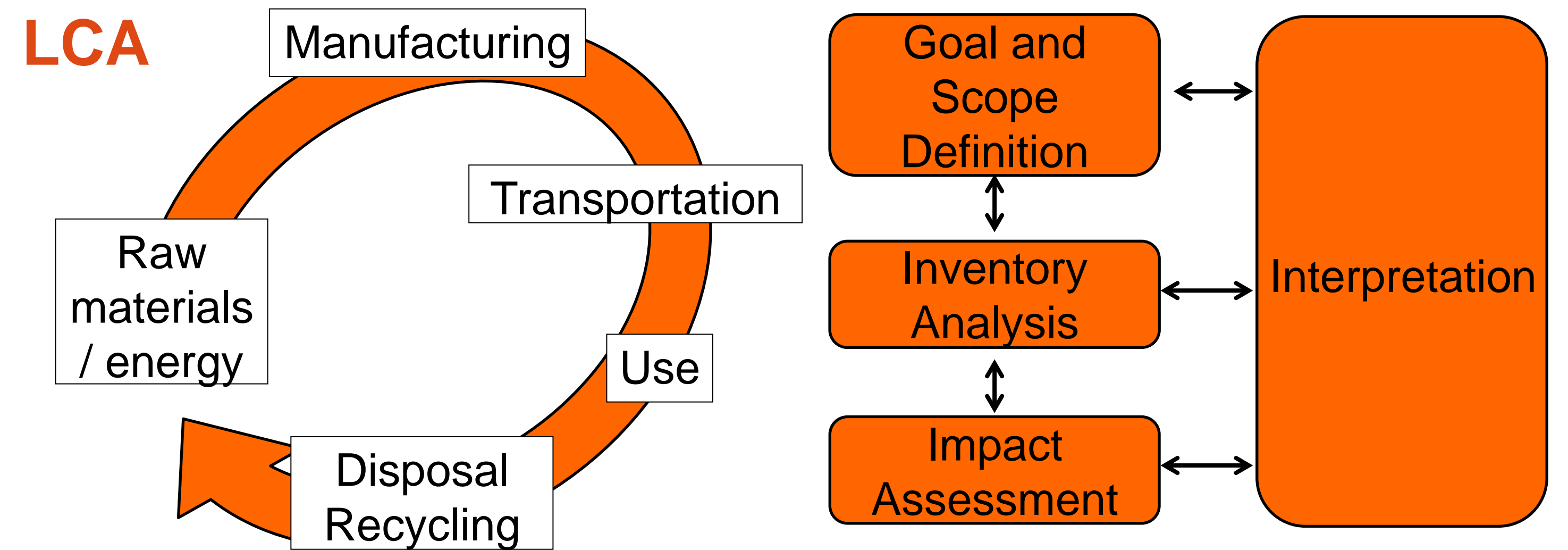


## Introduction

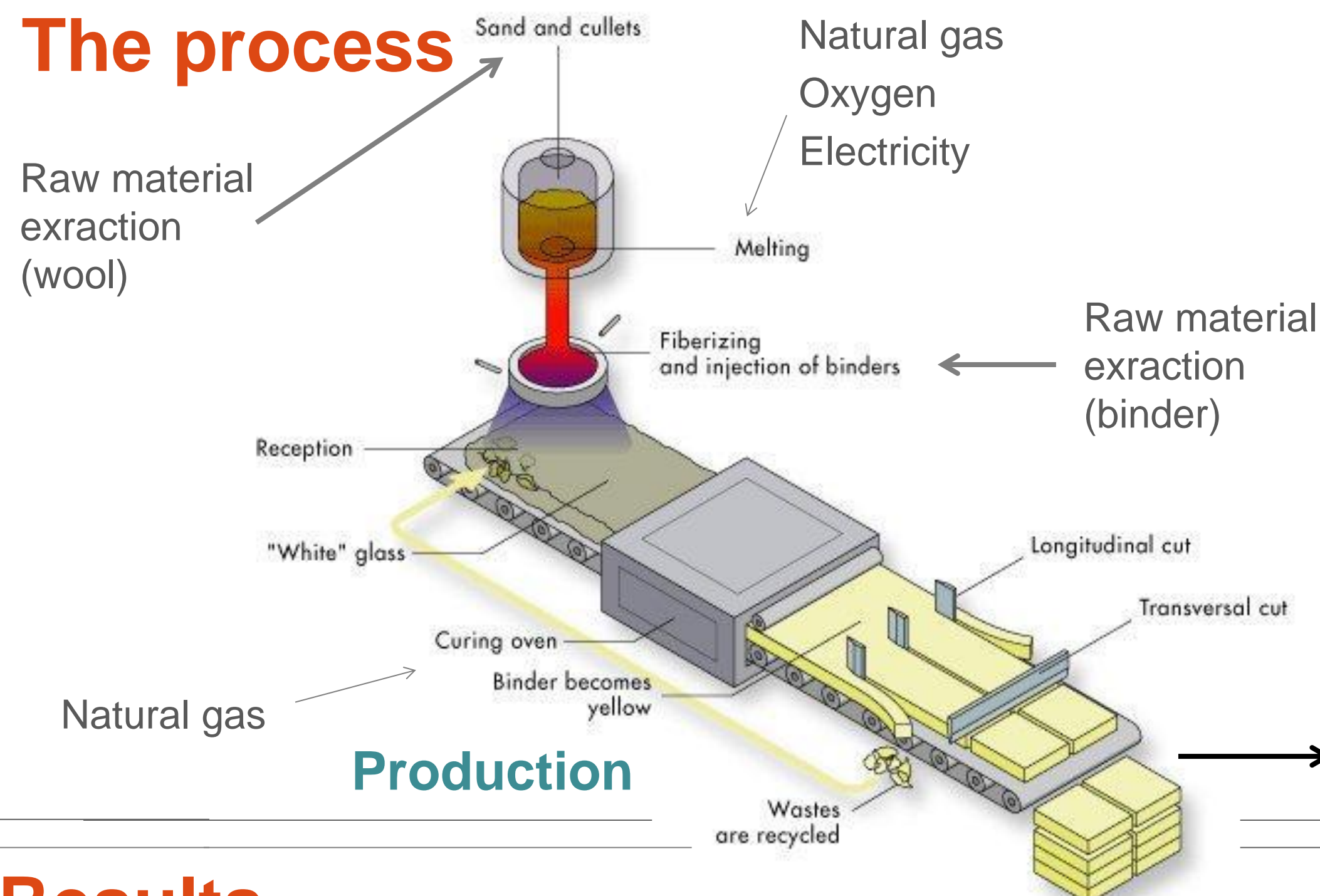
**Building sector** : Environmental Product Declarations (EPD) → Life Cycle Assessment (LCA)

**Knauf Insulation** (glass wool producer) : LCA → EPD and **eco-design** → GaBi model [3]. **Here: reducing climate change: How ? Influence on others impacts categories ?**

**LCA**: environmental aspects/impacts for all the stages of a product's life. Energy and material fluxes for the entire life-cycle analysed. 4 interdependent steps (ISO 14040 and 14044 norms [1,2]),



## The process



## 2 factories located in Belgium and in France working on similar processes

- 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).
- 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.
- Curing oven**: The mattress goes through a natural gas oven at 250°C in order to cure the binder.
- The mattress is *cut and packed*.

