

INVESTING IN THE WASTE AND CIRCULARITY SECTOR IN KENYA

Wastewater Management Guide





ABOUT ANDE

The Aspen Network of Development Entrepreneurs (ANDE) is a global network of organizations that propel entrepreneurship in developing economies. ANDE members provide critical financial, educational, and business support services to small and growing businesses (SGBs) based on the conviction that SGBs create jobs, stimulate long-term economic growth, and produce environmental and social benefits.

As the leading global voice of the SGB sector, ANDE believes that SGBs are a powerful, yet underleveraged, tool in addressing social and environmental challenges. Since 2009, ANDE has grown into a trusted network of over 250 collaborative members that operate in nearly every developing economy. ANDE grows the body of knowledge, mobilizes resources, undertakes ecosystem support projects, and connects the institutions that support the small business entrepreneurs who build inclusive prosperity in the developing world. ANDE is part of the Aspen Institute, a global non-profit organization committed to realizing a free, just, and equitable society.

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KOIS is a leading international impact investment and innovative finance advisory firm founded in 2014. KOIS offers consulting services to design, structure, and place a diverse range of innovative impact financing instruments, as well as to help organizations shape strategies to enhance their societal impact. KOIS also deploys return-seeking capital in social enterprises and impact investment funds.

KOIS has demonstrable expertise in co-designing, fundraising, launching and managing impact investment funds, results-based financing instruments and blended finance facilities. KOIS has launched and managed over 10 social and development impact bonds and structured impact investing funds for international corporates. Additionally, KOIS has launched 5 of its own investment funds across Europe and Asia and has cumulative assets under management of over US\$600m.

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ACKNOWLEDGEMENTS

This report was produced with support from the IKEA Foundation. The IKEA Foundation is a strategic philanthropy focused on tackling poverty and climate change, the two most significant threats to the future of children living in vulnerable parts of the world. Partnering with over 140 organizations, they work to improve family incomes and protect the planet, aiming to transform systems and build evidence of what works. Since 2009, they have committed over €2 billion to their partners, granting approximately €200 million annually. With an additional €1 billion pledged over five years to accelerate greenhouse gas emission reduction, the IKEA Foundation operates in vulnerable regions across Africa and Asia, as well as high-emitting countries like the EU, India, Brazil, and Indonesia, where they strive to make the greatest impact.



IKEA Foundation

We are grateful for the contributions of John Kohler, of Redleaf Venture Management, ANDE's training lead for investment managers, for sharing his feedback and expertise. ANDE thanks the individuals who provided reedback on the report in the drafting stages, including Rosemary Amondi (ANDE), Francis Gitau (ANDE), and Laura Simmons-Stern (ANDE).

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TABLE OF ABBREVIATIONS

▶ ABBREVIATIONS

BoP:	Bottom-of-pyramid	OBA:	Output-based aid
B2B:	Business-to-business	OpEx:	Operational expenses
B2C:	Business-to-consumer	OSM:	Off-site sanitation management
CapEx:	Capital expenditures	PPPs:	Public-private partnerships
CO2e:	Carbon dioxide equivalent	R&D:	Research and development
DFIs:	Development finance institutions	SGBs:	Small and growing businesses
ESOs:	Enterprise support organisations	SMEs:	Small and medium enterprises
ETPs:	Effluent treatment plants	SPVs:	Special purpose vehicles
FSM:	Faecal sludge management	VTOs:	Vacuum truck operators
GHG:	Greenhouse gas	WASREB:	Water Services Regulatory Board
NEMA:	National Environment Management Authority	WSPs:	Water service providers
NGOs:	Non-governmental organisations		

▶ DEFINITIONS¹

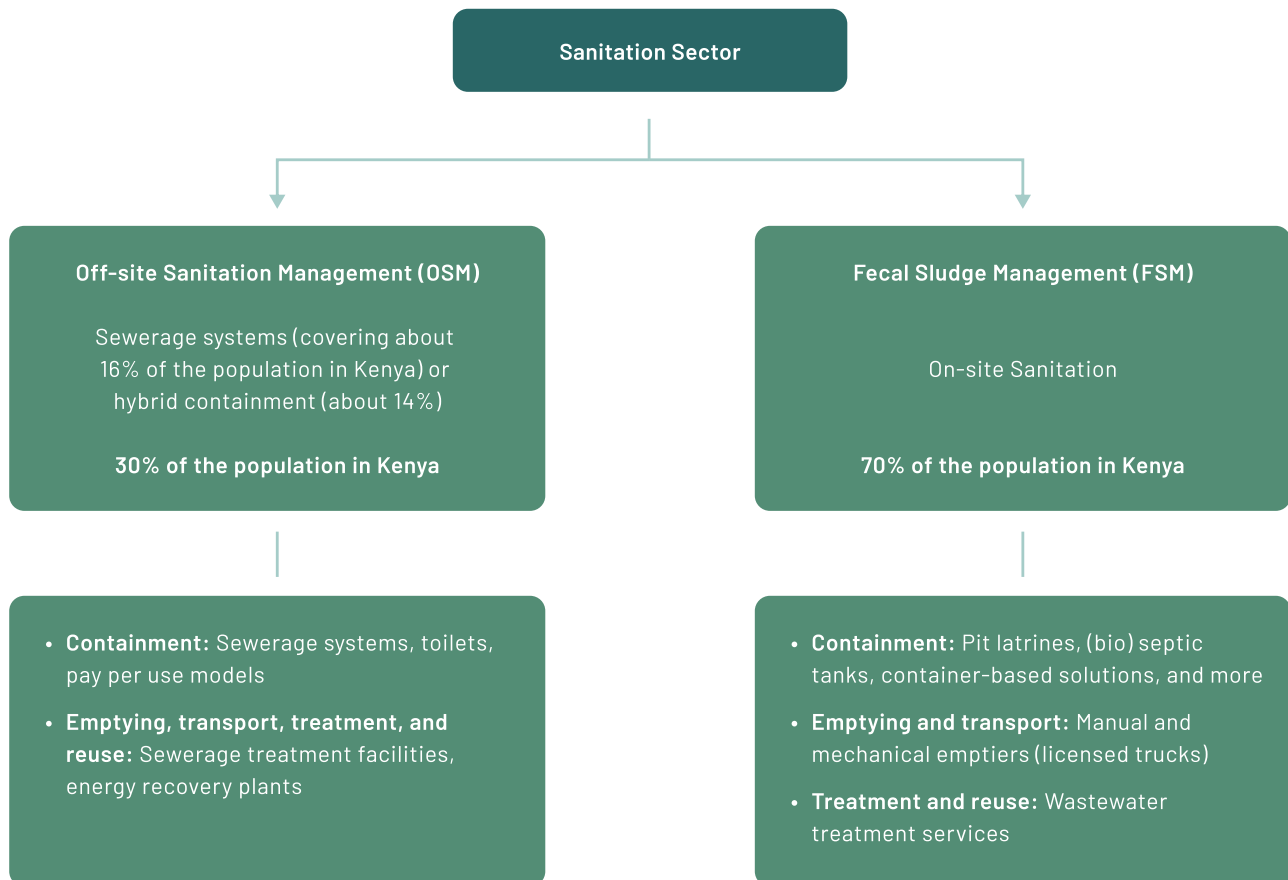
- 1 Idea stage**
The business is little more than an unproven idea, so the focus is on testing the idea and identifying a product-market fit.
- 2 Start-up stage**
The business is in the early stages of operations.
- 3 Early stage**
The business may have initial market traction and early revenues but will likely not yet be generating profit.
- 4 Growth stage**
The business demonstrates steady growth or scaling and likely profitability.
- 5 Mature stage**
The business has likely reached stable profits; growth may have slowed.

