

Saïcha Gerbinet (1), Roberto Renzoni (1), Vincent Briard (2), Jean-Marie Desert (3) and Angélique Léonard (1)



- (1) Laboratory of Chemical Engineering – Sustainable processes and development - University of Liège, Building B6 – Sart-Tilman, 4000 Liège, Belgium. Saïcha.Gerbinet@ulg.ac.be
 (2) Knauf Insulation Sprl, Head of Sustainability, Products and Buildings, Axis Parc, Rue E. Francqui, 1435 Mont-St-Guibert, Belgium
 (3) Knauf Insulation Sprl, HSSE Manager, Rue de Maestricht 95, 4600 Visé, Belgium



Introduction

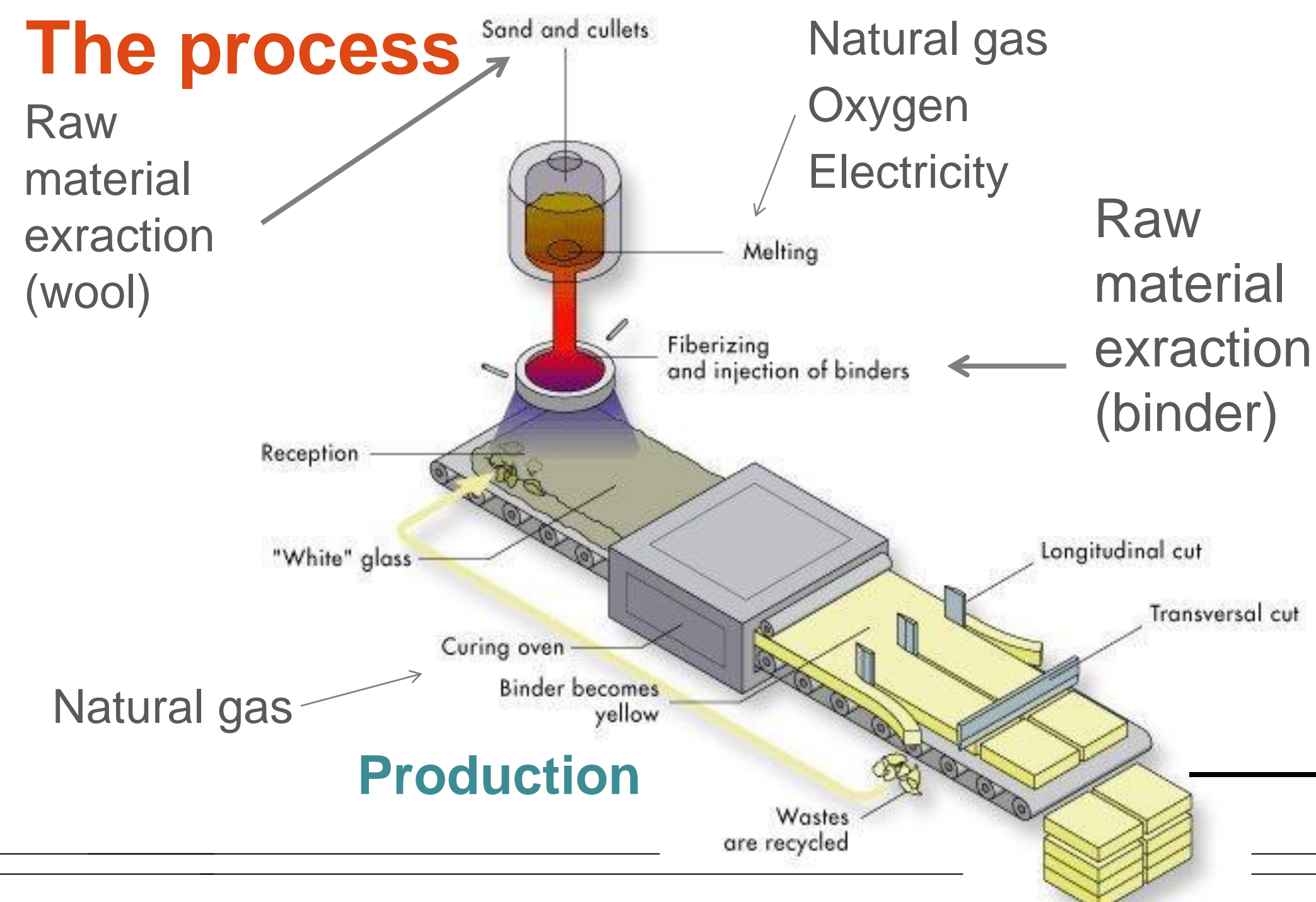
Building sector : increasing need to take into account, on a life cycle basis, the environmental impacts of (its) products.