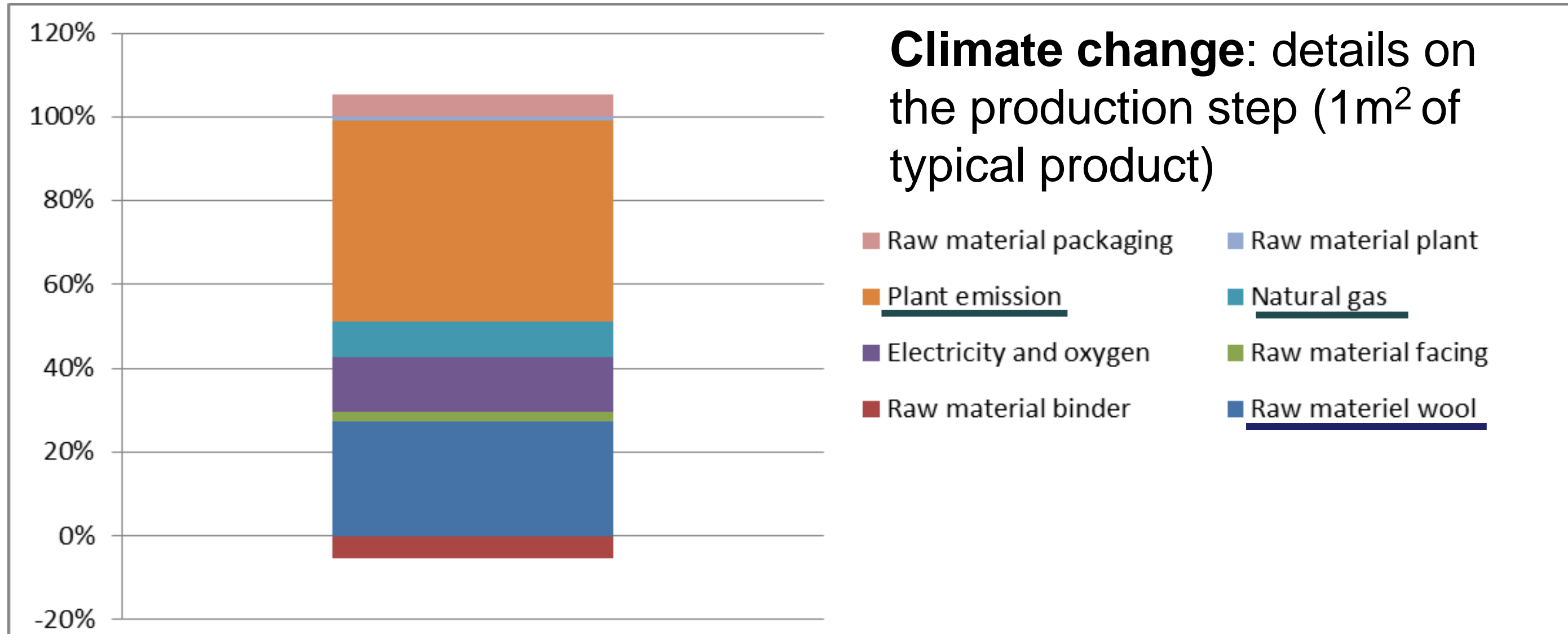
Transport (truck) → Installation → (Use (50 years)) → End of Life (landfill)