1. ANDE, Green Entrepreneurship in Kenya, 2023

INTRODUCTION

Kenya generates substantial volumes of wastewater from domestic, industrial and agricultural sources – amounting to 800 million litres per day from domestic use alone.² The country faces significant challenges in managing this wastewater effectively, which increases pressure on limited local freshwater resources. For instance, only 30% of the 400 million litres of wastewater generated daily in Nairobi undergoes treatment, and only 5% of wastewater from off-site sanitation management (OSM) is effectively treated because of failures in the sewage system, a lack of treatment infrastructure and facilities operating below capacity. These problems are exacerbated as transport trucks resort to illegal dumping in nature due to high discharge costs. As wastewater contains contaminants such as chemicals, oils and human waste, this results in heavy pollution of water bodies, endangering aquatic ecosystems and public health.³

Figure 1 – Domestic wastewater management in Kenya^{4,5}



2. Ministry of Water, Sanitation and Irrigation, 2021 Annual Status Report on Water, Sanitation and Irrigation, 2022.

3. Athena Infonomics & Open Capital Advisors, Urban Sanitation Market Overview: Kenya, 2020

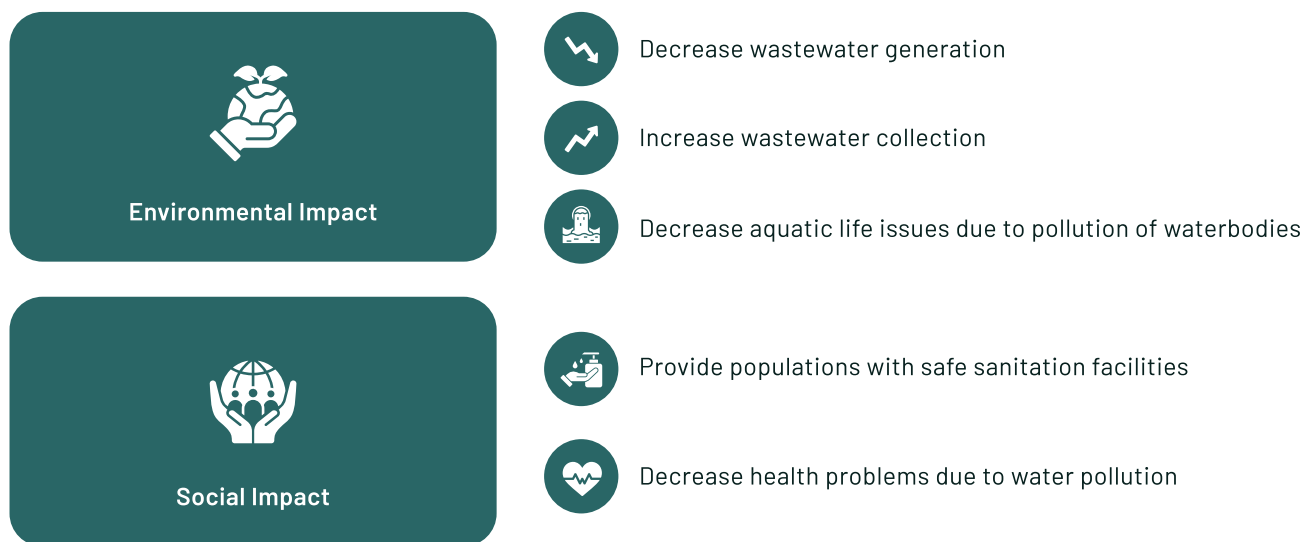
4. For the purposes of this study, the energy recovery business model was considered as part of the organic waste management sub-sector.

5. Athena Infonomics & Open Capital Advisors, Urban Sanitation Market Overview: Kenya, 2020

Kenya's wastewater management sector is underdeveloped but growing. Our study identified 27 active businesses in this field, including a few growth-stage businesses which have achieved scale through innovation, acquisition of effective technologies, and establishing strategic partnerships, such as the Fresh Life partnership with Regen Organics to convert waste collected by Fresh Life. Several businesses have attracted investments amounting to more than US\$ 10 million.⁶

As counties are constitutionally responsible for local wastewater management, they have established local utilities known as water service providers (WSPs).⁷ However, these WSPs cover only 16% of their sanitation duties through sewer connections, leaving opportunities for small and growing businesses (SGBs) to provide off-site sanitation services.⁸ Counties are increasingly recognising the importance of private sector involvement in addressing sanitation issues, resulting in the emergence of more and more public-private partnerships (PPPs). For example, Sanivation partnered with the Nakuru Water and Sanitation Services Company (Nawasco) to create a faecal sludge treatment plant, and Iko Toilet has regularly partnered with public utilities.⁹ As these WSPs cannot operate as for-profit businesses,¹⁰ they often create for-profit subsidiaries. For example, Nawascoal was created from Nawasco to transform organic waste into briquettes for domestic use. However, these subsidiaries need to demonstrate autonomy in business decision-making to boost investor confidence, given the potential for political interference.¹¹

Figure 2 – Positive impact of wastewater management businesses



6. Key informant interviews with businesses and financiers.

7. Public waste service providers (WSPs) are not counted in the 26 businesses identified in the wastewater sub-sector. WSPs are generally called [County name] Water and Sewerage/Sanitation Company. There are about 100 WSPs. Public WSPs are structured to be autonomous but still face significant political influence in their decision-making processes.

8. Athena Infonomics & Open Capital Advisors, Urban Sanitation Market Overview: Kenya, 2020

9. Iko Toilet operates using a build-operate-transfer model, where they partner with local authorities to develop facilities on public land.

10. Must reinvest all their profits into their growth and improvement.

11. Athena Infonomics & Open Capital Advisors, Urban Sanitation Market Overview: Kenya, 2020

METHODOLOGY

This study employed a mixed-methods approach to conduct a deep dive into the wastewater management sub-sector in Kenya. The primary data collection method consisted of 12 in-depth interviews with relevant businesses to explore their business models and with representatives of financiers and enterprise support organisations (ESOs) who have already supported and/or invested in wastewater management businesses. Specifically, the interviews focused on the value proposition of each business in the market context, their target customer segments and channels, key activities and resources required, revenue streams and models, and cost structures. The interviews also sought to gather information on the impact of each business, their financing needs, secured investments, growth trajectories and timelines to profitability.

To complement these interviews, secondary research was conducted to gather additional information from publicly available sources, such as industry reports, academic studies and government documents. This secondary research provided a broader context and helped to triangulate the findings from the interviews. The secondary research data were integrated with the interview data to provide a more nuanced understanding of the wastewater management sub-sector in Kenya.

The use of a mixed-methods approach provided a richer understanding of the wastewater management sub-sector in Kenya. The findings of this study provide valuable insights for policy makers and investors who wish to understand the wastewater management sector in Kenya, its entrepreneurial activity, and investment opportunities and strategies.

WASTEWATER SUB-SECTOR OVERVIEW

Overview of the entrepreneurship ecosystem

► ASSESSMENT OF KEY REGIONAL, NATIONAL AND SUB-NATIONAL LEGISLATIVE AND POLICY FRAMEWORKS

There are no specific policies for wastewater management in Kenya, but the government has set up some regulations regarding the treatment, reuse and disposal of wastewater. It has also established responsibilities for water services through both water-specific and general policies.

