

SUSTAINABLE SOLUTIONS FOR THE CHALLENGES OF SOLID WASTE MANAGEMENT IN HUMANITARIAN CONTEXTS

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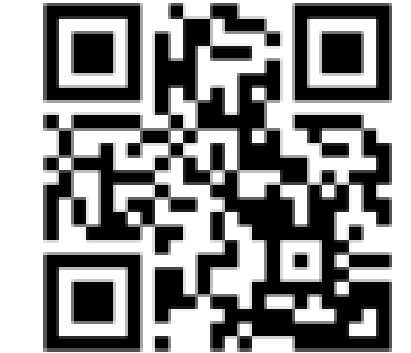
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BIO4HUMAN



Funded by the European Union

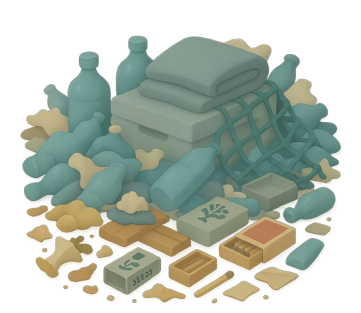


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Background

Humanitarian organizations face missing tools and insufficient support to improve sustainable waste management



Poor Waste Management



Hard-to-reach locations



Lack of priority



Financial constraints

- ❑ Inadequate waste management: 81% of waste is either openly dumped or burned.
- ❑ Limited controlled disposal: 13% of waste ends up in controlled dumping sites, which, while better, still falls short of sustainable management.
- ❑ Minimal recovery and valorization: Recycled by waste pickers (4%); Reuse (1%); Compost (1%).
- ❑ **The overwhelming majority of waste is not adequately managed, emphasizing a critical need to improve solid waste systems and promote circular economy strategies.**

Objective

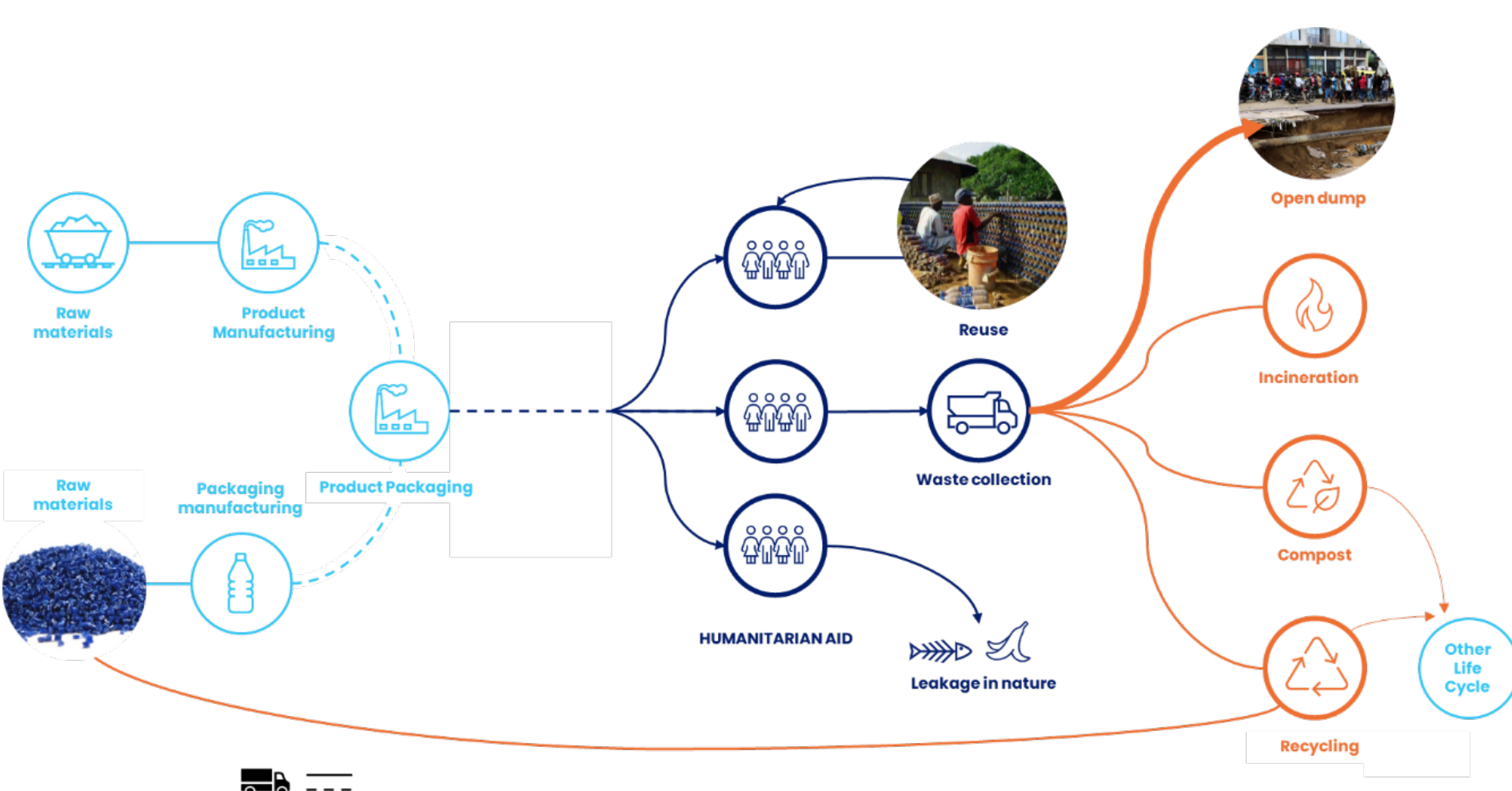
To identifying bio-based solutions for sustainable waste management applicable to the humanitarian sector

