Sustainable assessment of waste-to-energy management in humanitarian operations. Bio4HUMAN project approach.

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According to the UNEP Global Waste Management Outlook 2024, humanitarian operations produce thousands of tons of solid waste annually. This situation is aggravated by the non-biodegradability of solid waste contribution to soil, water and local ecosystems deterioration, becoming a matter of public health. The **objectives** of Bio4HUMAN project focus on the analysis of integrating bio-based reduction, reutilization and materials recycling solutions for improving the SWM of humanitarian aid through the collaboration between humanitarian aid and bioeconomy sector. The first **results** of this project scope a framework for implementing bio-based solutions for MSW management in the Democratic Republic of Congo (DRC) and South Sudan. Four waste scenarios have been identified: food, agriculture, non-food and wash kit. Several low carbon waste management scenarios are being assessed using environmental life cycle assessment (LCA) tool, regarding plastic waste recycling, domestic or municipal nonfood organic waste digestion to biogas for cooking, and soil and water remediation. The functional unit is generally the amount of waste generated or recycled. From the first 25 preliminary waste management solutions identified so far, the 5 preferred by technological and humanitarian sectors are based on the solid waste conversion to biogas as efficient energy vector. The subsequent life cycle analysis will enable identifying the gaps between current management and innovative bio-based solutions to guide the future humanitarian programs of the EU towards minimum ecological footprint, and the significance of the role of CO_2 transformation technologies. **This is on-going research belonging to the Horizon Europe project Horizon Europe Bio4HUMAN project (GA101135144).**