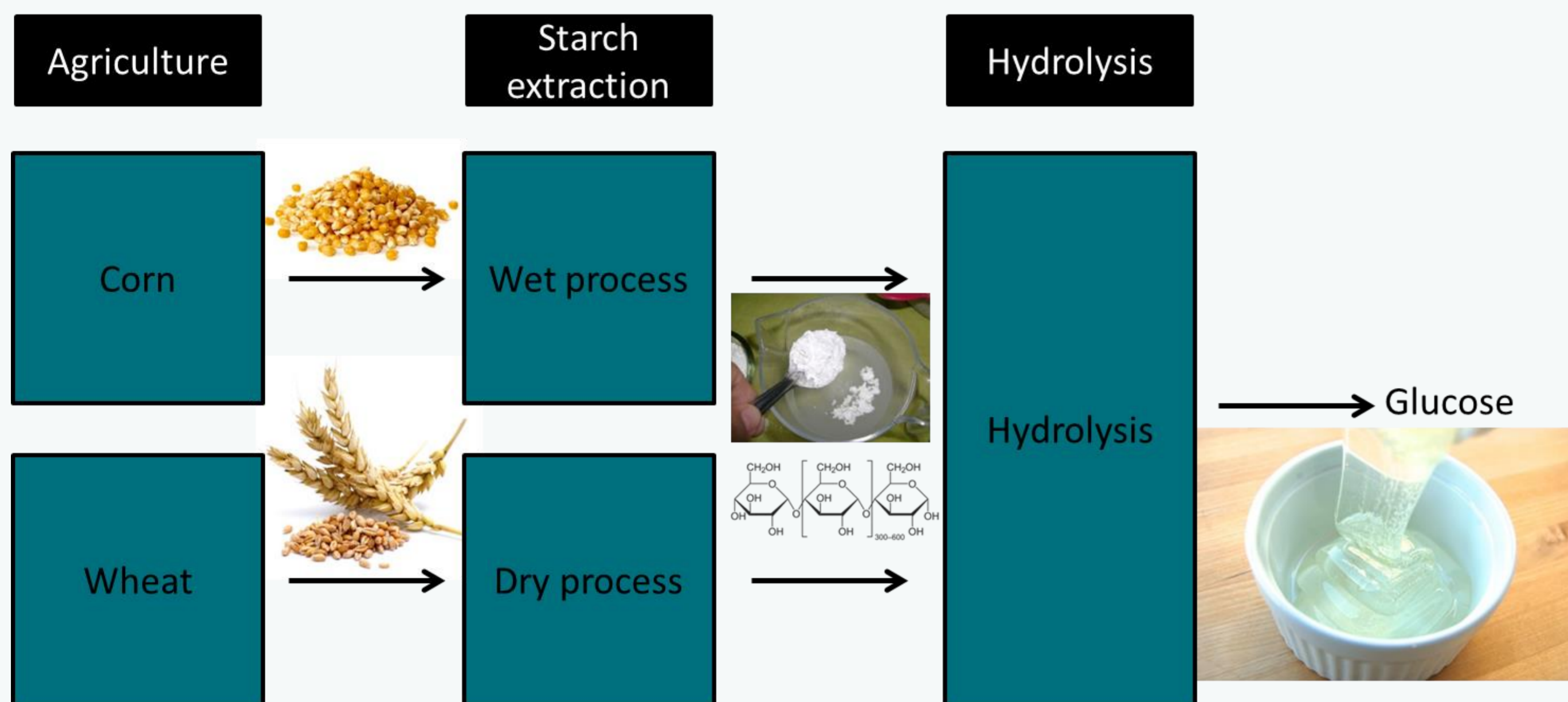


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Introduction



Glucose has gained interest for several reasons

- Several applications (food and industry, i.e. binder production)
- Produced from renewable materials (corn and wheat)
- Better understanding of its environmental impact: LCA

However, LCA of agricultural products is affected by high uncertainties. To increase our results robustness we conduct LCA in three cases and compare the results

- Agricultural data from Belgian practices with GaBi datasets
- Agricultural data from Belgian practices with Ecoinvent datasets
- Agricultural and datasets from Ecoinvent

Data: Agriculture: Belgian practices (data provided by CRA-W) [1] (with adaptation to available datasets) or Ecoinvent

Starch extraction and hydrolysis: literature or industry: same in the 3 cases

Material & Method

Goal and scope

Asses the environmental impact of glucose production in a Belgium context. Obtain robust results: understand the influence of the data sources

The functional unit is the production of 1 ton of glucose.

Method

- LCA methodology: ILCD recommended methods [2]
- Categories choice: normalization + EndPoint + recommendation
- Ecoinvent in Simapro software (without long term emissions as they are not included in GaBi) and GaBi database in GaBi software
- Check: No difference in methods implementation induced by the software in the selected categories

Results – Discussion

Local data?

