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# Reuse of Mineral Waste for Eco-friendly Insulating Foam: LCA Approach in Wallonia

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## Introduction

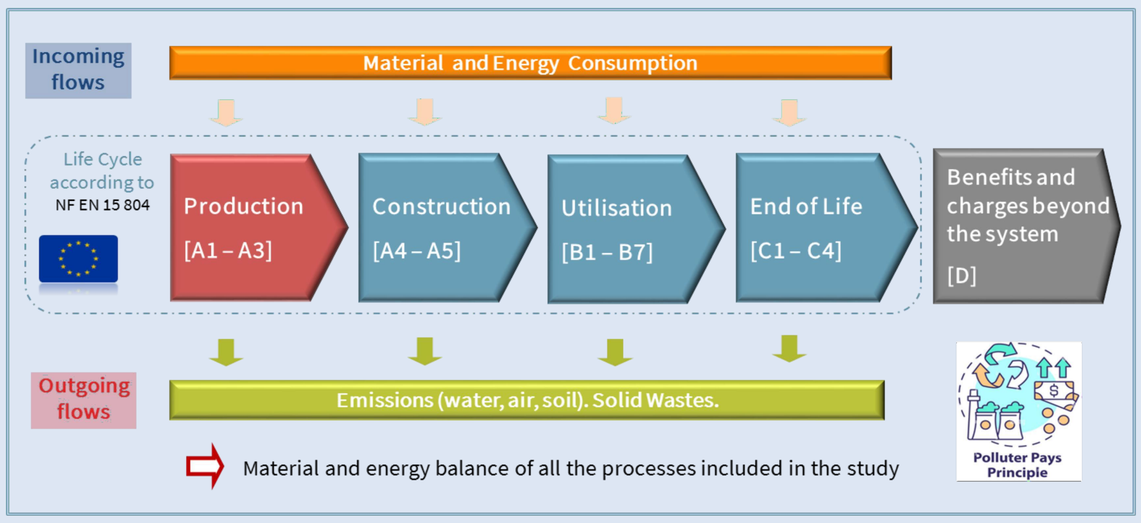
The construction industry is increasingly focused on energy efficiency and **reducing greenhouse gas emissions** [1]. In **Wallonia**, IPSIIS, a thermal insulation company, is conducting research as part of the 'REMIND' program (Reverse Mineral Industry in Wallonia) to develop a sustainability plan. The aim of their project, called IRMA, aims to integrate **local mineral waste** from **deconstruction** into the manufacturing process of **mineral foam**. This approach replaces part of the natural raw material and strives to achieve equivalent or superior properties with **minimal environmental impact**.

## Objectives

- Integration of mineral waste from **deconstruction**
- Replace natural raw material with **waste materials**
- Utilize **Life Cycle Assessment** (LCA) as a decision-making tool and foster **circular economy**
- Material science **optimization** approach to study alternative materials (Ashby)
- Explore **business opportunities** and economic trends resulting from sustainable practices

## State of the art

- ✓ Primary data collection from industrials about raw materials + transport to production site + processing ⇒ *inventory and LCA*
- ✓ Secondary data from Ecoinvent 3.9
- ✓ Characterization: - FU for each system
  - System boundaries based on **EN 15804+A2** [2]




