











Composed of five steps, the approach is shown as a decision help in a pre-study. It is designed to save time and money by including no experiments and using public scientific data as a database. After structuring and processing process data from scientific literature, the LCA step give an environmental impact-process matrix which can be analyzed by MDS method. In the case study, the comparison of biomass pretreatment processes for glucose production, this MDS clustering methods highlight major findings: (i) a group includes impacts related to land use, and land transformation is detected, and (ii), a cluster of all impacts related to chemical pollution of soils and water.

Several limitations have been identified:

- The data from the scientific literature are by nature data from a series of batch experiments in the laboratory. The life cycle analysis (LCA) is therefore performed for a low level of technology readiness level (TRL) or maturity (TRL 1/2).
- The approach does not integrate the change of scale required to implement a semi-industrial pilot, especially if the process becomes semi-continuous
- The abundance and the quality of the data are not sufficient for these new technological processes.

The most ambitious perspective is the automation of the database enrichment phase. A further research objective will include the comparison of several ML clustering tools. Other points for progress are to reconsider the functional unit, the global environmental assessment strategy by integrating the upstream agricultural phase (consequential LCA, system allocation and system extension policy) and considering the global supply chain according to a dynamic analysis, spatial, or even temporal.

### Acknowledgments

This work has been sponsored by the French government research program "Investissements d'Avenir" through the Research National Agency (ANR-18-EURE-0021).

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