



ASPEN NETWORK
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ENTREPRENEURS
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Building the Green Economy

Trends and Opportunities for Green
Entrepreneurship in **Kenya**

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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.

About the IKEA Foundation

This report was produced with support from the **IKEA Foundation**. The IKEA Foundation is a strategic philanthropy that focuses its grant making efforts on tackling the two biggest threats to children's futures: poverty and climate change. It currently grants more than €200 million per year to help improve family incomes and quality of life while protecting the planet from climate change. Since 2009, the IKEA Foundation has granted more than €1.5 billion to create a better future for children and their families. In 2021 the Board of the IKEA Foundation decided to make an additional €1 billion available over the next five years to accelerate the reduction of Greenhouse Gas emissions.

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DEFINITIONS AND ABBREVIATIONS

► DEFINITIONS AND STUDY SCOPE

Small and growing businesses (SGBs): This study focuses on growth stage opportunities in small business entrepreneurial activity, classified by ANDE as small and growing businesses (SGBs). SGBs are defined by ANDE as commercially viable businesses with five to 250 employees that have significant potential and ambition for growth. Typically, SGBs seek growth capital from US \$20,000 to \$2 million. SGBs differ from the more traditional characterization of small and medium-sized enterprises (SMEs) in two fundamental ways. First, SGBs are different from livelihood-sustaining micro and small businesses, which start small and are designed to stay that way. Second, unlike many medium-sized companies, SGBs often lack access to the financial and knowledge resources required for growth. While some literature and resources apply broadly to SMEs, ANDE focuses on SGBs when possible (such as in the primary data collection on entrepreneurs and intermediaries and in case studies).

Green entrepreneurship: This report follows the International Labour Organization (ILO) definition of the term green entrepreneurship. According to the ILO, green enterprises are those that address climate change and/or have a positive environmental value either through the process of delivering products/services (e.g., utilizing clean technologies) or by providing products or services in a green sector (e.g., waste management). As noted by the ILO, "Usually, green entrepreneurs consider both aspects in their business models, creating additional decent employment through the use of more environmentally friendly processes, while reducing the overall environmental impact as a result of people or companies using the final product or service."¹

► ABBREVIATIONS

AfDB:	African Development Bank	NCCAP:	National Climate Change Adaptation Plan
ASAL:	Arid and semi-arid land	NDC:	Nationally determined contribution
CO2:	Carbon dioxide	PAYGO:	Pay as you go
DFI:	Development finance institution	PE:	Private equity
EE:	Energy efficiency	PPP:	Public-private partnership
EV:	Electric vehicle	SGB:	Small and growing business
FAO:	Food and Agriculture Organization of the United Nations	SDG:	United Nations Sustainable Development Goal
GDP:	Gross domestic product	SHS:	Solar home system
GHG:	Greenhouse gas	SME:	Small and medium-sized enterprise
IFC:	International Finance Corporation	VAT:	Value-added tax
MEPS:	Minimum energy performance standard	VC:	Venture capital

¹ Green entrepreneurship: Creating green jobs through sustainable enterprise development. International Labour Organization.



METHODOLOGY

The information shared in this report was gathered from three sources:

- 1 **Synthesis of existing literature and resources, such as research studies, policy documents, and online resources, which are cited as footnotes throughout the report.**
- 2 **Primary and secondary data collection from entrepreneurs and intermediaries, including:**

Entrepreneur data: To understand the state of green entrepreneurial activity in Kenya, the authors selected a sample of 100 green enterprises that fit the SGB criteria. To identify enterprises, the authors searched publicly available sources, including Crunchbase and portfolios of accelerator and incubator programs, as well as pulling from Intellectap's internal database. Enterprises identified from these sources were narrowed down to only those that fit the SGB criteria, meaning they had a maximum of 250 employees and investment of no more than \$2 million. This sample is not meant to capture the full scale of entrepreneurial activity in Kenya, particularly those enterprises in the informal sector, nor is it necessarily representative of all SGB activity in the country. Rather, this sample is meant to capture many of the promising enterprises with a strong web presence and high levels of investor awareness in order to understand trends among SGBs that are achieving market traction and are candidates for scale.