In France: environmental and sanitary statements (“Fiches de Déclarations Environnementales et Sanitaires” (**FDE&S**)). Environmental part : **LCA**

Knauf Insulation, a glass wool producer for the French market: evaluate the environmental impact of its processes in view of FDE&S realization.

→ **Model** (GaBi 5): *specific adjustable parameters* for assessing the life cycles of *all Knauf Insulation products* → **FDE&S creation or eco-conception**.

The process

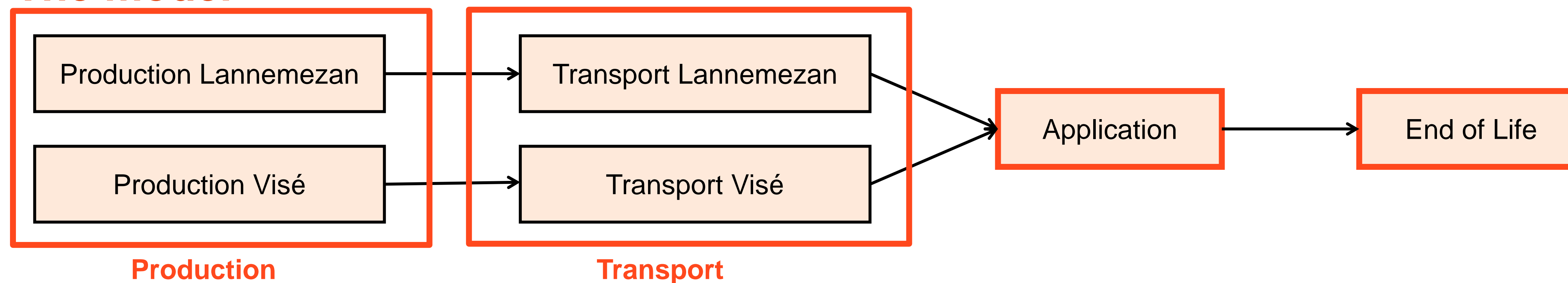


2 factories: Liège province (Belgium) and Midi-Pyrénées region (France) **working on similar processes**

- 1. Raw materials** (recycled glass (cullet), sand, limestone and soda ash, as well as recycled off-cuts from the production process, borax and sodium carbonate) are weighed, mixed and sent to a *furnace* (1350°C - combination of two heating techniques: oxy-combustion and electricity).
- 2. Forming:** the melted mass *is fiberized* and *the binder* is added. Special binder with *ECOSE Technology* (based on plant starch) is used. The wool mattress is then formed and for some products, a glass veil is added on one or both sides.
- 3. Curing oven:** The mattress goes through a natural gas oven at 250°C in order to cure the binder.
- 4. The mattress is cut and packed.**

Transport (truck) → Installation → Use (50 years) → End of Life (landfill)