Figure 1 underlines:

- Large contribution of agriculture steps in glucose production
- Large differences when local data or European Ecoinvent data are used

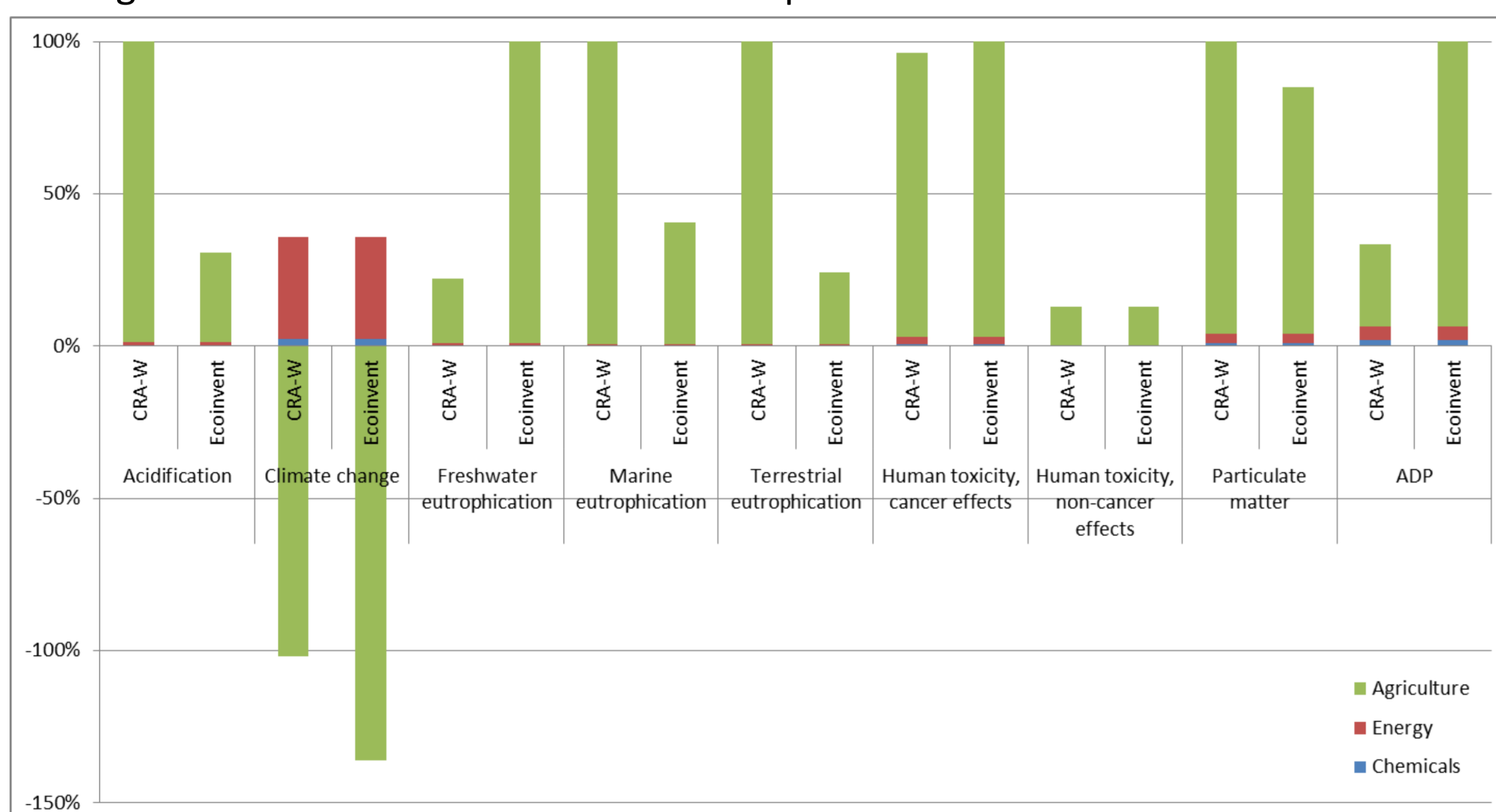


Figure 1. Comparison between the use of local data or Ecoinvent for agricultural steps

ADP?

- Differences coming from ressources part (ReCiPe: similar results obtain for ADPF)
- Differences in the infrastructure modeling: differences in metal consumption (lead, indium, etc.).
- **CF indium: 555.** This high C.F. induces that a small difference in indium consumption can lead to large difference in the results (like here)

