Benefits of using importance analysis: reflections from the LCA of a urban biorefinery using urban organic waste (RES URBIS)

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Benefits of using importance analysis: reflections from the LCA of a urban biorefinery using urban organic waste (RES URBIS)

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Introduction

In the context of bio-economy, innovative concepts for the integrated management of biowaste are being developed. An example is the concept of urban biorefinery system developed within the EU H2020 project RES URBIS, where biodegradable plastic is produced from urban organic waste. To assess the environmental performance of the proposed concept and address decision-making in the context of bioeconomy, a consequential LCA is planned in the project. Given the research nature of the project and the technology readiness level of the technology (i.e. TRL 6), few challenges are present: i) geographical representation as to address EU-wise decisions; ii) Upscaling of technology data to ensure comparability with existing full-scale options; iii) Definition of scope in the context of future scenarios, including technology data, market for plastic (substitution), energy mix.

The objective of the presentation is to illustrate how a two-steps LCA based on the global sensitivity analysis (GSA) proves useful to improve the overall quality of the LCA study as well as to orient research activities needed for the development of the proposed concept.

Material and Methods

The screening LCA was performed as a global sensitivity analysis, according to the Bisinella et al. (2016). Uniformly distributed uncertainty was estimated for individual parameters and handled using variance-based techniques for the uncertainty propagation. Employed data were mostly retrieved from literature, as described in Boldrin and Andreasi Bassi (2017).

Results and Conclusions

The results provided a preliminary assessment of the overall performance of the system and a list of important parameters (Table 1.1). Based on these, a broad discussion was undertaken in the project to address further research and improved measurements and data collection.

Table 1.1 overview of important LCA parameters within the four assessed scenarios.

AD	Incineration	Landfill	RES URBIS
H_2O content	NO_x	CH_4 oxidation	H_2O content
Fate of N and P	$\eta_{electricity}$	Distance	Fate of N and P
Heavy metals	Distance	% biogas to electricity.	Heavy metals
P substitution	Capital costs	NO_x	PHA substitution

References

Bisinella, V., Conradsen, K., Christensen, T.H., Astrup, T.F. (2016). A global approach for sparse representation of uncertainty in Life Cycle Assessments of waste management systems. *Int. J. of LCA*, 21(3), 378-394.

Boldrin, A., Andreasi Bassi, S. (2017) Screening LCA. Deliverable report 1.2 for the EU H2020 project "RES URBIS - Resources from Urban Bio-waste", Grant Agreement 730349. Department of Environmental Engineering, Technical University of Denmark, Denmark.