Figure 3 – Main legislation and policies on wastewater in Kenya

<p>2006 The Environmental Management and Co-ordination (water quality) Regulations</p>	<p>Forbids any person or organization from disposing of wastewater and other substances in water bodies, apart from those who are in possession of a valid effluent discharge license from the National Environmental Management Authority (NEMA). The Regulations require wastewater to be treated to meet specific standards before it can be discharged into bodies of water and promotes the reuse of treated wastewater for non-potable purposes. Moreover, they forbid the use of wastewater for irrigation purposes, unless it meets specific standards. Non-compliance can lead to fines and imprisonment.</p>
<p>2010 The Kenya Constitution</p>	<p>Recognizes access to clean and safe water as a fundamental human right. The Article 43(1)(a) acknowledges water's importance for human dignity and well-being and assigns responsibility for water supply and sanitation services to the 47 counties, ensuring local governance and tailored services for each community.</p>
<p>2015 The Kenya Environmental Sanitation and Hygiene Policy 2016-2030</p>	<p>Aims to eliminate sanitation and hygiene-related diseases in Kenya by 2030, focusing on increasing public and private sector investment through public-private partnerships. Moreover, it clarifies the roles and responsibilities of stakeholders and agencies involved in the sanitation sector.</p>
<p>2016 The Water Act</p>	<p>Aims to harmonize the water sector with the Constitution's devolution framework, recognizing water management as a shared responsibility between the national and county governments.</p>

► OVERVIEW OF OPPORTUNITIES FOR ENTREPRENEURSHIP



Containment

70% of Kenya's population lacks access to basic sanitation. Sanitation issues not only affect urban populations who live in informal settlements with limited sanitation infrastructure but also people in rural areas, where facilities often consist of simple pit latrines with low levels of safety, hygiene and privacy.¹² Moreover, 3% of the population in urban areas and 12% of the population in rural areas still practise open defecation.¹³ Private businesses are needed to improve access to sanitation containment facilities in rural areas and informal settlements.



Emptying and Transport

The unaddressed market opportunity for manual and mechanical emptying services is estimated at US\$ 26 million in Nairobi alone.¹⁴ Most emptying and transport services are currently provided by small-scale players who manually or mechanically empty tanks.¹⁵ In Nairobi, mechanical supply meets less than 10% of the demand for faecal sludge management (FSM) services, while manual emptying covers around 40% of the demand.¹⁶ Moreover, traditional trucks cannot access some informal settlements or overly dense areas. Despite official dumping sites and treatment plants, many operators illegally discharge waste into open water to avoid discharging costs. There remains a huge market opportunity for new private players in the field of FSM emptying and transport, especially in rural areas and informal settlements where sewer systems are almost non-existent. As the informal sector is highly present in this part of the value chain, formalisation of this workforce would also be beneficial. Moreover, solutions to optimise vacuum truck operators' journeys in rural areas where houses are further apart are needed.¹⁷



Treatment and Reuse

While treated wastewater in Kenya can contribute to addressing the low availability of water for irrigation and drinking in the country,¹⁸ less than 30% of the wastewater generated in Nairobi is treated. Wastewater treatment plants are operating below capacity, often due to poor quality infrastructure resulting from a lack of investment and maintenance.¹⁹ This highlights the need for both new treatment facilities and the upgrading of existing infrastructure for FSM and OSM waste. Private companies could partner with counties to help bridge the gap and better operate treatment plants.

12. Ministry of Health, Kenya Environmental Sanitation and Hygiene Policy 2016-2030, 2016

13. USAID, Research and Learning for Rural Sanitation in Kenya, 2021

14. Annual deficit based on an average exhauster truck's capacity and the transport fee charged according to the Kenya Septage Association.

15. Manual emptying is informal, involving climbing into pits to collect waste, while mechanical operations use licensed trucks.

16. Mansour et al., Situation Analysis of the Urban Sanitation Sector in Kenya., 2017

17. Mallory et al., Understanding the Role of Informal Pit Emptiers in Sanitation in Nairobi through Case Studies in Mukuru and Kibera settlements, 2021

18. Bernard & Omondi, Wastewater Production, Treatment, and Use in Kenya, 2012

19. Athena Infonomics & Open Capital Advisors, Urban Sanitation Market Overview: Kenya, 2020

► CHALLENGES HINDERING THE GROWTH OF THE WASTEWATER MANAGEMENT SUB-SECTOR IN KENYA

Wastewater businesses often struggle to generate revenue because many of them are working with cash-poor customers. They often provide services to bottom-of-pyramid (BoP) customers and government stakeholders, who rarely have the means to pre-finance a costly wastewater management solution upfront. Businesses have been forced to innovate around their operating models and pricing strategies, setting up monthly payments through leasing, subscriptions and other payment mechanisms, which result in them having to pre-finance their operations and solutions upfront.

In addition, the legal and regulatory frameworks around wastewater management are incomplete, fragmented, unclear and unenforced. For example, water quality regulations are not clear for everyone, particularly for households or small organisations that opt for their own wastewater treatment systems. These customer segments are often unaware of water quality regulations or do not know how to measure the quality of water after treatment.²⁰ Moreover, the national government does not provide technical assistance to counties to help them with planning, budgeting and implementing investments in the sanitation sector. Pro-poor sanitation service subsidies have already been put in place, but their disbursement depends on the counties' budget prioritisation and spending discussions or on access to external donor funding to supplement core budgets. Finally, regulations on pit emptying and FSM services are not developed, except in some counties where manual pit emptying is considered illegal because of concerns about pit emptiers' health. However, due to weak enforcement of legislation, the informal sector is still highly active in this service provision.²¹ The fragmented nature of legal frameworks leads to low enforcement and conflicting sectoral mandates,²² resulting in a lack of clarity that can be difficult for actors in the sub-sector to navigate and deter investors from entering the sub-sector.²³

Finally, despite high financing needs, it is difficult for wastewater businesses to attract capital. Due to the nascent nature of the sub-sector, investors lack an understanding of its risks and opportunities. The lack of reliable business data requires a time-consuming and expensive due diligence process, which sometimes prevents investors from making investments in the sub-sector. In addition, the perceived lack of innovations deters equity investors from contributing to the sub-sector as they typically look for businesses that have the ability to scale. Businesses in this sub-sector are, therefore, more likely to attract debt investment which can be leveraged to cover their high upfront capital expenditure (CapEx) costs. Furthermore, the heavy government involvement in the sector is often perceived as an additional risk by financiers. The trend of publicly owned water service providers creating for-profit subsidiaries has led to reluctance from investors to engage with businesses due to concerns about government interference.²⁴

20. Key informant interviews with businesses.

21. Mansour et al., Situation Analysis of the Urban Sanitation Sector in Kenya, 2017

22. The Ministry of Health and the Ministry of Water are both responsible for policy making and planning. Then, county governments are responsible for planning and implementation. And finally, monitoring and regulations are functions of the Water Services Regulatory Board (WASREB) and the National Environmental Management Authority (NEMA), which both have representatives at county level.

23. Athena Infonomics & Open Capital Advisors, Urban Sanitation Market Overview: Kenya, 2020

24. Athena Infonomics & Open Capital Advisors, Urban Sanitation Market Overview: Kenya, 2020

DESCRIPTION OF COMMON BUSINESS MODELS

The following table highlights the key business models identified in the wastewater management sub-sector and illustrative businesses for each of these models.