The model

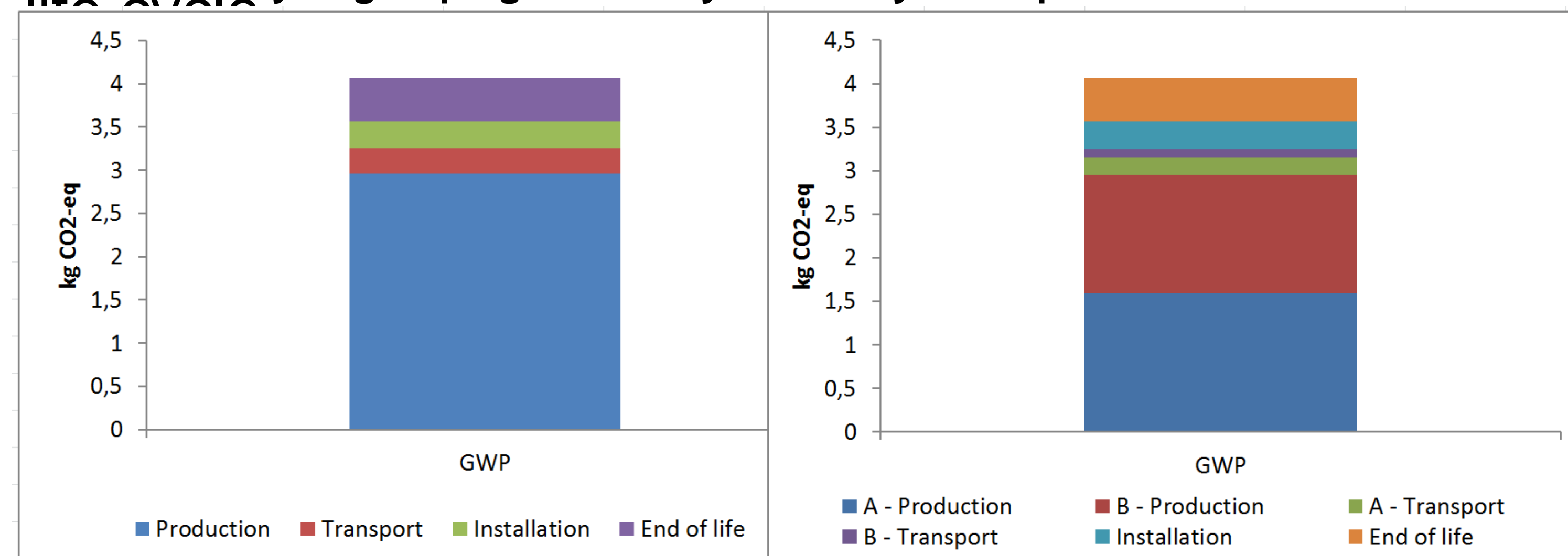


- GaBi: phases of the life cycle can be modelled by **plan**.
- A plan can contain processes or other plans, and for each process, **parameters** can be added.
- In this study, parameters → use the same model for **all Knauf Insulation glass wool products** (example, one parameter : share of sales from each factory)

Results

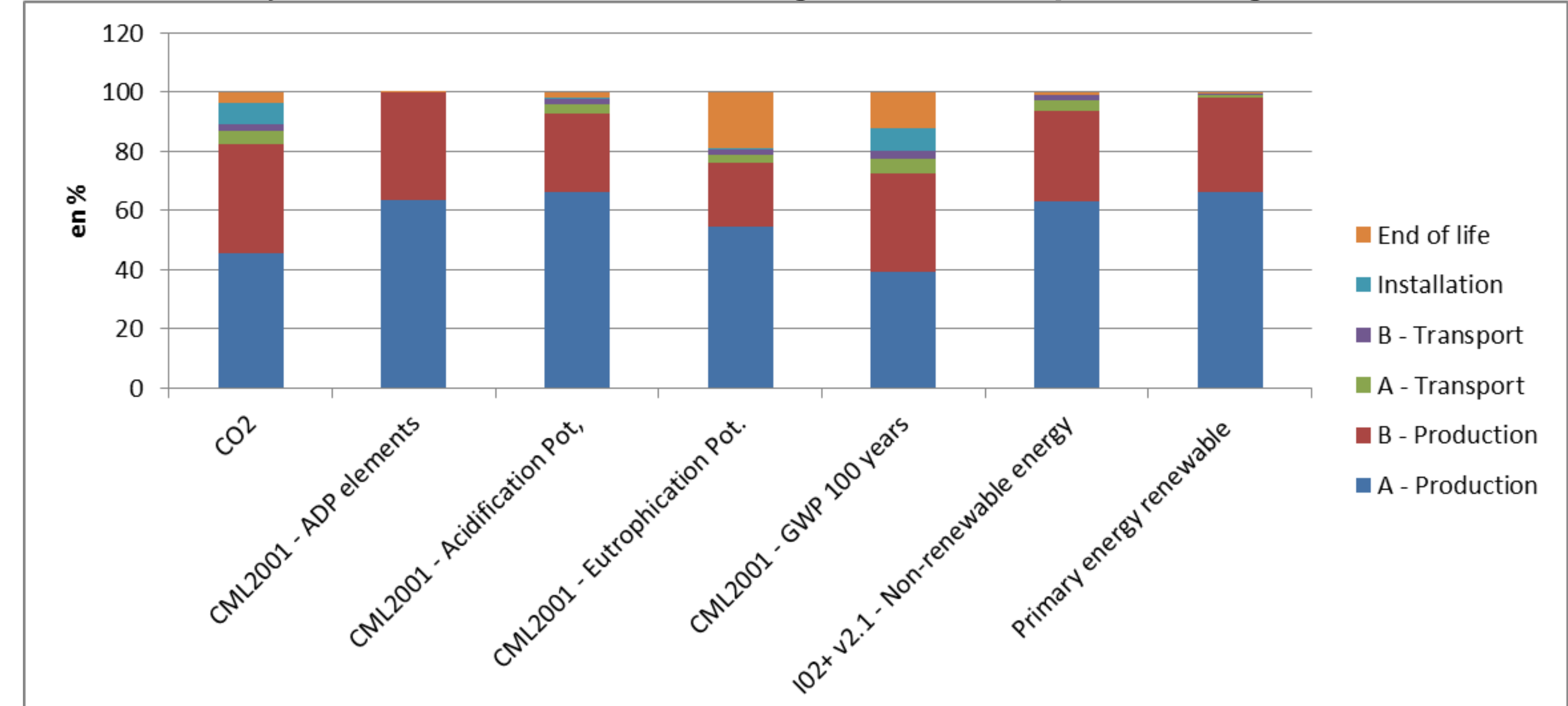
- FDE&S
- Better understanding of environmental impact through its life-cycle
- Eco-conception