Methodology



¹ Addressing the challenge brought by the solid waste management crisis in humanitarian settings by deploying innovative bio-based solutions, systems, and technologies.

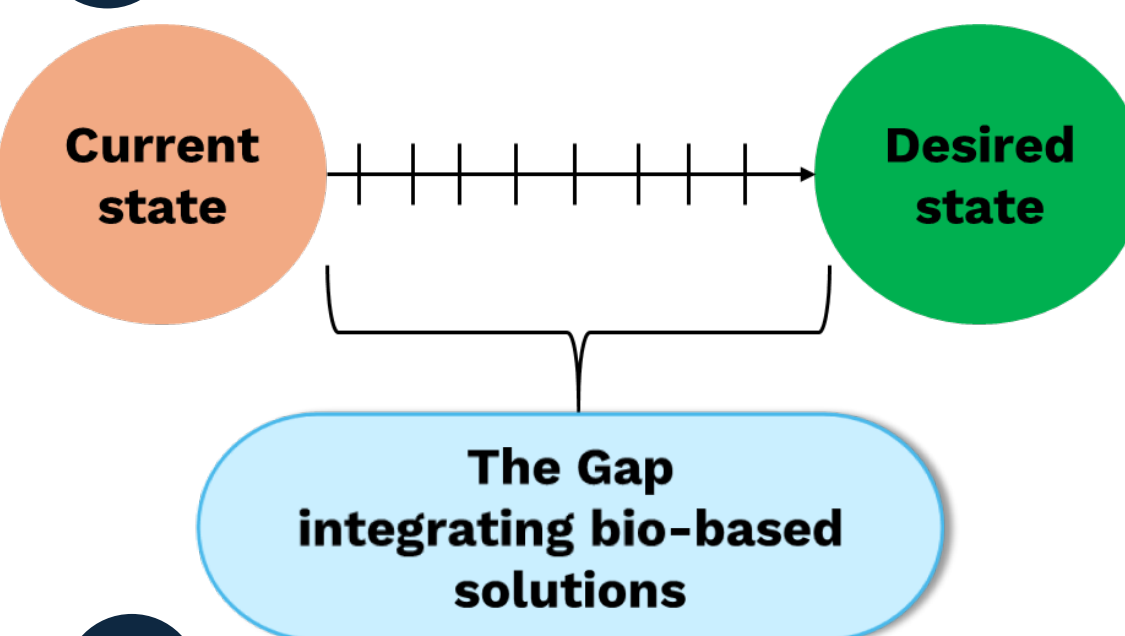
1 Setting up the problem: Two locations + Humanitarian Aid Life Cycle