Figure 4 – Illustrative businesses by business model²⁵

Business Model	Illustrative Businesses		
Prevention of wastewater - waterless toilets			
Pit emptying			
Bio septic tanks			
Treatment systems and plants			

25. It is important to remember that there are certainly more businesses in the sub-sector, but they were not identified as part of this study. Moreover, one business can operate several business models.

Prevention of wastewater – waterless toilets

► DESCRIPTION

Waterless toilets offer an FSM containment solution to provide access to sanitation services, particularly for underserved communities in Kenya. These communities, such as those living in informal settlements, often face significant challenges in accessing reliable sanitation facilities. Waterless toilets²⁶ can also benefit schools, busy markets and organisations hosting events. These solutions allow their users to experience better sanitation conditions, in turn improving community health and reducing water usage.

These businesses collect revenues in different ways, depending on the type of customers and use cases.

Potential models include pay-per-use fees (B2C), lease agreements with schools and markets (B2B), and rent from adjoining facilities offering additional services like small shops, advertising spaces and event spaces (B2B).

Delivering such services requires businesses to build, operate and maintain their facilities. Facility construction includes site assessment, planning, designing, engineering and building the toilets. Operating and maintaining them involves regular cleaning, waste management and frequent repairs to ensure hygiene and functionality. Community engagement and education are also crucial, through awareness campaigns and user training to promote proper usage and maintenance.

As a result, waterless toilet businesses' primary cost drivers consist of materials, energy and the labour required for the company's logistical and construction processes. The government often owns the land and provides businesses with authorisation to install their facilities.

26. Container-based toilets can be either pit latrines or toilets that must be emptied.

Figure 5 – Overview of the waterless toilets value chain



► **MAPPING OF BUSINESSES USING THIS MODEL**

Four businesses have been identified as providers of waterless toilets. Despite the nascency of this field, Iko Toilet, Fresh Life²⁷ and Karibu Loo have received international recognition and raised funding to advance their operations. For example, Iko Toilet raised US\$ 757k in debt investments from the Global Water Challenge, the World Bank and Acumen.

Figure 6 – Mapping of businesses by stage of maturity²⁸

Stages of Maturity	Number of Businesses	Illustrative Businesses
Start-up stage/ Idea stage	0	
Early stage	0	
Growth stage	4	
Mature stage	0	

27. From the Sanergy Collaborative.

28. We were not able to find the amounts of investments secured for each of the business, therefore, we assessed their stage of maturity by the year of creation, the number and scale of projects achieved, and the number of employees in the company.

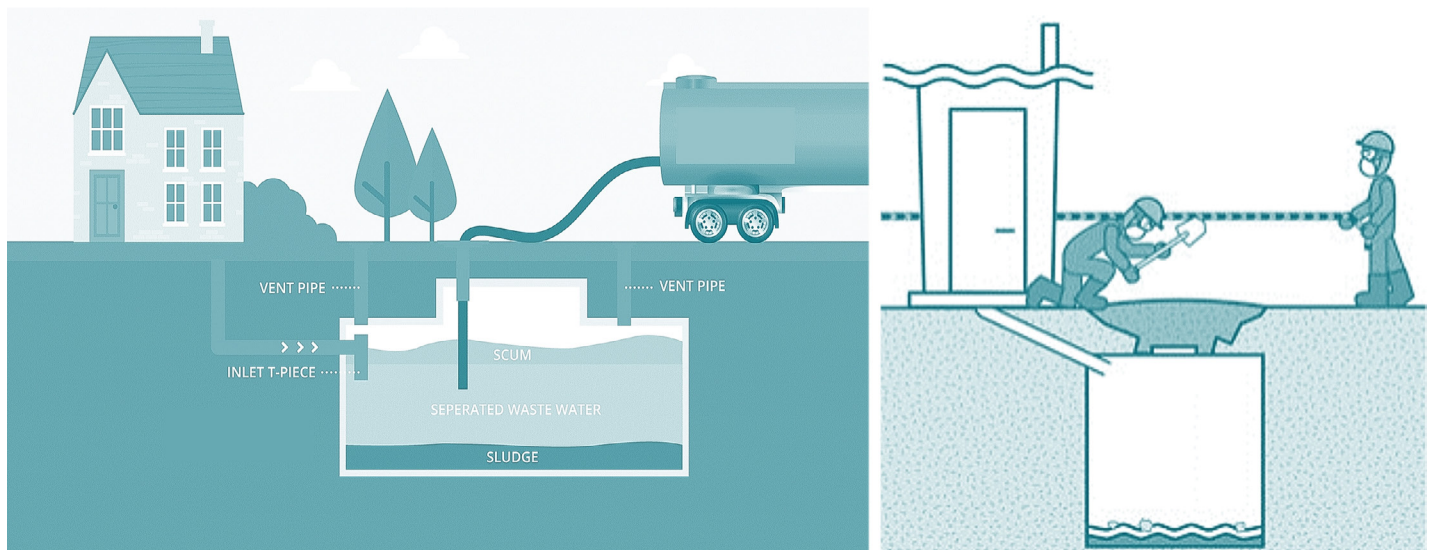
On-site sanitation services – pit emptying

► DESCRIPTION

Given that only 30% of the Kenyan population is connected to sewerage systems, pit emptying plays a significant role in wastewater management.²⁹ Customer segments include both urban and rural households who do not have access to sewer systems and therefore use pit latrines or conventional septic tanks. A large share of customers are members of communities living in informal settlements. In these settlements, sanitation waste accumulates and requires emptying. Businesses operate either by manually emptying pits or using trucks to handle mechanical pit emptying (e.g., Watertech and Sanivation). A few businesses have developed their own pit-emptying manufacturing equipment (e.g., Sanivation) or exhaustion centres (e.g. Fresh Life from Sanergy).

Revenue streams include payments for FSM pit emptying services, which mainly cover labour costs for manual pit emptying and truck costs for mechanical pit emptying. Manual pit emptying requires disinfectants, emptying tools and labour. Mechanical emptying involves purchasing and licensing trucks, labour, fuel and other necessary inputs.³⁰

