

Assessment of Organic Food Distribution in Alberta & Its Potential to Divert Food Waste from the Landfill

Helena Milovic, MSc in Sustainable Energy Development, School of Public Policy
Supervised by Dr. Tatenda Mambo, School of Public Policy | Caroline O'Driscoll and Napoleon Tuckler, PuraBia



School of
Public Policy



Abstract

- Food waste has an enormous impact on the environment, economics and energy within our society.
- To identify the impact of landfilling food waste and available opportunities in three alternative uses of food waste i.e., anaerobic digestion (AD), composting or animal feed for PuraBia, an organic food distribution center in Calgary, Alberta.
- A Cost Benefit Analysis (CBA) was undertaken combining financial and environmental calculations.
- The findings suggest that composting is the most viable alternative to food waste being sent to the landfill. However, the context is an essential influence, as it nuances each scenario which includes the geolocation and partnerships in play, and impacts the viability of each alternative.

Food Waste

- 1/3 of the food produced for human consumption is lost or wasted on an annual basis throughout the supply chain generating approximately 3.3 billion tons of CO₂ (FAO, 2011; Lam et al., 2018).
- Food waste is defined as a food product thrown away at the distribution center.
- Disposing food waste at landfills has negative environmental impacts and high financial costs (Shabbirahmed et al., 2024).
- Valorizing food waste, through compost, animal feed and AD can provide new resources, energy production, financial opportunities while reducing emissions (Sarangi et al., 2024).
- AD is a process where food waste is sent into a sealed tank and bacteria breaks it down producing biogas and fertilizer (Pullen, 2015).