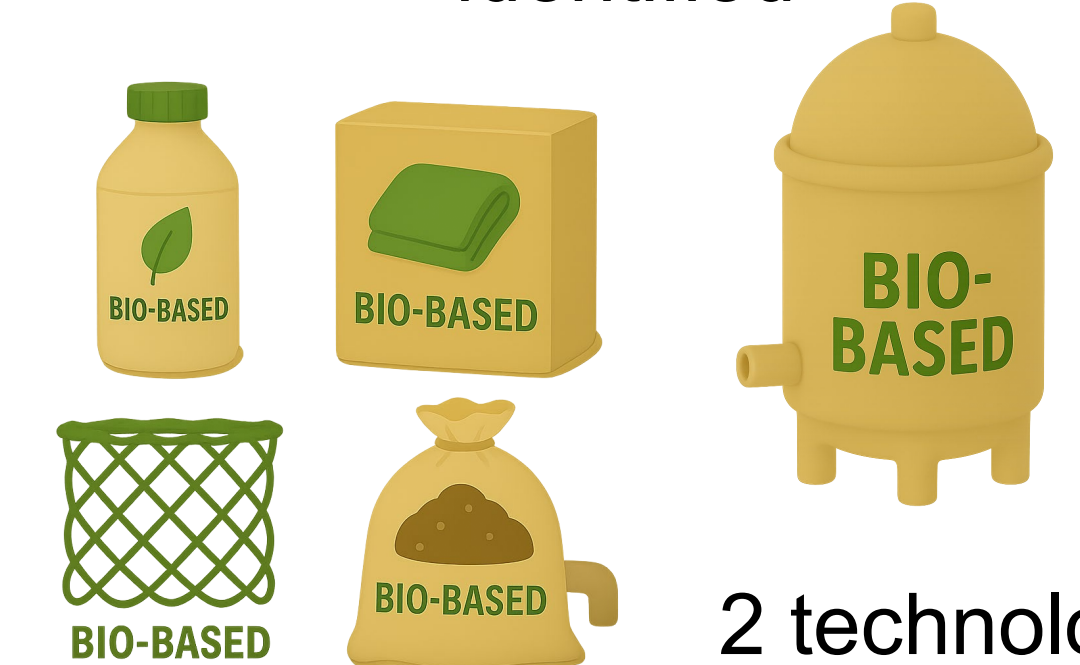
2 Five humanitarian-aid kits (benchmarks)



3 Gap - Assessment



4 27 innovative solutions identified



2 technologies

5 Life cycle assessment

¿Lower impacts than conventional products / treatment technologies?

