Biomethane Potential from Urban Food Waste in Africa

Langeveld, J.W.A[a]*, M. Lamichhane[a] & A. Lazarus[a]

Biomass Research, Netherlands[a]; *Corresponding author, email: hans@biomassresearch.eu

Introduction

The climate and global energy crisis calls for a shift from fossil fuels to sustainable energy sources. Anaerobic Digestion (AD) is a proven technology converting organic waste into biogas and organic fertilizers, yet its expansion in Africa is limited by investment costs and concerns on feedstock availability. Africa currently focuses on small-scale manure digesters, but there is a huge untapped potential in urban and household waste including sewage sludge.

Urban food waste is the ideal feedstock for energy recovery and waste reduction; its high organic content, moisture level and biodegradability ensure significant biomethane potential (Pilarska et al., 2023). This study explores the biomethane potential of urban food waste in some African countries to assess its potential for energy generation.

Figure 1. Countries included in this study

Methodology

A literature review was conducted to obtain data on urban population and food waste generated in major urban centres in six African countries (World bank, 2022 and World Population Review, 2024). Biogas potential was calculated using generic information on their composition (dry matter, volatile solids) and specific methane yields. Results are evaluated and compared to availability of primary (crop residues, animal manure), secondary (food industry waste including fruit pulp, sugarcane waste, and slaughterhouse waste) and tertiary (household, restaurant, and urban waste) sources.

Results

61 million tons total annual food waste is generated in the study area. Out of this, **49 million tons (80%)** is estimated to originate from urban centres (conservative estimate). The biomethane potential from urban food wastes is **2.2 billion cubic meters (BCM)** and the energy value is per year is **83.5 billion MJ** per year for selected countries.

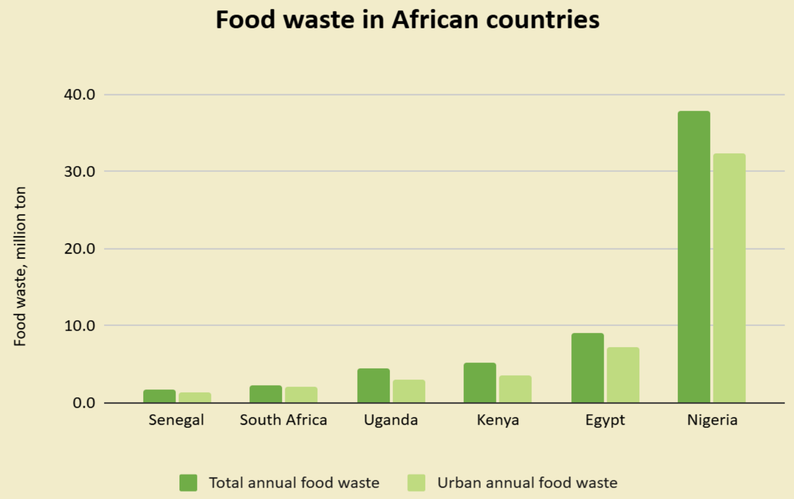

Figure 2. Food waste in African countries

For entire continent, the biomethane potential is **24 BCM** and the energy value is **860 billion MJ** per year.

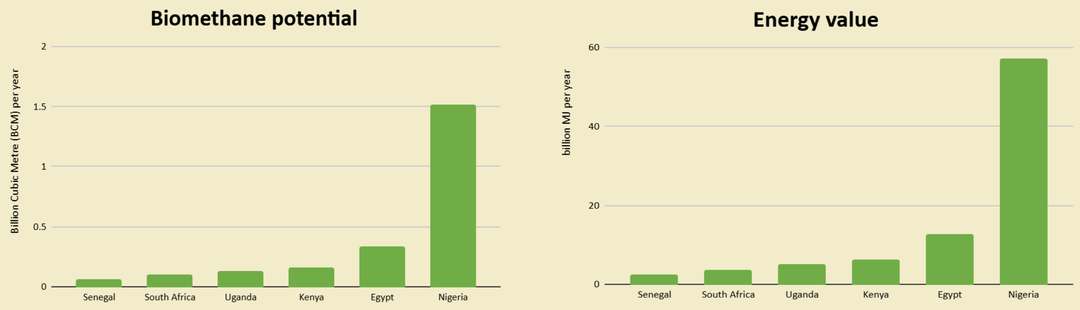

Figure 3. Biomethane potential and energy value of urban food wastes

Other feedstocks

When compared with **agricultural and food industry waste**, the role of **urban food waste** appears modest. For instance, studies show **2.5 BCM** can come from cattle manure and slaughterhouse waste in Mauritania (Ali et al., 2020), and **5.7 BCM for Kenya, expanding to 25.6 BCM** across five Great Lakes countries, can be sourced from manure, crop residues, food industry, and urban waste combined (Langeveld et al., 2023).

However, the potential is **significant** compared to increasing gas use in Africa (GECF, 2025) and global biomethane targets (IEA, 2024). Additional sources of biogas include sewage sludge. While wastewater treatment is common in European countries, developing countries have moderate coverage, pointing to an opportunity for greater energy recovery from sludge (Mateo-Sagasta et al., 2015).

Conclusion

The evaluation of urban food waste as a feedstock shows considerable potential for methane production in Africa. Further research is needed to assess practical performance, including a test program for medium-scale biodigesters. This will provide crucial information for developing local biogas markets.

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Biomass Research, Wageningen, Netherlands
https://biomassresearch.eu

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The Research reports and factsheets can be downloaded for free from the website.

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