## Results

### 1. Climate change impact

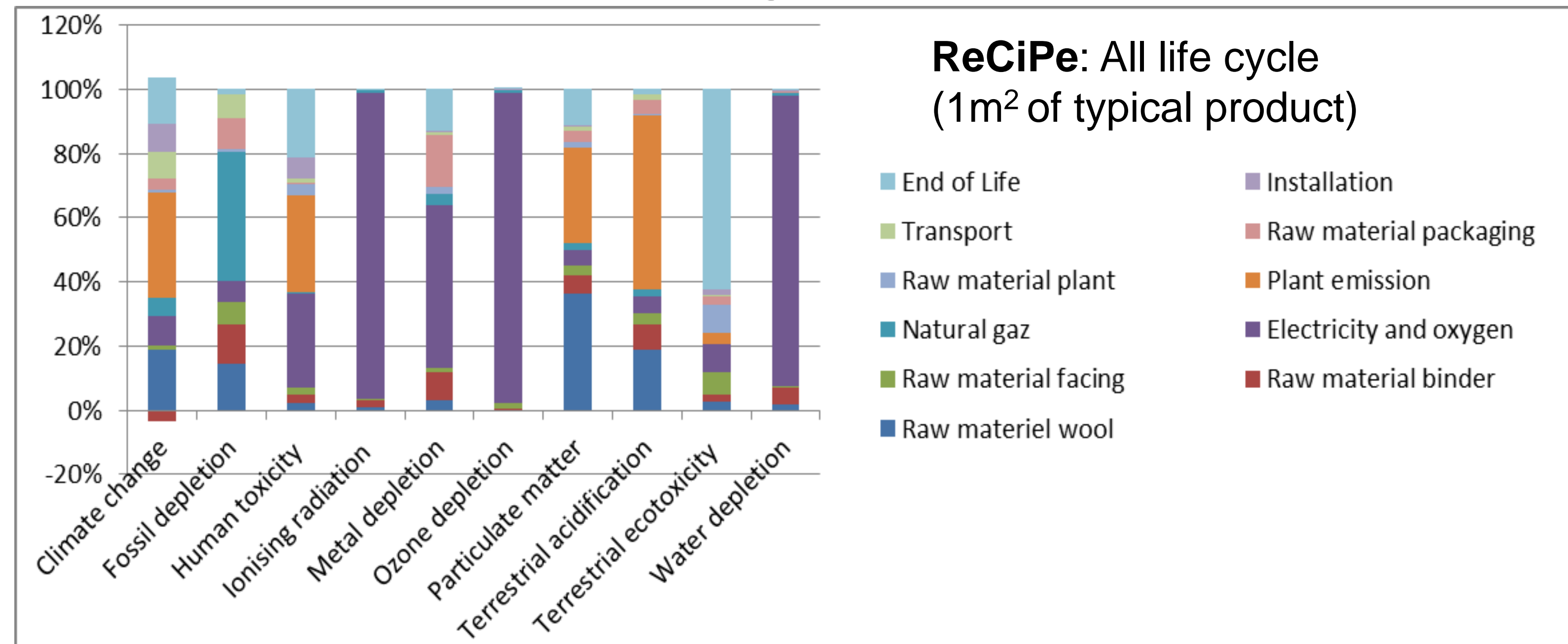
**Production step is the main contributor to climate change, as follows:**

- **Natural gas** production and combustion (emissions resulting from its combustion are included in "Plant emissions").
- Extraction and transport of **raw materials for wool**



