Environmental impact assessment of biobased binders: from production to industrial applications

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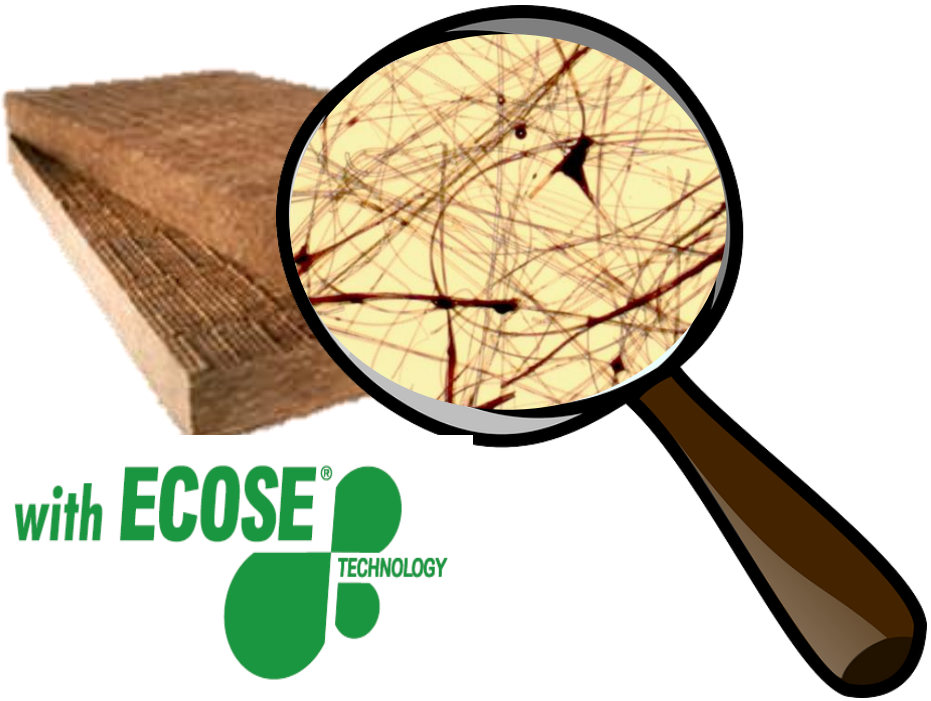

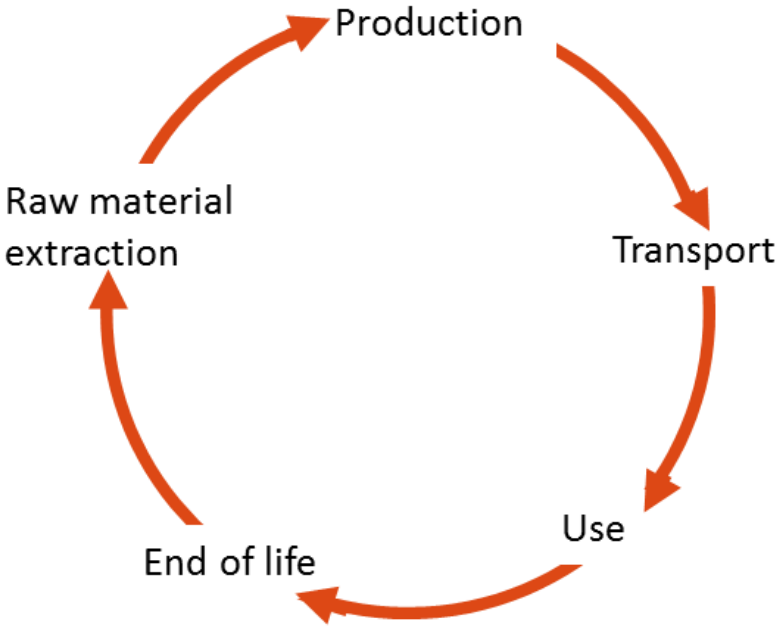

Environmental impact assessment of bio-based binders: from production to industrial applications

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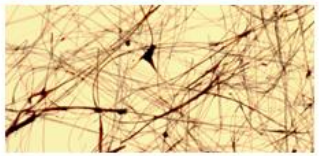
A binder?