2: Possibility of grouping differently the life cycle steps



Global Warming Potential (GWP – 100 years with CML2001 - Nov. 2010) of a standard product for pitched roof application with the life cycle steps such as in the FDE&S on the left and with another grouping on the right (share of plant A is higher).

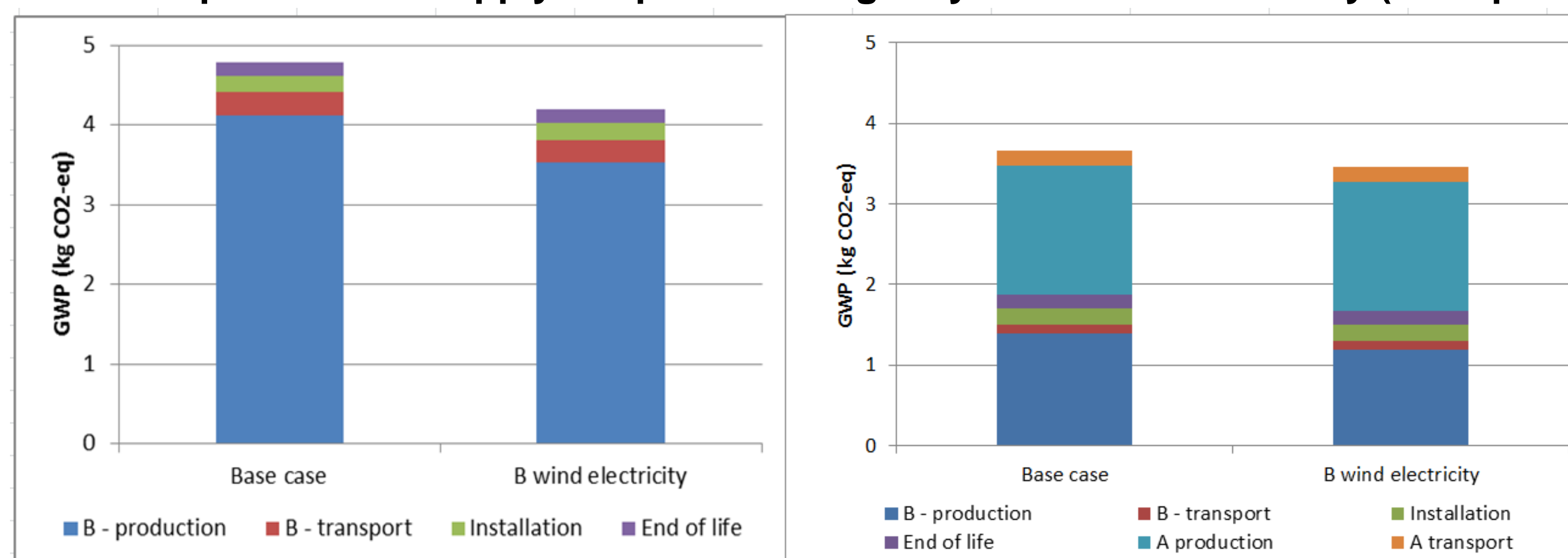
2: Possibility to use different methodologies and/or impacts categories



Most relevant impacts categories for a standard product for pitched roof application (share of plant A is higher).

