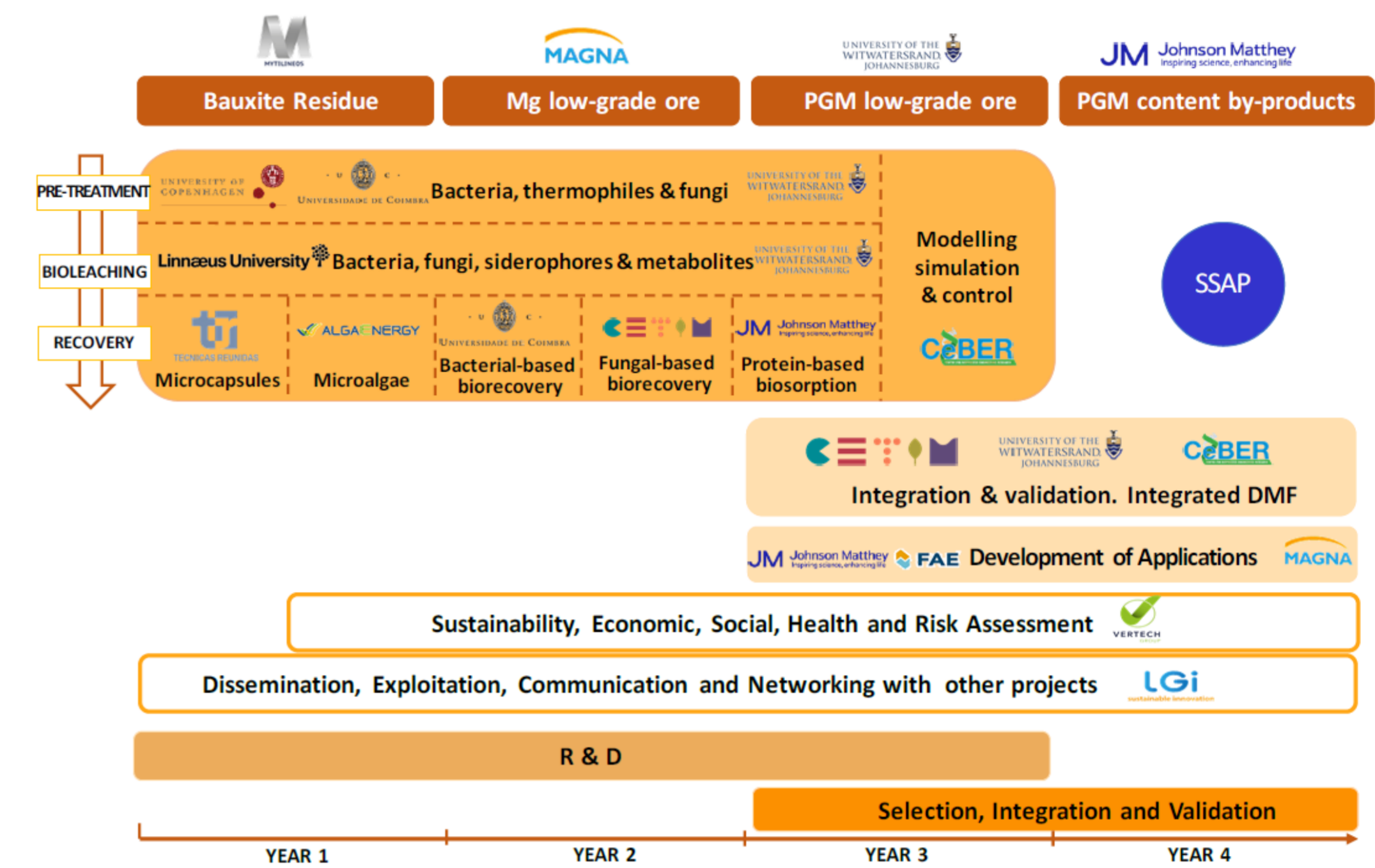
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## What is BIORECOVER project

The main objective of BIORECOVER is the research and developed of a **new sustainable and safe process**, essentially **based on biotechnology**, for selective **extraction of a range of Critical Raw Materials** from relevant unexploited secondary and primary sources:

- Rare Earths** from Bauxite Residue.
- Magnesium** from Mg wastes of low grade minerals and calcination by-products.
- Platinum Group Metals** from flotation tailings from South Africa (UWITS) & PGM slags, dusts and press cake.