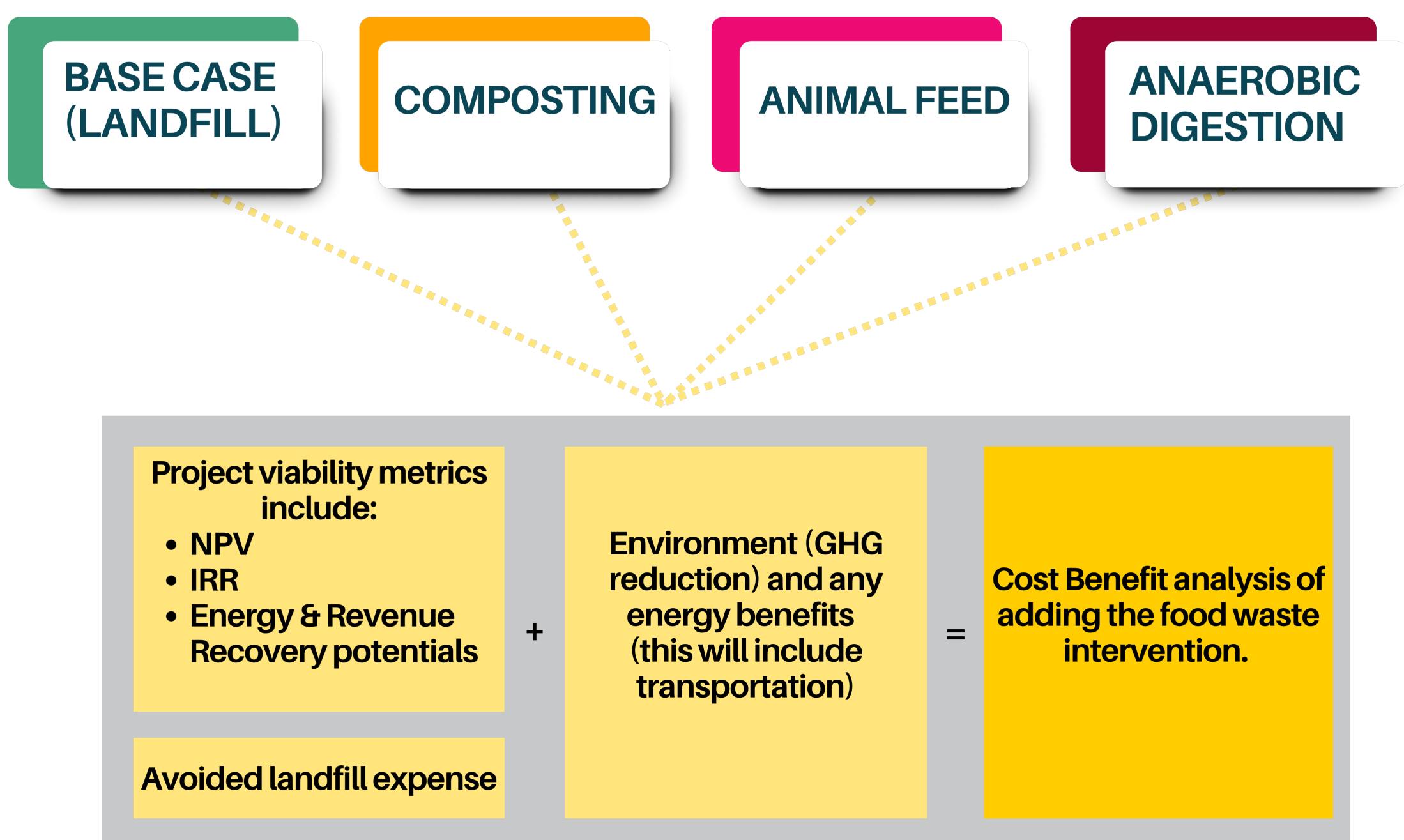
SDG Approach



Research Question

What volumes and types of organic food waste are generated, and what are their energy and revenue recovery potentials? Which alternative uses; anaerobic digestion, composting or animal feed are financially viable for managing this waste at scale? What are the environmental impacts of each alternative, particularly with respect to energy consumption and generation? Which alternative uses best optimize value recovery in Alberta?

Methodology



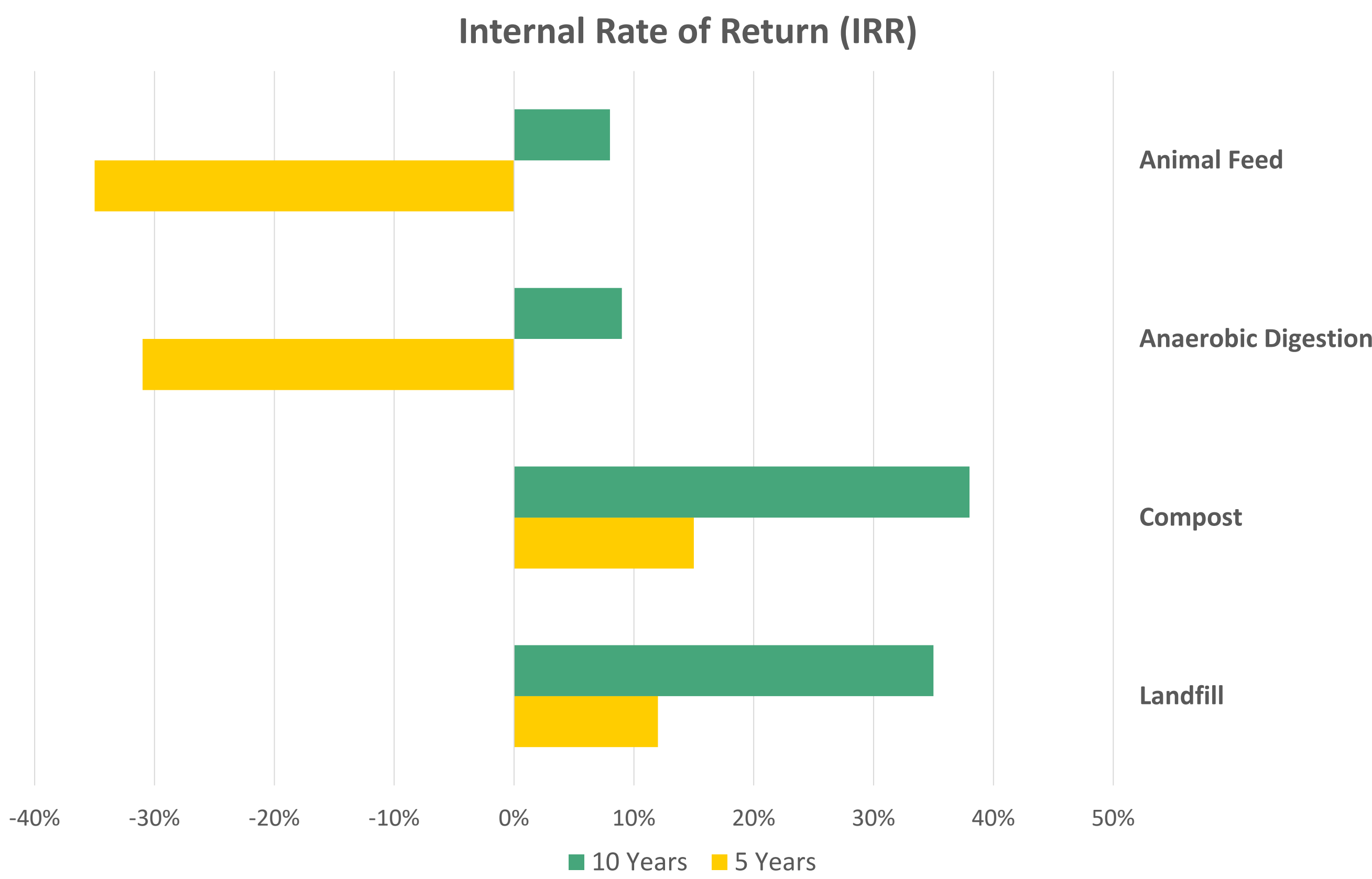
The CBA analysis combined primary data and publicly available information to complete the financial and environmental calculations.