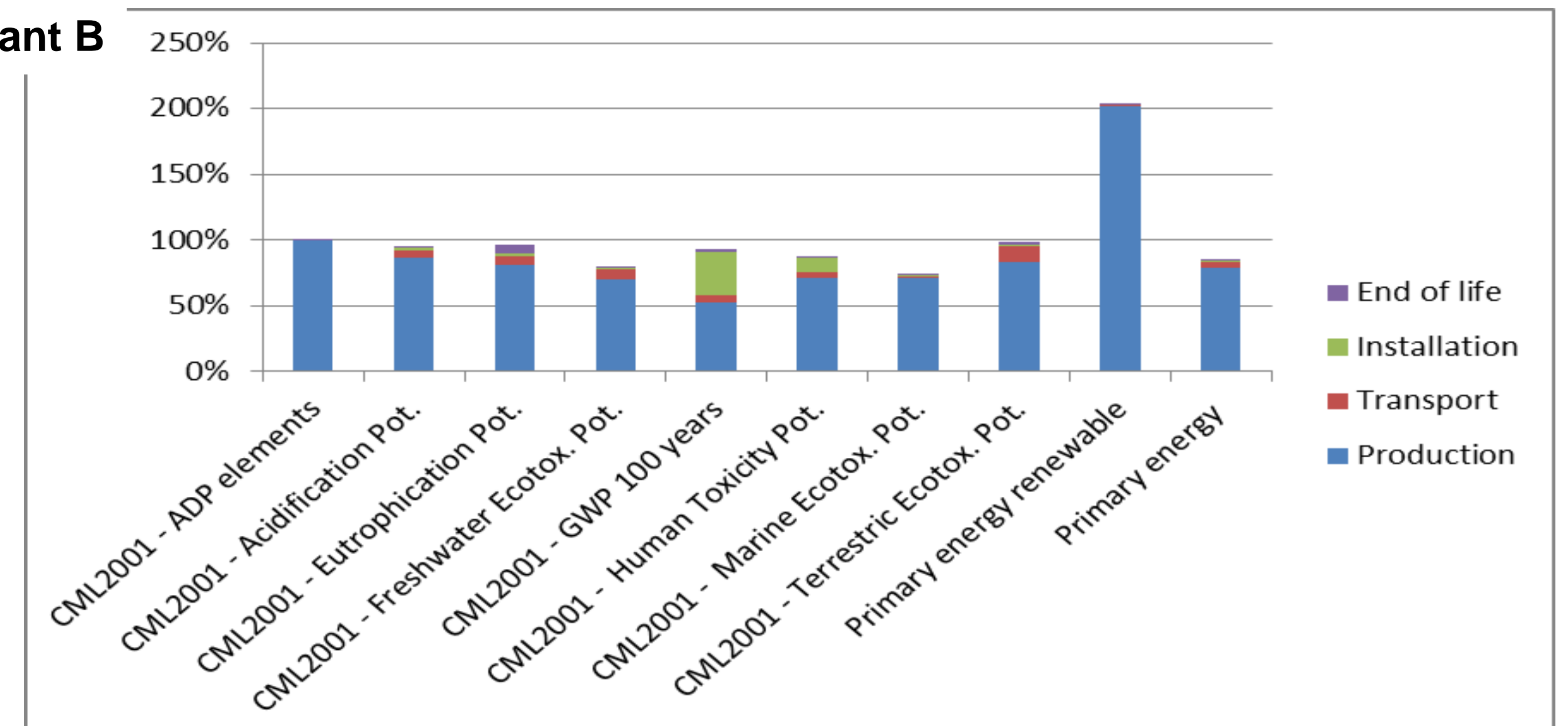
2: Other possibilities: going in more details and examining each process or each plan individually or determining which process has the highest impact in a particular category.

3: Example: electric supply : Impact of using only renewable electricity (wind power) at plant B



Global Warming Potential (GWP – 100 years with CML2001 - Nov. 2010) of a standard product for pitched roof application. Base case (left) – only renewable electricity (wind) for plant B (right). *Measured in two ways:*

- Plant B only (left):** the use of wind electricity instead of the country mix partially reduces the GWP. But, the GWP is mostly related to the natural gas combustion and stays high.
- Product made in both plants (right)** (share of plant A is higher), the GWP is smaller (plant A uses proportionally less natural gas). Nevertheless, the use of wind electricity in plant B reduces the GWP (even if its production share is smaller, plant B has higher GWP).



Combination of several impacts categories for a standard product for pitched roof application produced at plant B using only wind power electricity. The reference is the actual production.

Taking into account several impacts categories → avoidance of impact transfer
 Studying the differences between the two plants → where to improve
 Process modification → impact on environmental performances

Conclusions and perspectives:

The proposed model examines the entire life cycle of all glass wool products produced by Knauf Insulation in both plants. From this model, FDE&S, for communication and building design purpose and eco-conception to lower environmental impacts, can be developed. In fact, it allows to show the environmental impacts for the most relevant categories of process modifications such as change in energy supply.