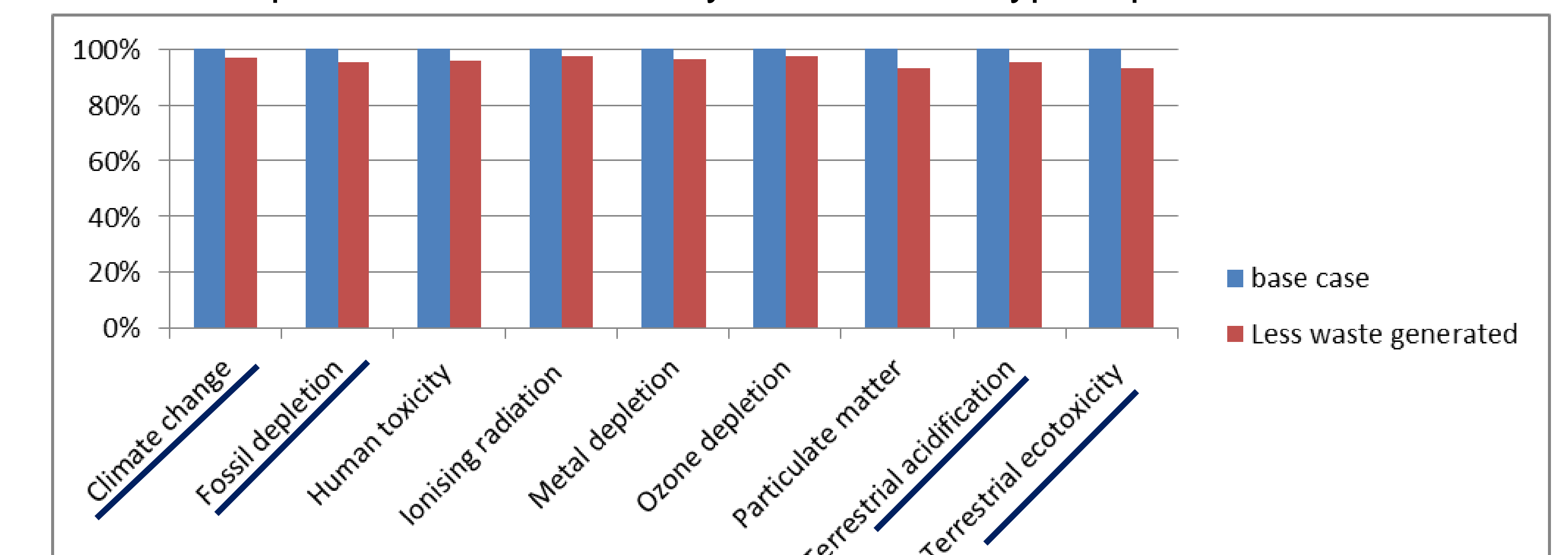
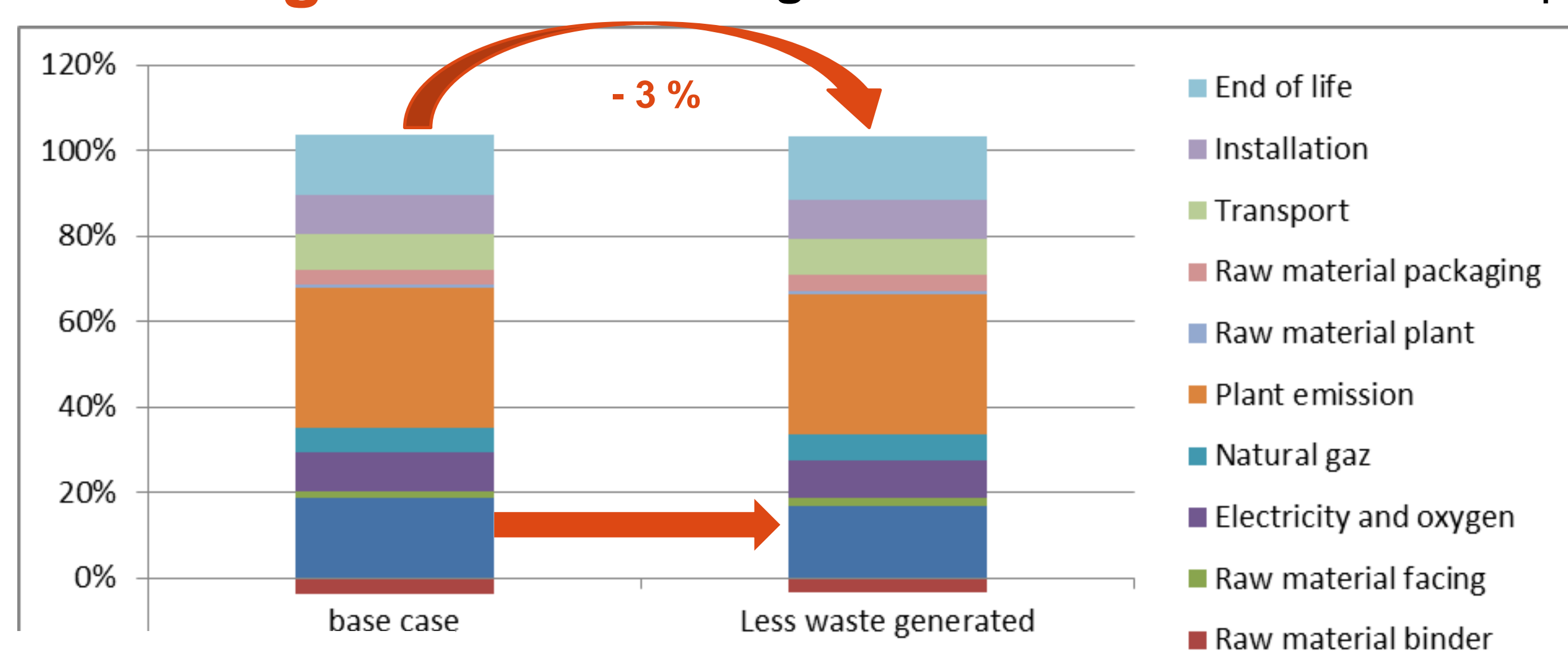
### 2. ReCiPe methodology [4]