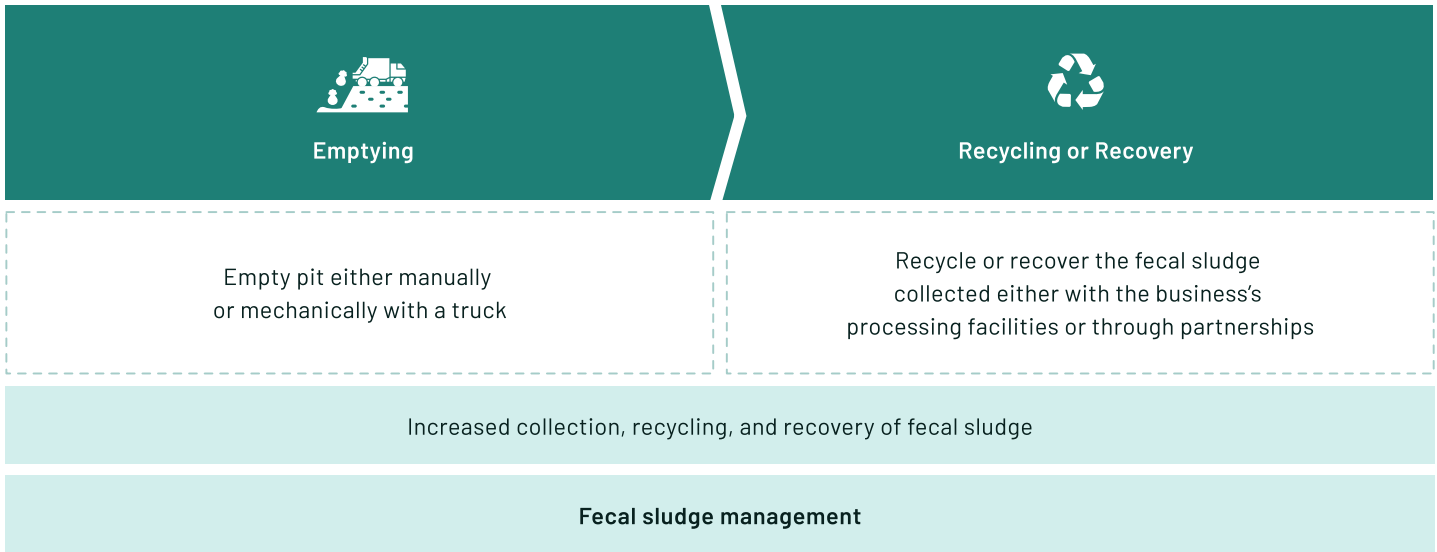
Figure 7 – Mechanical and manual pit emptying



29. USAID, Research and Learning for Rural Sanitation in Kenya, 2021

30. Athena Infonomics & Open Capital Advisors, Urban Sanitation Market Overview: Kenya, 2020





Figure 8 – Overview of the pit emptying value chain



► **MAPPING OF BUSINESSES**

This study has identified five SGBs using this business model, with the emergence of new businesses being challenged in part by the dominance of the informal sector in FSM pit emptying. Investors who have invested in this business model include EEP Africa, Finca Ventures and World Within Ventures.

Figure 9 – Mapping of businesses by stage of maturity³¹

Stages of Maturity	Number of Businesses	Illustrative Businesses
Start-up stage/ Idea stage	0	
Early stage	0	
Growth stage	4	  
Mature stage	1	

31. The PuPu pump is a cutting-edge solution that integrates a compact compressor, an automated reservoir with non-return valves and a manual suction/pressure valve. Its small reservoir capacity enables the rapid creation of a vacuum, allowing for efficient removal of sludge in a short timeframe.

► SANIVATION – CASE STUDY

It is important to note that although Sanivation does pit emptying, that is just part of the activities that constitute its business model.



Origin: **Kenya**

Year of foundation: **2014**

Number of employees: **145**

Monthly revenue (2024): **US\$ 3.33m**

“A Sanitation Partner for African Secondary Cities”

MARKET PROPOSITION

- 1 **Provides city administrations with various sanitation services:**
 - ✓ **Master planning** (citywide inclusive sanitation plans, feasibility studies, market assessments, capacity building for operators, and stakeholder workshops).
 - ✓ **On-site sanitation** (manual pit emptying and utilities, container-based sanitation (CBS) systems, and technology for semi-mechanized pit emptying and transfer stations).
 - ✓ **Waste-to-value treatments plants** (conversion of organic waste into briquettes) design, building, and operations.
 - ✓ **Municipal solid waste management advisory.**
- 2 **Responds to the needs of 70% of the population in Kenya who use on-site sanitation and the unaddressed market opportunity for manual and mechanical emptying services, estimated at US\$ 26 million in Nairobi alone.** The estimated sanitation market potential for the period 2022-2030 in Kenya is about US \$52.85 B.
- 3 Sanivation runs a significant share of their activities through **Public-Private Partnerships (PPPs), helping the public bodies to exercise their duties regarding sanitation**, often thanks to grants provided by donor institutions.

IMPACT



Has provided essential services **reducing diseases (mostly diarrheal diseases) and pollution.**



Has **positively affected over 500,000 lives with improved sanitation services**, acting as a sanitation partner for African secondary cities.



Increases access, affordability, reliability, and sustainability of energy, by converting fecal sludge into biomass briquettes.



Supports cities to become clean, healthy, and productive by co-developing sanitation solutions.




Has **avoided greenhouse gas emissions amounting to 748,000 tons of CO2 equivalent.**

KEY MILESTONES ACHIEVED

- ✓ **2014:** Established the social enterprise, **first with a shop in Naivasha, selling in-home blue box toilets (on-site sanitation) with pit-emptying services**
- ✓ **2015:** Started to **convert fecal sludge and other biomass waste into briquettes and fuel**
- ✓ **2016:** Participated in the **Toilet Board Coalition accelerator program**, allowing them to access an extensive network
- ✓ **2018:** **Partnered with Nawasco (Nakuru's local sanitation utility) to build a waste-to-value treatment plant in Nakuru**
- ✓ **2019:** **Started delivering long-term planning services to cities**, including city-wide inclusive sanitation plans
- ✓ **2021:** **Reached 50,000 people with improved sanitation services**
- ✓ **2023:** **Reached 350,000 people with improved sanitation services**

FUNDING SECURED

Amount	Types of Instrument	Select Investors
About US\$ 4.5m	Mostly grants and government funding, but also equity and debt	

KEY SUCCESS FACTORS IDENTIFIED

- ✓ **Working in partnership with businesses or municipalities:** works closely with both municipal authorities and private sector partners to develop tailored sanitation solutions that address specific community needs, especially in underserved areas, thereby enhancing their service delivery and impact and attracting funding and support from various stakeholders.
- ✓ **Selling to business and industries:** sells briquettes in bulk to hospitals, restaurants and schools for example, allowing to scale more easily.

Bio septic tanks

► DESCRIPTION

Bio septic tanks, also known as biodigester tanks, are an innovative and sustainable containment solution for people not connected to sewage systems. As many people are not connected to the sewers and treatment is inefficient, bio septic tanks represent a solution to treat waste directly at the source. The system is based on anaerobic digestion, a natural biological process using microorganisms to break down sanitation waste.³² As a result, emptying is no longer required and the release of wastewater into water bodies is avoided, preventing human health and biodiversity issues. In addition, this system is very efficient, allowing the effluent to be safe for discharge and other non-drinkable uses such as irrigation, and reduces the groundwater pollution that often occurs with pit latrines and septic systems. Moreover, although the initial investment is higher than for conventional tanks, bio septic tanks are more affordable in the long term as they consume less energy, require less maintenance and can last longer.^{33 34}

Bio septic tanks are suitable for commercial buildings, healthcare facilities, learning institutions, residential homes, and rural and outlying areas without access to sewage systems. Businesses can offer flexibility by providing different products and services based on the needs of different customer segments. Prices also vary depending on size, amounting to around US\$ 2,000 to US\$ 3,000 for a one-cubic-meter tank,³⁵ which would allow the sanitation needs of 20 to 30 people to be continuously covered.

However, this flexibility requires businesses to perform a field survey for each potential customer, which represents a high upfront cost. Businesses typically travel to customers, assess the potential project and develop a proposal, which incurs significant costs. However, only a small share of these field surveys result in sales as most people underestimate the costs of the system. Businesses only start manufacturing the bio-septic tank after the contract has been signed, following which they offer installation and maintenance services. Other operational expenses (OpEx) include materials, energy and labour. CapEx includes the acquisition of the infrastructure and technology to produce bio septic tanks and regulatory costs as each tank has to be approved by the National Environment Management Authority (NEMA).