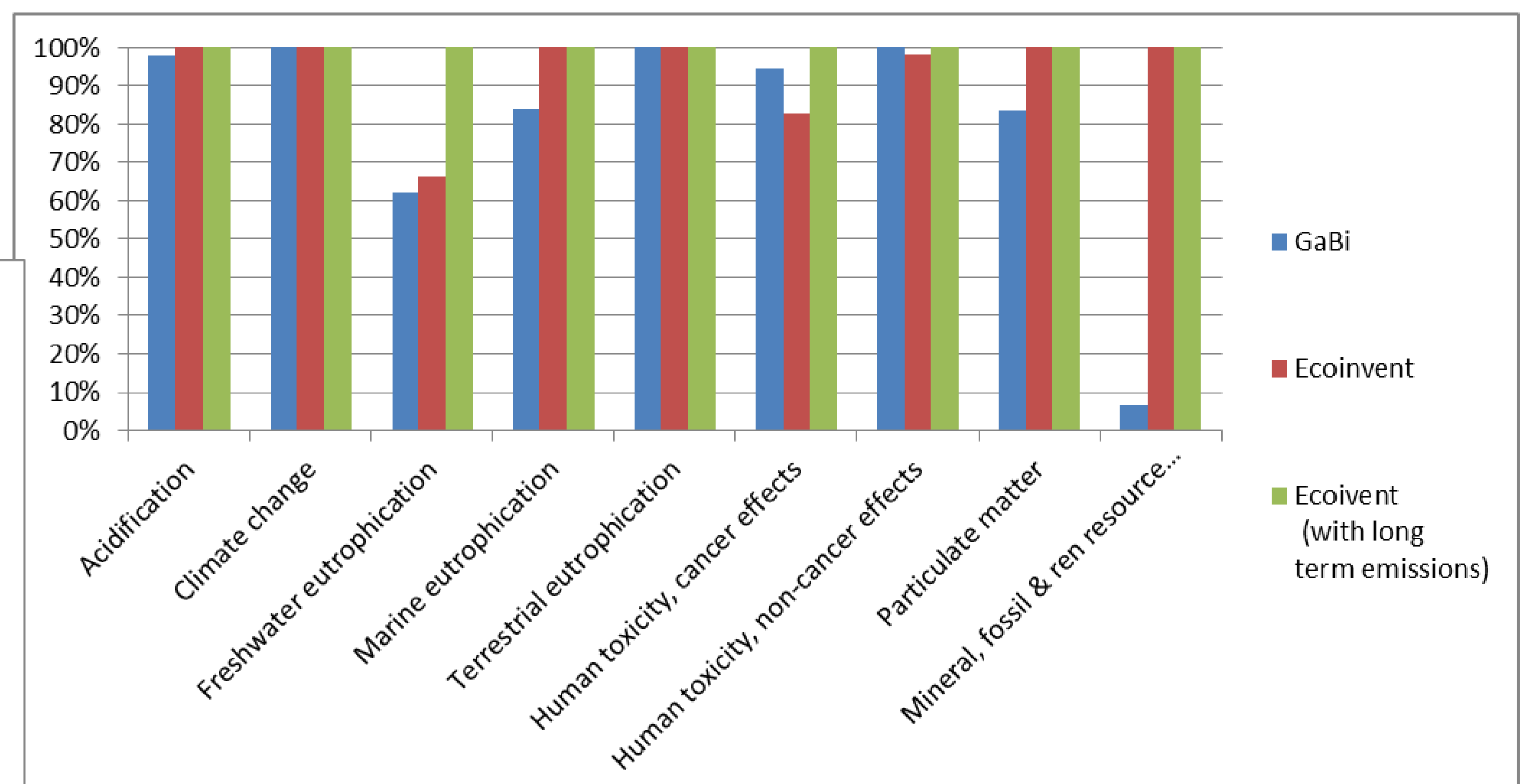


Figure 2. Comparison between the used of Ecoinvent and GaBi (CRA-W agriculture data)

Ecoinvent or GaBi?

In GaBi, long term emissions are not included, therefore, GaBi and Ecoinvent should only be compared without these emissions. Nevertheless, the Figure 2 allows to understand the part related to these emissions. There are significant differences in

- Freshwater eutrophication: long term phosphate emissions in grounwater
- Human toxicity (cancer effect): long term metal emissions in groundwater (Chromium, Arsenic, Nickel, etc.)

Figure 2 also underlines the large differences between GaBi and Ecoinvent in some categories (mostly ADP).

Conclusions

The major learnings of this study are:

- When studying agricultural products, the use of specific data could really improve the results
- When comparing the results between two databases:
 - It is necessary to check if the same hypothesis are used. Example, in Ecoinvent with Simapro, by default, long term emissions are included. These emissions can have large influence on the results (example of fresh water eutrophication) but are not included in GaBi.
 - Some differences can be induced by differences in modelling, such as the modelling of infrastructure.
- Some metals have really large contribution in ADP in ILCD methodology, therefore a small change in the consumption can induce large differences in the results, even if the consumption of this element stays very low.

References

[1] Walloon Agricultural Research Centre (CRA-W), ALT4CER project. 2014.

[2] European Commission - Joint Research Centre and Institute for Environment and Sustainability, International Reference Life Cycle Data System (ILCD) Handbook- Recommendations for Life Cycle Impact Assessment in the European context. 2011