Takes into account **9 other impact categories.**

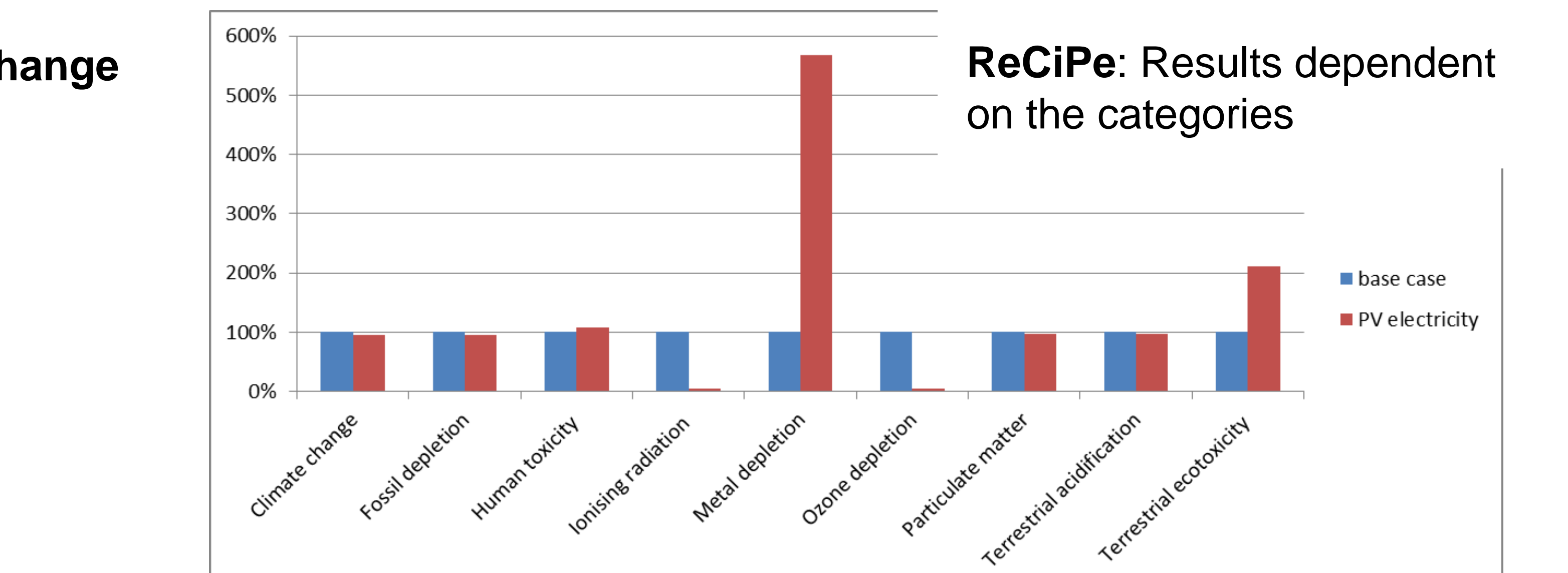
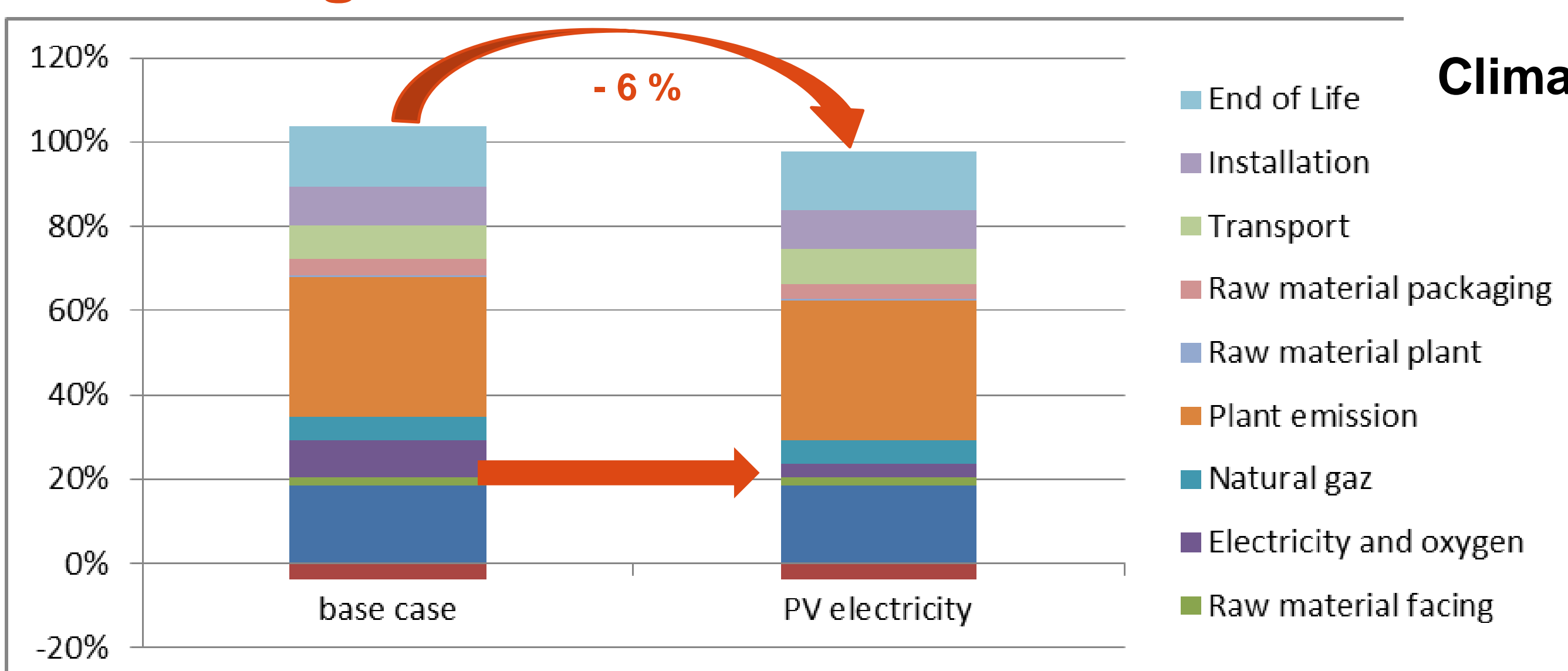


**3. A comparison between two production plants underlines the importance of waste generation. Less waste in plant B: smaller environmental impact.**

## Eco-Design : 1. Less waste generated → Amount of waste in plant A = Plant B. Impact on the whole life cycle for 1 m<sup>2</sup> of typical product.



## Eco-Design : 2. Energy mix for electricity production: French mix is totally replaced by photovoltaic (in the French plant) for 1 m<sup>2</sup> of typical product.



## Conclusions and perspectives

### LCA : A powerful tool for eco-design

1. Better understanding of the environmental impact
2. Help to prevent impact transfers from an impact category to another or between life cycle steps.
3. Quantifies environmental performances which is useful for communication