Revenue streams comprise both the installation of the bio septic system and maintenance services.³⁶ Sometimes, companies also produce and commercialise ancillary products to help mitigate the unpleasant odour that the biodigestion process can produce.³⁷ However, given high upfront costs, customers often cannot afford to pay the entire cost of the installation at once. Therefore, customers sometimes ask to pay in instalments or via a monthly subscription, which requires the business to pre-finance systems.³⁸

32. Some systems also use the aerobic process in addition to the anaerobic one.

33. HPD Consult, Advantages and Disadvantages of Biodigester Septic Tank, 2020

34. Classic tanks generally last about 20 to 40 years, depending on the materials used (steel, plastic or concrete).

35. This price includes all services, but the prices given on some websites do not include such additional costs as installation and site preparation.

36. Tanks are often provided with a five-year warranty. Customers often need maintenance services over a period of 20 to 40 years or more (the lifespan of a bio septic tank).

37. Even if the unpleasant odour is reduced compared to classic septic tanks.

38. Key informant interviews with businesses.



Figure 10 – Bio septic tank

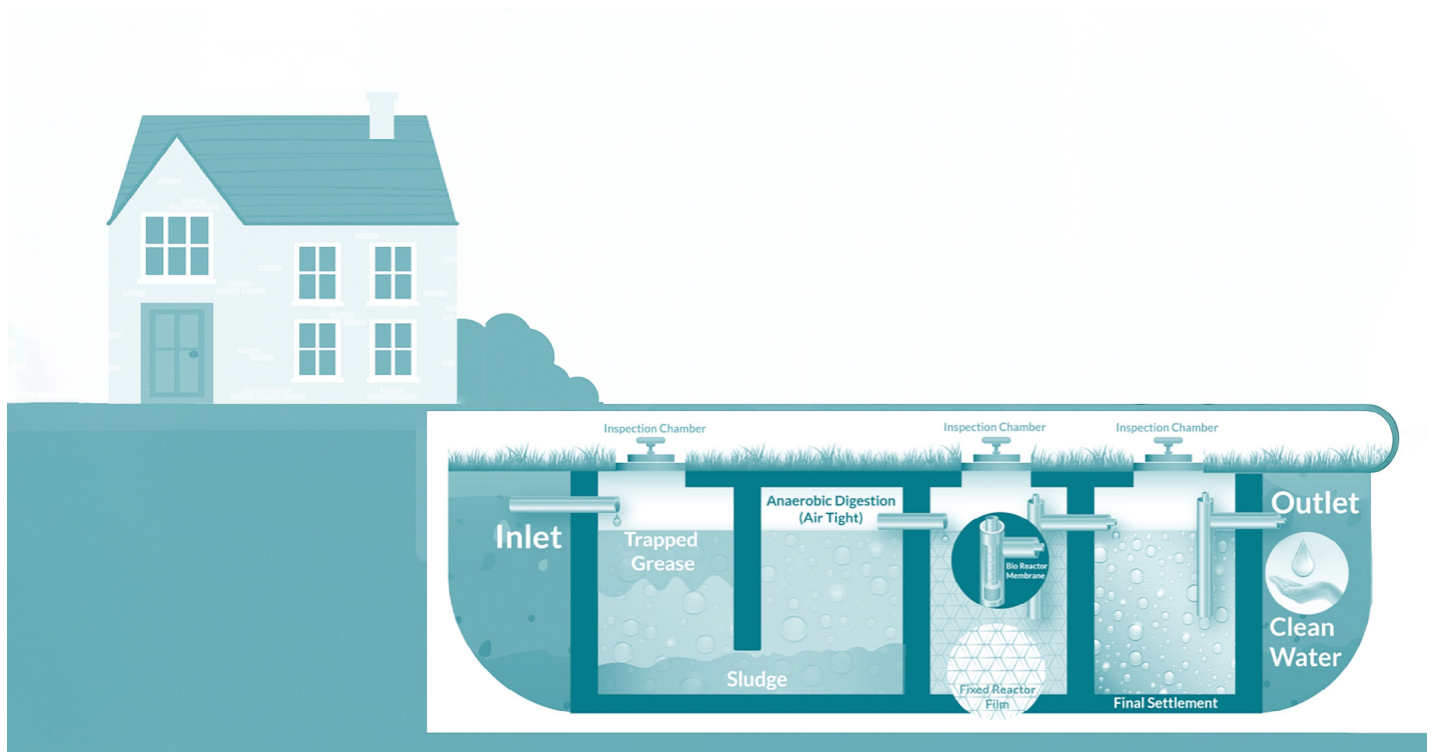


Figure 11 – Overview of the bio septic tanks value chain



► MAPPING OF BUSINESSES

This study identified ten businesses providing bio-septic tanks in Kenya. These businesses are all mature, with many years of experience³⁹ and many projects completed.

Figure 12 – Mapping of businesses by stage of maturity

Stages of Maturity	Number of Businesses	Illustrative Businesses
Start-up stage/ Idea stage	0	
Early stage	0	
Growth stage	0	
Mature stage	10	  

39. Generally, more than 10 years.



Treatment systems and plants

► DESCRIPTION

Designing, building and maintaining treatment systems and plants is particularly needed in Kenya where only 30% of wastewater is effectively treated and most of the collected wastewater from pit emptying ends up in nature.

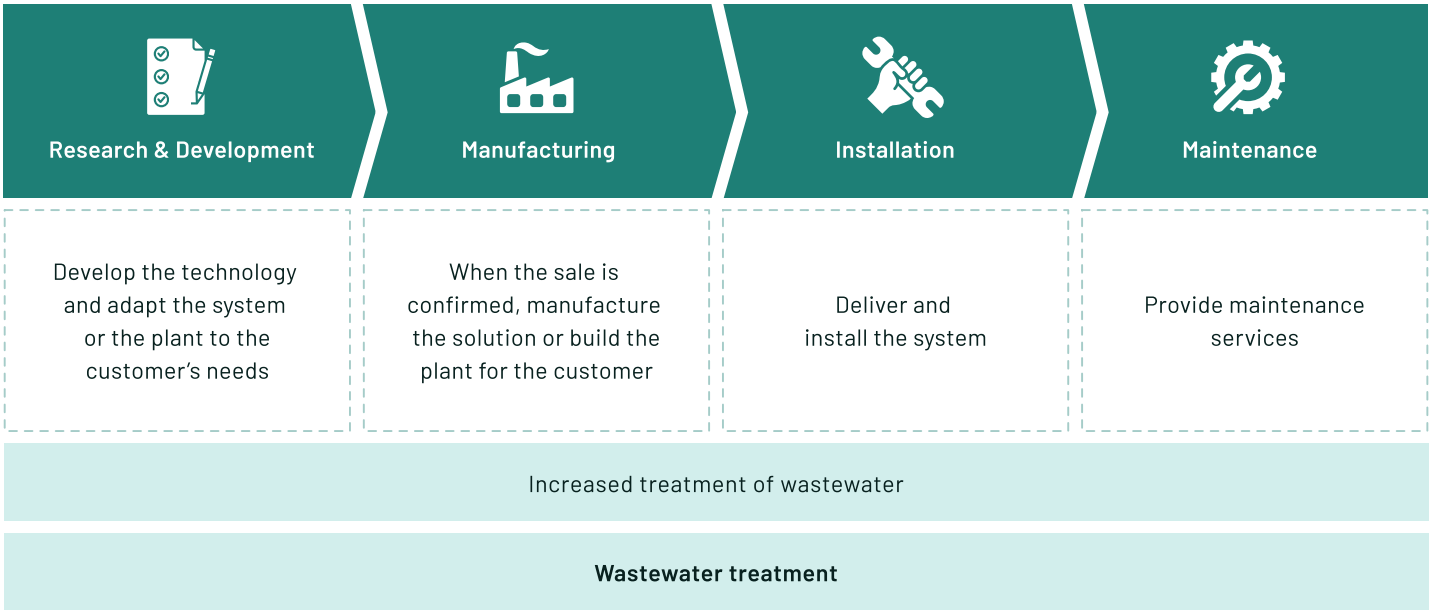
Given public actors' inability to provide treatment facilities, the private sector has entered this segment of the market.