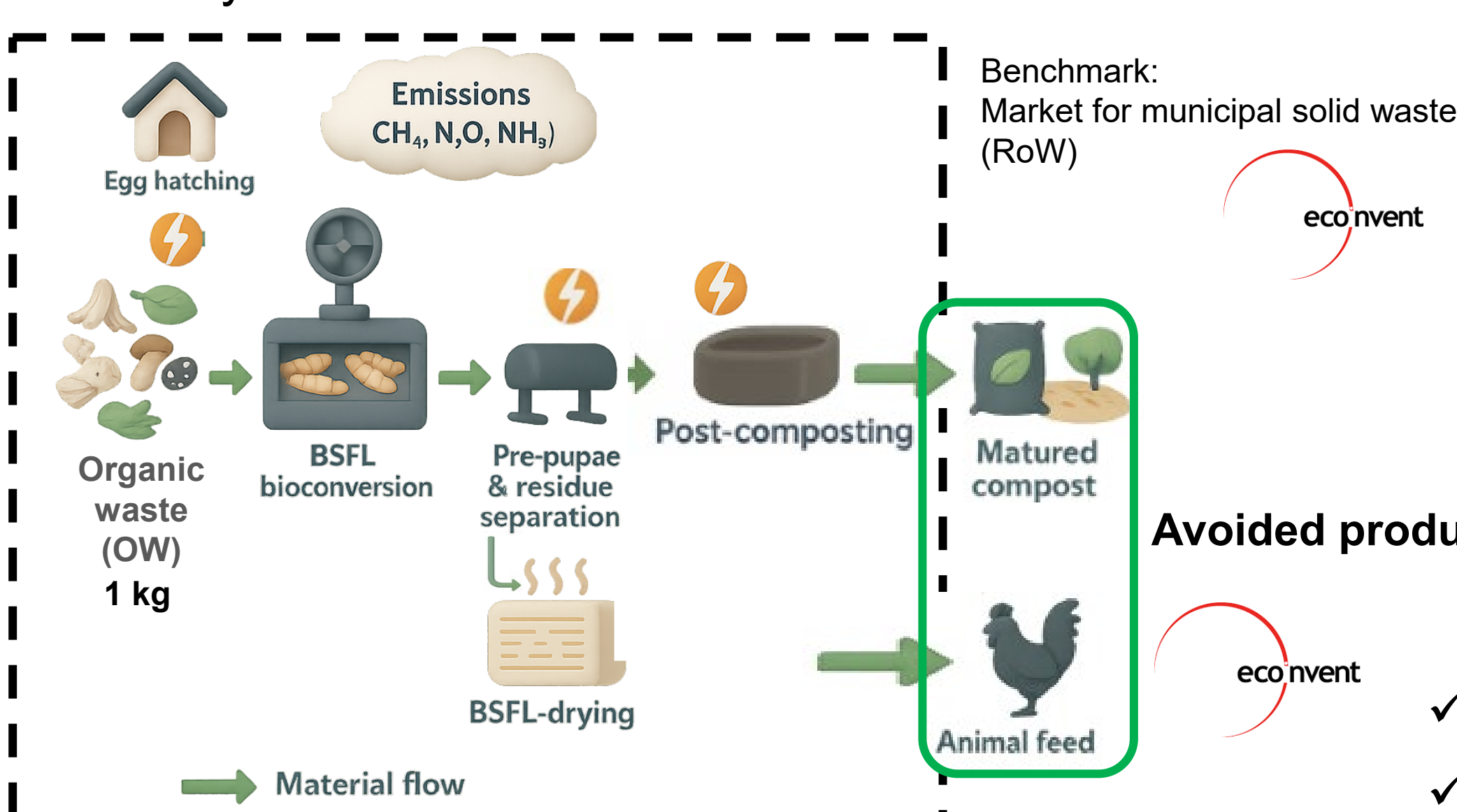
Results

Case-study: Valorization of organic waste through black soldier fly (BSF)

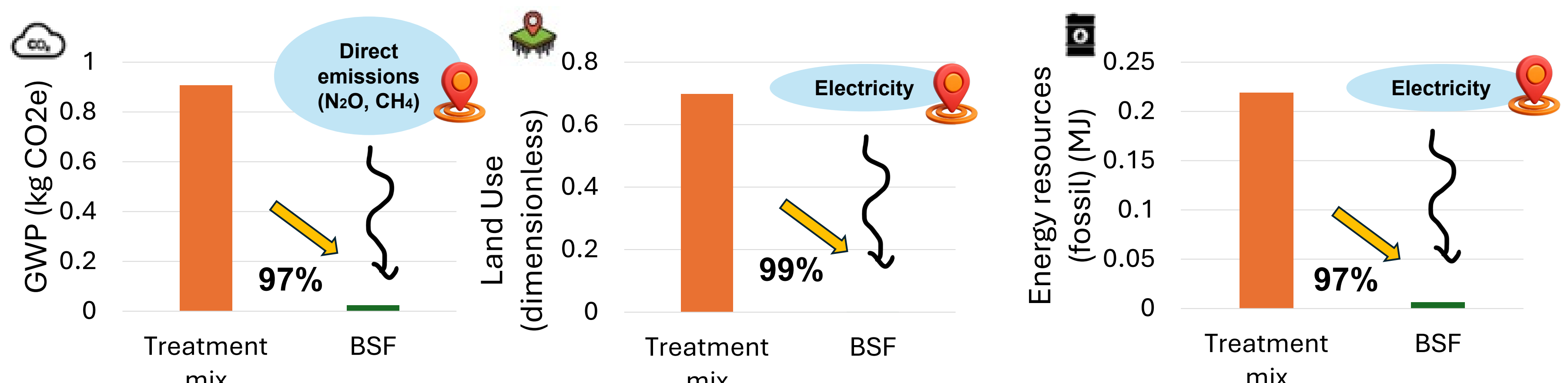
Goal and scope: To evaluate the environmental benefits of treating 1 kg of organic waste by bio composting with BSF from a cradle-to-cradle perspective in comparison with a treatment mix.

System boundaries:
Inventory from literature²

Methodology: EF 3.1



Impact results (per kg):



BSF may be considered a potential bio-based solution:

- ✓ Global warming potential is sharply reduced in BSF in comparison with the reference treatment mix.
- ✓ BSF demonstrates a much lower dependence on fossil fuels.
- ✓ Land use is substantially reduced with BSF treatment, showing nearly no land demand, in contrast to the treatment mix.

Conclusions

- ❖ Bio4HUMAN is currently identifying potential bio-based solutions to substitute conventional products in humanitarian-aid contexts.
- ❖ A case study based on a circular supply chain using BSF larvae can produce high-value bioproducts, reducing global warming, fossil energy and land occupation categories.
- ❖ This study has demonstrated that the valorisation of organic waste through BSF outperforms traditional composting.

References

- 1 Bio4HUMAN, 2024 <https://bio4human.eu/>
- 2 Guo, H., Jiang, C., Zhang, Z., Lua, W., Wanga, H. (2020). " Material flow analysis and life cycle assessment of food waste bioconversion by black soldier fly larvae (*Hermetia illucens* L.) ". Science of the Total Environment. 750, 141656.

Partner Institutions:



Acknowledgments

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