

Waste-to-Biogas in Kisumu City, Kenya



Kisumu, Kenya



Organic waste recovery in Kisumu, Kenya

CURRENT CHALLENGES AND SOLUTIONS

Waste management in Kisumu is characterized by a linear collection system covering 50% of waste generators but collects only 22.5% of the waste due to infrequent pickups. Recovery activities are minimal and rely on the informal sector, leaving much waste uncollected, burnt, or littered. The disposal site operates as an open dump with frequent landfill fires, contributing to greenhouse gas emissions.

To address these challenges, a waste-to-biogas study was deployed to assess current solid waste management, propose a value chain for recovering organic waste by-products, and enhance the existing waste management system using local biogas technologies. The study focused on four fresh-produce markets, six informal settlements, and included other areas like middle income residential neighbourhoods, restaurants, schools and hotels as significant organic waste generators. It aimed to establish ten small-scale anaerobic biodigesters for organic waste treatment.

OBJECTIVE OF THE INTERVENTION

The goal of the Gap Fund's intervention was to assess the local solid waste management system, with an emphasis on organic waste composition, generation and transfer in the study area.

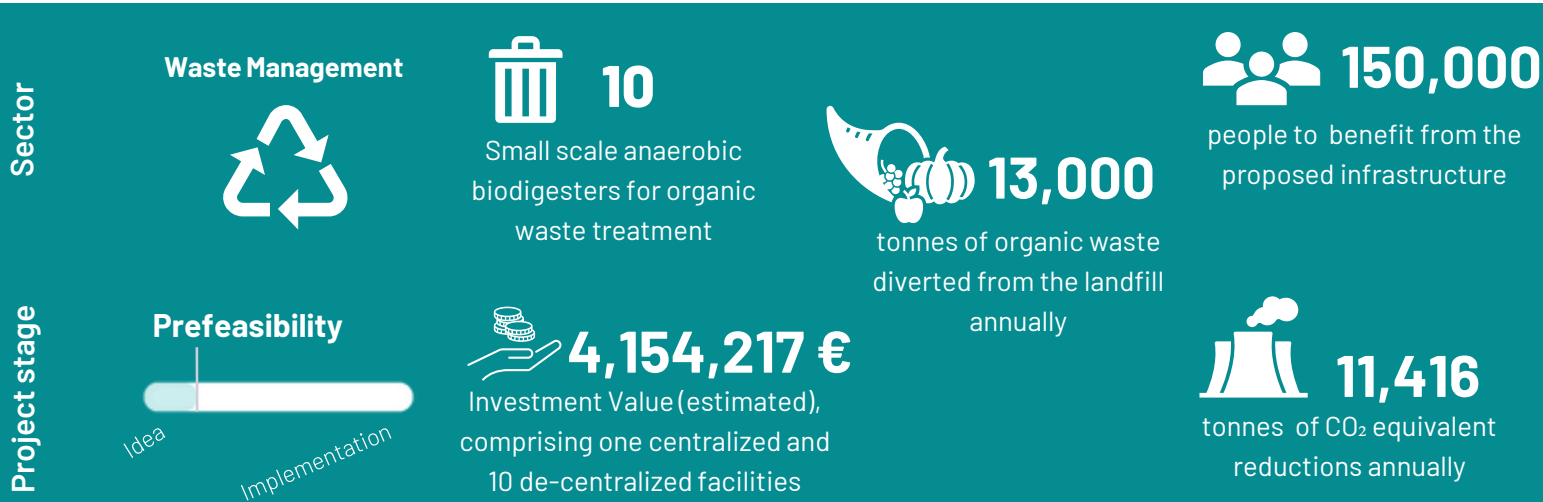


Kasese disposal site of Kisumu County

THE GAP FUND'S SUPPORT

The intervention included:

- 1 Organization of a scheme for waste segregation at source for all categories of municipal waste generated
- 2 Assessment of the different technological options for the treatment and recovery of organic waste and the market and revenue potential of the by-products (biogas, bio-slurry and bio-slurry enriched compost)
- 3 Capacity-building amongst the City Government technical staff and waste actors
- 4 Development of models for operation and maintenance of organic waste-to-biogas systems
- 5 Analysis of the upscaling possibilities of the biogas technology options



THE INTERVENTION AT A GLANCE

Field missions, stakeholder interactions and assessments revealed the need for improvements in organic waste management and by-product marketing. Awareness and educational campaigns were highlighted as essential for successful source-separation schemes.

The investment scope suggests **constructing a centralized modular facility and a composting facility**, followed by **10 small-scale facilities**. Environmental and Social Impact Assessments (ESIA) are recommended for these facilities.

CO-BENEFITS OF THE INTERVENTION

- Renewable energy generation – converting organic waste into biogas.
- Energy security – consistent energy source, reduced exposure to energy price fluctuations and supply disruptions.
- Offer an alternative to firewood for cooking – combat deforestation.
- Reduce environmental impact of waste disposal.
- Bio-slurry production as a source of organic fertilizer
- Ensure project scalability in diverse regions and socio-economic settings.
- Create direct and indirect employment.

FINANCIAL PATHWAYS

Kisumu county aims to propose the project to the Green Climate Fund, given the methane pledge at COP29 and the focus on biogas for organic waste diversion.

Other financing pathways include grant funding, e.g. by the African Development Bank or urban climate finance initiatives by multilateral financing institutions.

The project would be viable on its own if the city provides feedstock and partners with the private sector.

PROJECT CHALLENGES

The local government faces challenges in integrated SWM and relies on Community-Based Organizations (CBOs) for waste services and waste service providers. Additionally, while compressed biogas technology is promising, marketing bio-slurry and compost poses challenges.

SCALE-UP POTENTIAL

The proposed solution includes a larger centralized facility and upgradable small-scale modular facilities, both scalable and replicable. This scale is essential due to Kenya's current biogas experience and market trends. The project considers selling compressed biogas, compost, and using generated energy. Membrane technology upgrades are viable and feasible. The solution is sustainable, cost-effective, and adaptable to community needs, allowing installations to be relocated if necessary.

NEXT STEPS:

- Apply to the Green Climate Fund promptly due to the COP29 focus on biogas and organic waste.
- Collaborate with CBOs and NGOs for awareness, education, and information campaigns.
- Form partnerships (including PPP) with CBOs and the private sector for solid waste management services.
- Explore financing opportunities for current and future project upgrades.
- Develop markets for bio-slurry and biogas uptake.
- Raise awareness for source separation.
- Introduce a gate fee at the disposal site.

TA PARTNER AND BENEFICIARIES



TA IMPLEMENTED BY



THE GAP FUND IN A NUTSHELL

Since its launch in 2020, the City Climate Finance Gap Fund provides technical assistance to cities in low- and middle-income countries to support the early preparation of climate-smart infrastructure projects, including energy, transport, waste, water, wastewater and nature-based solutions (NbS).

Find more about the City Climate Finance Gap Fund on:



For additional information, please contact: gapfund_technicalsecretariat@eib.org

Summary of the pre-feasibility study for a Waste-to-Biogas Project in Kisumu City, Kenya



THE GOVERNMENT OF THE GRAND DUCHY OF LUXEMBOURG
Ministry of the Environment,
Climate and Biodiversity