The customer segments are diverse, ranging from large institutions, schools, apartment blocks, hotels, individual households and municipalities. Each segment requires tailored solutions to meet specific wastewater treatment needs, requiring adaptability of the equipment and infrastructure. For example, households, apartment blocks and hotels typically require on-site sanitation systems of varying technological specifications and sizes. Additionally, businesses operating in this field design, build and maintain effluent treatment plants (ETPs) for various industries. Channels for reaching these customers include direct sales teams, partnerships with local authorities and institutions, and targeted marketing campaigns to raise awareness about the benefits of advanced wastewater treatment solutions. In addition to marketing and administrative tasks to promote services and manage customer relations effectively, key activities for this business model involve the technical aspects of researching, developing, designing and installing treatment systems, as well as ongoing management and maintenance to ensure long-term functionality.

Given the different solutions proposed and the varied customer segments, businesses often diversify their revenue models to meet different customer needs. Businesses can generate income through the direct sale of wastewater treatment systems through a monthly subscription model for ongoing maintenance and support or by providing rental options for customers who prefer not to commit to a full purchase.

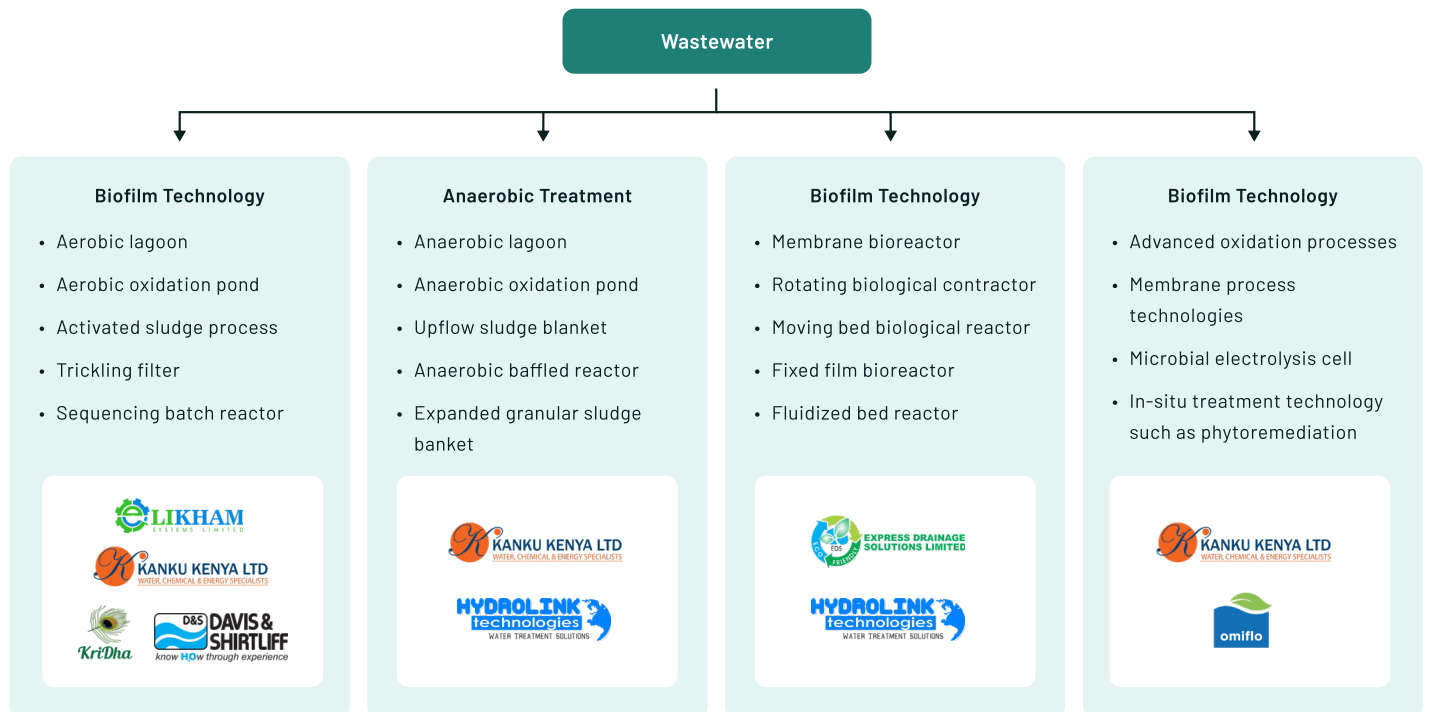
Cost drivers in this business model are mainly high CapEx and regulatory costs. High investments are needed to purchase advanced technology and manufacturing equipment, as well as the materials needed for installation and setup. Regulatory costs are also significant, as each project must undergo an environmental impact analysis and receive technical approval from the NEMA. Finally, OpEx includes costs related to running offices and maintaining a skilled workforce.

Figure 13 – Overview of the treatment systems and plants value chain



A wide range of technologies exist to treat wastewater. The most frequently used ones are activated sludge processes, sequencing batch reactors, anaerobic bioreactors and membrane bioreactors. However, companies like Kanku Kenya and Omiflo are also exploring emerging options like membrane process technologies and phytoremediation.

Figure 14 – Wastewater treatment technologies and illustrative businesses⁴⁰



40. Sangamner et al., A Critical Review of Conventional and Emerging Wastewater Treatment Technologies, 2021

► **MAPPING OF BUSINESSES**

This study identified 11 businesses in this field, most of whom are in the growth or mature stage. The pool of businesses that sell wastewater treatment systems and plants is not only relatively mature but also very dynamic as there are more and more actors emerging. Financiers that have already invested in the field include Norfund, UK Aid and the Shell Foundation.

Figure 15 – Mapping of businesses by stage of maturity

Stages of Maturity	Number of Businesses	Illustrative Businesses
Start-up stage/ Idea stage	0	
Early stage	3	  
Growth stage	1	
Mature stage	7	  

► OMIFLO - CASE STUDY



Origin: **Kenya**

Year of foundation: **2019**

Number of employees: **10**

Monthly revenue (2024): **US\$ 3.8k**

Break-even: **Expected by mid-next year**

"Providing exceptional wastewater treatment, with no energy or chemicals, no smells, and simple maintenance"

MARKET PROPOSITION

- 1 Designs, installs, manages, and maintains **plant-based, energy and chemical-free wastewater treatment systems called Omiflo Phitofix**, which do not require either a septic tank or exhauster. They are adaptable, odourless, simple to build, and require less space, and are more affordable than conventional systems. They are therefore well-suited for households, schools, big institutions, apartment blocks, hotels, and other medium to large size buildings. In addition, the system can be implemented in existing treatment plants to allow them to improve performance and save energy.
- 2 **Responds to the needs of 70% of the population in Kenya who use on-site sanitation and the unaddressed market opportunity for manual and mechanical emptying services, estimated at US\$ 26 million in Nairobi alone.** The estimated sanitation market potential for the period 2022-2030 in Kenya is about US \$52.85 B.