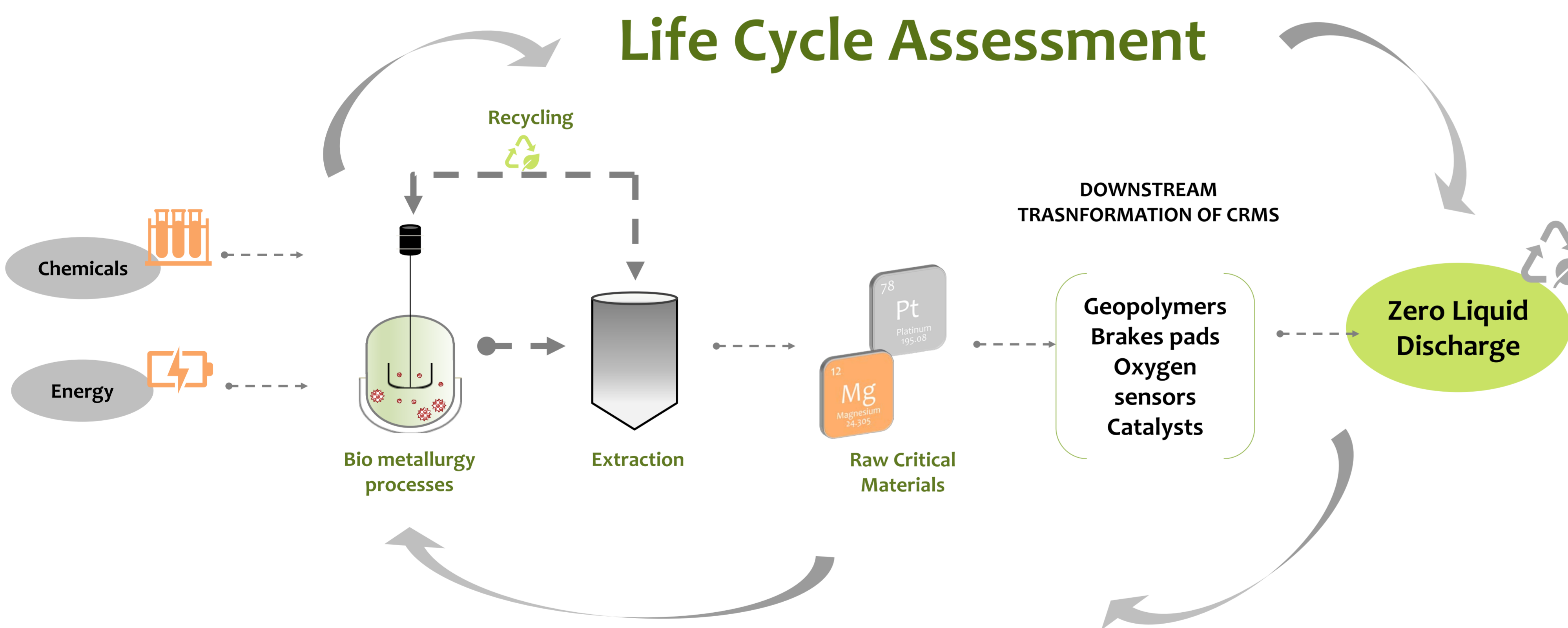
**LCA & LCC** and a **Decision Making Framework** will support these aims. The awareness, trust & acceptance of the society about the importance of raw materials will be addressed by an awareness campaign and public perception studies. **Cost effective and environmentally favorable concepts with flexibility and modularity aspects in minerals processing and recycling processes** for CRM extraction will be the **basis of BIORECOVER approach, supported by interactive LCA and LCC** which will enable a **minimum consumption of reagents, water and energy to be achieved**. Likewise, BIORECOVER implies **Zero Liquid Discharge** by the valorisation of residual streams making the overall process more sustainable both environmentally and financially.



## Environmental and Social Objectives

- Development of strategies for the valorisation of the generated residual streams, focusing on construction materials (geopolymers) development.
- Perform an Interactive Life Cycle Assessment (LCA) in order to reduce the generation of waste, wastewater and emissions of the whole operations involved in the BIORECOVER process and end-user's applications.
- H&S analyses and design of tools to minimise the risk associated with the operations of BIORECOVER process.
- Social Impact assessment to define the social consequences of the BIORECOVER process, to improve the public awareness of the relevant stakeholders and general public.
- Assess the cost-effectiveness of each individual stage, overall BIORECOVER process, and end user's applications to increase the economic performance in terms of higher material, water, energy efficiency

## Interactive LCA Methodology



To achieve a Zero Liquid Discharge process, the valorisation of the generated residual streams are addressed focusing on construction materials. Moreover, throughout the project, an interactive LCA and LCC is also carried out according with the information provided and the continuous results in order to modify each process to achieve the expected environmental and cost performance of the overall process.

## What results are expected?

- ✦ Valorise the generated residual streams (**at least 90%**) as construction raw materials and other processing scenarios (further recovering of other metals such as Fe),
- ✦ **Minimise the water consumption and wastewater generation** to achieve a **Zero Liquid Discharge** in order to obtain an **environmentally sustainable from raw materials to end users**.
- ✦ **Fight climate change** through processes with **lower energy consumption (20-30%)**.
- ✦ Implementation of **circular economy models**
- ✦ **Reduce 60%** the emission of **GHG**
- ✦ Reach an **efficient use of resources reducing the storage of wastes** from industrial and mining.