Findings

- The approximate volume and type of food waste generated, is 10% of the total sales of French Beans, Snow Peas, Baby Corn and Baby Carrots.
- The analysis demonstrates that the baseline scenario of an organic fresh food distribution center is financially viable.
- Based solely on the Benefit-Cost ratio, AD and composting have the best ratios, which implies that the benefits outweigh the costs.
- It can be inferred that lowest CO₂ emissions are from AD, with composting coming second. It needs to be noted that the scenarios are not lateral comparisons.
- Comparison between the value recovery is nuanced and depends on the premise and long-term goals.

Findings cont.

- Using a Discount rate of 7% the IRR was calculated and reveals the profitability of each scenario



- The process of composting generates less CO₂ emissions than landfilling on an annual basis
- Composting and AD are commercially viable and environmentally positive within these parameters.

Conclusion

- Diverting food waste from the landfill can be financially and environmentally beneficial. It is possible to develop a sustainable food system where an actor within the system can divert and transform food waste.

Limitations & Further Work

- Limitation of comprehensive and publicly available data constrains the analysis and prevents direct environmental comparison within this study.
- Future work should include testing on the physical and biological characteristics of the food waste that occurs within distribution facilities as well as an S-LCA.

References

FAO. (2011). *Global food losses and food waste – Extent, causes and prevention*. Food and Agriculture Organization of the United Nations. Rome. <https://www.fao.org/4/mb060e/mb060e.pdf>

Lam, C.-M., Yu, I. K. M., Medel, F., Tsang, D. C. W., Hsu, S.-C., & Poon, C. S. (2018). *Life-cycle cost-benefit analysis on sustainable food waste management: The case of Hong Kong International Airport*. Journal of Cleaner Production, 187, 751–762. <https://doi.org/10.1016/j.jclepro.2018.03.160>

Pullen, T. (2015). *Anaerobic digestion: making biogas, making energy: the Earthscan expert guide*. Routledge.

Sarangi, P. K., Pal, P., Singh, A. K., Sahoo, U. K., & Prus, P. (2024). *Food Waste to Food Security: Transition from Bioresources to Sustainability*. Resources, 13(12), 164. <https://doi.org/10.3390/resources13120164>

Shabbirahmed, A. M., Somu, P., Yang, H.-H., Hiruthyaswamy, S. P., Karua, C. S., & Yadav, A. K. (2025). *Challenges and strategies for waste food anaerobic digestion: insights and future directions: Challenges and strategies for waste food anaerobic digestion*. Environment, Development and Sustainability, 27(11), 27009–27042. <https://doi.org/10.1007/s10668-024-04820-1>