IMPACT



Treats 240,000 liters of wastewater daily




Reduces pollution of waterbodies

RECOGNITION

- ✓ Winner of Prince Albert II of Monaco Foundation's prize (2023)
- ✓ Oceans Innovation Prize "No waste challenge" winner (2021)
- ✓ MIT SOLVE Winner (2023)

FUNDING SECURED

Amount	Types of Instrument	Investors
US\$ 100k	Grant	

GROWTH PLANS

- ✓ Seeking to expand its pool of customers, by **attracting larger customers to run larger projects**, and expanding their geographic footprint.
- ✓ Investigating the possibility to **use a subscription model to generate revenues and offer their customers a solution to avoid paying for the entire cost for the system upfront.**
- ✓ Looking for a **catalytic grant for their carbon offsets**, as well as to improve their systems and demonstrate their added value as well as equity funding to finance their expansion, notably by increasing marketing activities
- ✓ **Looking for technical support to strengthen their business and financial management knowledge.**

**FUNDING NEEDED**

Amount	Types of Instrument	Needs
US\$ 200k	Catalytic grant, debt, and equity	Improve system, implement a new payment model, and expand the business

KEY SUCCESS FACTORS IDENTIFIED

- ✓ **Working in partnership with businesses or municipalities:** partners with of the biogas suppliers to provide solutions to transform collected waste into energy
- ✓ **Selling to businesses and industries:** sells to schools, big institutions, hotels, and other organizations having medium to large size buildings.

FINANCING LANDSCAPE ASSESSMENT

Mapping of financing needs

Wastewater businesses in Kenya have significant financing needs due to the high CapEx required, the research and field study costs of designing projects, and the costs associated with regulatory compliance. Providing treatment systems and plants requires significant CapEx to finance the production processes, including infrastructure and technology acquisition. Furthermore, even if some businesses are highly replicable, others are investing in research and development (R&D) to develop new technologies, improve their environmental impact and reduce operating costs.⁴¹ These businesses often have not yet reached break-even, requiring patient capital and more risk-tolerant investors.⁴² Additionally, for customer-tailored solutions, pre-contract field surveys present a high up-front and high-risk cost for businesses as there is no certainty of a contract being signed. Additionally, regulatory costs are substantial, as each project must undergo an environmental impact analysis and receive technical approval from the NEMA. For FSM businesses involving mechanical emptying, companies must obtain NEMA licences for all trucks, which is also costly.⁴³

Wastewater businesses often target customers (either individuals or organisations) with relatively low access to capital, which reduces margins and pushes these businesses to develop alternative payment mechanisms.

In particular, while Kenyan municipalities represent potential customers for large projects, they often face financing difficulties due to historically low national budget allocations. Therefore, despite high infrastructure and technology costs, businesses need to propose affordable solutions to acquire customers, for example through monthly payment mechanisms. Such mechanisms often require businesses to pre-finance their infrastructure and delay the return on investments.⁴⁴ Working capital debt is particularly well-suited in this context to address cashflow challenges and pre-financing needs.

41. Such as the sensors in the Fresh Life toilets.

42. Athena Infonomics & Open Capital Advisors, Urban Sanitation Market Overview: Kenya, 2020

43. Key informant interviews with businesses.

44. Athena Infonomics & Open Capital Advisors, Urban Sanitation Market Overview: Kenya, 2020

Potential innovative finance mechanisms

Although innovative financing structures are still in their early stages in Kenya's wastewater sub-sector, **blended finance is gaining momentum**. The country's wastewater sub-sector has seen the development of innovative financing structures, including project financing through output-based aid (OBA) subsidies, green bonds and others.



Support Mechanisms

Impact-first funders, such as accelerators, incubators and foundations, can help to support high-risk early-stage businesses through support mechanisms. They typically provide financial support in the form of grants and non-financial support in the form of technical assistance, such as management coaching and investor readiness training to strengthen business models.



Risk Mitigation Instruments

Risk mitigation mechanisms play a vital role in attracting commercial finance to the wastewater sub-sector by reducing financial risk and, in some cases, lowering the cost of capital.

Guarantees and OBA have improved access to infrastructure services for low-income communities by incentivising public water utilities to provide services. For example, the World Bank has collaborated with commercial lenders through the Maji ni Maisha programme. Kenya's K-Rep Bank was the commercial lender, financing 80% of the solution through a loan, and the community participated at 20% through equity. Once an independent impact evaluator had confirmed the achieved outcomes, the World Bank delivered the OBA subsidy to refinance the loan. The remaining amount was repaid by the community with revenues from the utility.⁴⁵

Furthermore, to reduce the risk of default that can occur if the government is a customer, an escrow can be created to act as a neutral third party holding the money for a period of time to ensure that both parties fulfil their obligations.

Moreover, building special purpose vehicles (SPVs) for such investment mechanisms can act as an additional risk mitigation tool by using a separate legal entity that absorbs and manages project risks. The project initiator creates a project company, to which the assets will be transferred to attract financing without risk. However, given the complexity of this mechanism, it is more suitable for big projects, such as wastewater treatment plants.⁴⁶

45. The World Bank Group, Scaling Up Blended Financing for Water and Sanitation in Kenya, 2016

46. ESFC Investment Group, SPV: Special Purpose Vehicle, n.d.



Results-based Finance

This innovative mechanism has already been leveraged several times in water and sanitation in Kenya. More recently, a result-based finance mechanism has been launched to fund the scaling of Fresh Life, with funding from the Osprey Foundation and Grand Challenges Canada. The payment will be disbursed on a quarterly basis, based on the achievement of pre-agreed outcomes.⁴⁷



Climate Finance

Green bonds have the potential to attract significant capital into the wastewater sub-sector in Kenya. Bonds typically correspond to large investments, which could finance the development of much-needed infrastructure in the country. For example, Kenya's Green Bond Programme, launched in 2019, aims to mobilise domestic and international capital for environmentally beneficial investments, including water and waste management. The programme provides a legal framework for listed and unlisted green bonds.

47. Social Finance International, Revolutionising Urban Sanitation: Fresh Life's Results-Based Financing Initiative in Nairobi, 2024

CONCLUSION

Significant amounts of wastewater are generated daily from domestic, agricultural and industrial activities. However, the nascent nature of Kenya’s wastewater management sub-sector, coupled with the high costs of technologies and infrastructure, governmental involvement and the risk profile of private and public customers can deter investors from entering the market. Although water and sanitation are the responsibility of counties, they have yet to fully fulfil their duties, leaving significant opportunities for the private sector. The private sector offers a mix of on-site sanitation management (OSM) and faecal sludge management (FSM) containment solutions through the manufacturing of waterless toilets. However, more businesses are active in FSM, providing services such as pit emptying, on-site containment and treatment solutions through bio septic tanks, treatment systems and plant manufacturing.

There is a need to increase investments in the sub-sector to address the financial needs of businesses, notably through innovative financing mechanisms. Typical financial needs arise from high CapEx costs, research and field study costs for project design, and regulatory compliance costs. Moreover, since wastewater businesses often serve cash-poor customers or unreliable government clients, they frequently have to establish new payment mechanisms, such as monthly payments. This requires businesses to pre-finance their infrastructure and delay the return on their investments.



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