## Evaluative and Negotiating Steering

**Choice of waste**
From demolition: Sand, wool and glass fibers, mix of concrete and bricks, etc.

**Characterization of fluxes**
Physical properties, chemical compositions, toxicity, etc.

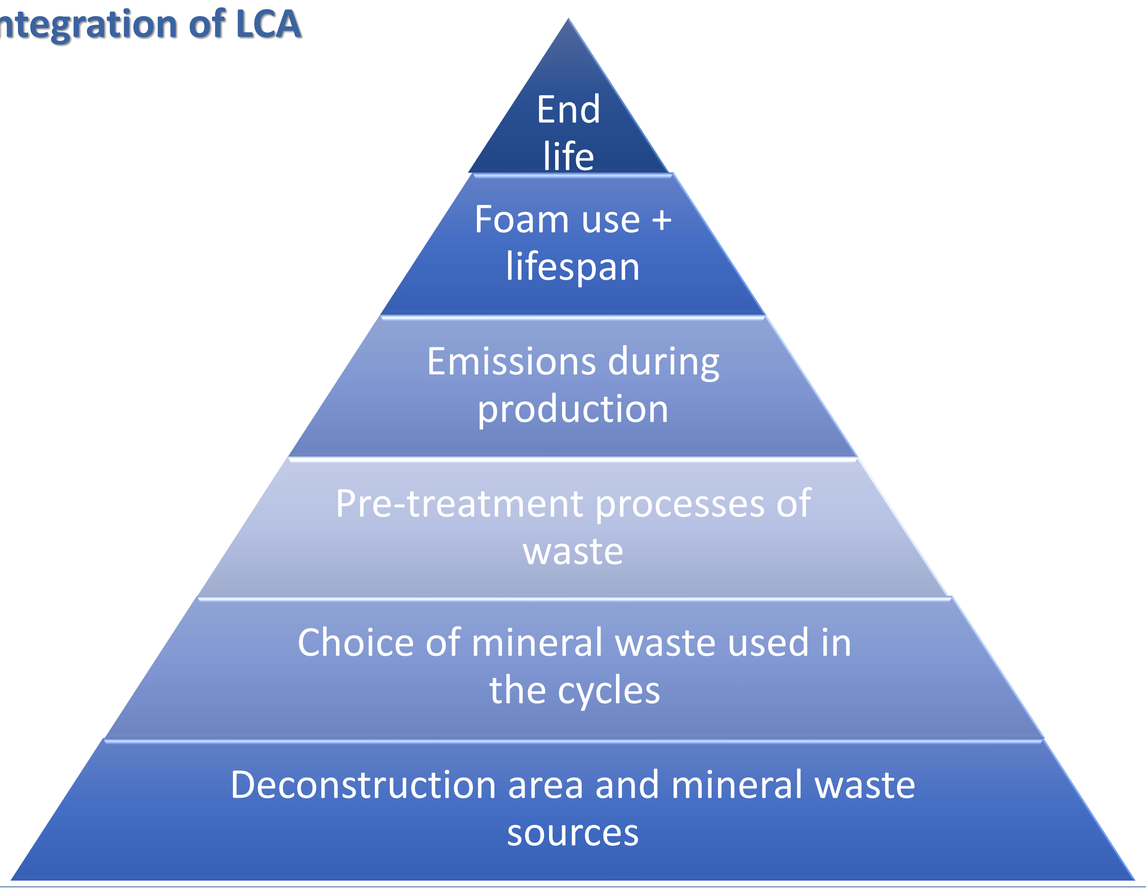
**CHOICE: Go/No Go**

**Production**
Optimization of production process with mineral waste included (pre-treatment)

- ✓ Conduct Life Cycle Assessment (LCA) analysis to evaluate environmental impacts from cradle to grave
- ✓ Optimization of the final product by combining material science principles (Ashby's method) [3] and LCA results

If GO ⇒ Upscale approach will take place to align the product with potential market requirements

## Integration of LCA




## Project and perspectives

- ✓ 39 months for project - started in October 2022
- ✓ Expected outcomes :
  - Identification of strategic alternatives and eco-design choices based on LCA results
  - Promotion of circular economy practices within the construction industry in Europe
  - Creation of cost-competitive products with minimal environmental impact
  - Generation of new business opportunities and economic trends in Wallonia
- ✓ Funded by The European Commission and Walloon Region and supported by GreenWin

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**References**
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[2] Ioannidou D., Foster. C., Symeonidis A., Muller J., Bourgault G., FitzGerald D., Moreno Ruiz E., (2021). Documentation for the 'Allocation, Cut-off,EN15804' system model, ecoinvent Association, Zurich, Switzerland.
[3] Ashby, M.F.. Materials Selection in Mechanical Design. Netherlands, Elsevier Science, 2016. Ashby, Michael F. Materials and the environment: eco-informed material choice. Elsevier, 2012.