Use: e.g. holds together fibers for mineral wool insulation products
Traditionally: based on Phenol Formaldehyde Urea (PFU).
Knauf Insulation

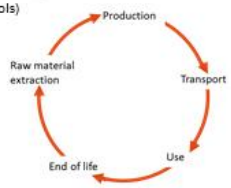
- Developed a new binder: ECOSE Technology
- No added formaldehyde
- Bio-based materials
- First developed for mineral wool products (glass and stone wools)
- Others applications possible: wood composite panels, etc.

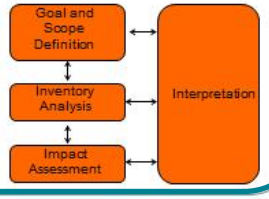
→ **Environmental impact?**



Life Cycle Assessment (LCA)

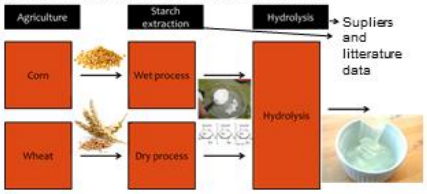
- All life cycle steps
- Energy and material fluxes for the entire life-cycle analysed
- 4 interdependent steps
- ISO 14040 and 14044 norms [1]



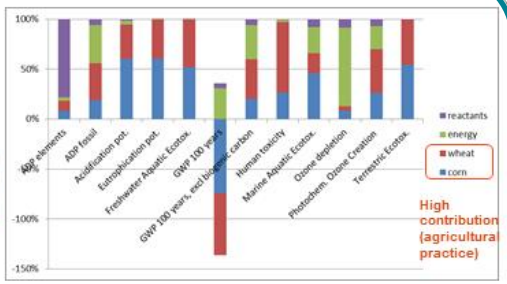


ECOSE LCA:

1. **LCA of ECOSE mains component**: Carbohydrate



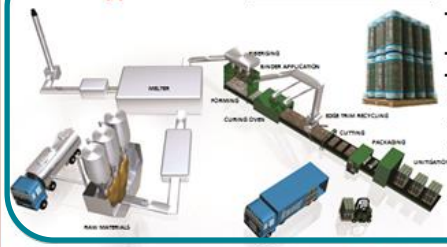
Belgian practice + adapted to others countries (yields) [2]



2. **Inclusion of others components**

- High contribution of carbohydrate (agricultural practice)
- Comparison with other binders: results depend on the environmental impacts categories. ECOSE better if related to resources depletion, GWP

ECOSE application LCA: Glass mineral wool products



- A lot of products/production sites but production process always similar
- Developed a generic model: Able to model all products from all Knauf Insulation plants in GaBi software [3]
- Included ECOSE LCA
- Modified version to study products with PF (old plant data)

thinkstep GaBi Product Sustainability Performance

Results:

- Environmental Products Declarations
- Ecodesign
- Comparison ECOSE vs PF (results depend of the impact categories)
- Comparison with products using other binders

Conclusions and perspectives

Carbohydrate LCA: High contribution of agricultural pratices
ECOSE LCA: High contribution of Carbohydrate (agriculture)
Comparison with non biobased binders: results depend of the environmental impact

GMW LCA: Generic model: Ecodesign and EPD
Comparison with PF binders: results depend on the environmental impact
Perspectives: Other sources for carbohydate
Other ECOSE applications: Stone wool, wood composite panels, etc.

Bibliography:
1. ISO 14040 and 14044 , Environmental management - Life cycle assessment - Requirements and guidelines. 2006.
2. Walloon Agricultural Research Centre (CRA-W). ALT4CER project. 2014.
3. LBP, University of Stuttgart, and PE INTERNATIONAL, GaBi 6, 2012. p. GaBi 6: Documentation of GaBi6-Datasets for life cycle engineering.

1 → Why ECOSE is so special?
What is LCA?

2 → How ECOSE is produced
LCA results for its main component

3 → How Glass mineral wool is produced
LCA model

4 → After?