Intermediary data: To gather data about the support services available to green entrepreneurs, ANDE utilized its Entrepreneurial Ecosystem Snapshot methodology, which includes gathering data on the work of organizations that support green enterprises (referred to as intermediaries) through either financial or nonfinancial support. The process includes a combination of primary surveying of intermediaries regarding their support services and perspectives on challenges and opportunities for green entrepreneurship and desk research to fill in information from non-respondents. Through this process, ANDE identified a total of 176 intermediaries in Kenya, 49 via survey and 127 via desk research. The methodology is designed to capture all – or nearly all – entrepreneur support organizations and can therefore be understood as a census of all actors providing support specifically for green entrepreneurship in Kenya at the time data collection was carried out (May to November 2022). The full set of insights gathered from the data are available at <https://www.kenya-ecosystem.tech>.

- 3 **Interviews with stakeholders, including:**

Key stakeholder interviews: Using the convenience sampling method, primary interviews were conducted with 16 green entrepreneurs, five investors, four sector associations, three incubators and accelerators, and one government agency in Kenya. In addition, one stakeholder convening was held in Nairobi in September 2022 to gather perspectives from a broad range of ecosystem actors. The convenience sampling method does not guarantee the representativeness of a sample by design, and the sample relied on the target respondents' willingness to participate in a call with the research team. However, the combination of one-on-one interviews and stakeholder conversations provided a rich amount of qualitative data for this report.

SGB case studies: Another round of interviews was conducted with five selected green entrepreneurs, one working in each sector group, using the purposeful sampling technique.² To meet the selection criteria, the entrepreneurs had to have achieved exemplary business growth in recent years while having a clear approach to gender equality and impact measurement and management (IMM). As the goal of the case studies is to exemplify successful business models, the selected SGBs are, by design, not representative of all SGBs in the ecosystem.

2 Palinkas, L. et al. 2015. [Purposeful sampling for qualitative data collection and analysis in mixed method implementation research.](#) *Adm Policy Ment Health*.



INTRODUCTION

Climate change and environmental degradation pose a significant and urgent threat to economic growth, public health, and livelihoods around the world. Experts warn that failure to prioritize climate action will continue to put human welfare at significant risk over the next ten years and well beyond.³ Developing countries will bear the brunt of climate change economically, socially, and environmentally.⁴ According to research by Swiss Re, natural catastrophes led to US \$190 billion in economic losses in 2020 alone.⁵ If no mitigation and adaptation action is taken, world GDP could shrink by 18% over the next 30 years⁶ which would widen existing socio-economic disparities within and among nations.⁷

In Kenya, the threat is pressing. While Kenya is responsible for less than 0.1% of global greenhouse gas (GHG) emissions annually,⁸ its economy is highly vulnerable to climate change effects due to its reliance on sectors particularly sensitive to climate shocks, such as agriculture, tourism, and ecosystem services.⁹ The U.S. Agency for International Development (USAID) estimates that climate change will lead to losses of about 2.6% of Kenya's GDP annually by 2030 due to its harm to key sectors of the economy.¹⁰

While the country is a minimal contributor to GHG emissions currently, collectively, Africa's CO₂ output per capita is outpacing its population growth. By 2016, the continent's CO₂ emissions had grown to 14 times those of 1950,¹¹ compared to a relatively constant population growth rate in Africa averaging 2.45% from 2000 onward.¹² If by 2060 Africa produces the same emissions as India does today, then even 20% cuts in emissions by the most significant current CO₂ contributors (i.e., China, the United States, India, Russia, Japan, and Germany) would not offset the increases in CO₂ emissions from Africa. Kenya, the most industrialized country in East Africa, has already contributed the largest share of carbon emissions between 2000 and 2017 in the region.¹³

Large corporations are seen as the largest emitters of greenhouse gasses globally, yet it is estimated that over 80% of their emissions are derived from their value chains, where primarily small and medium-sized enterprises (SMEs) operate.¹⁴ These are scope 3 emissions, which refer to indirect emissions resulting across the supply chain. Scope 3 emissions are typically both more difficult to measure and address than scope 1 (direct emissions from company operations) and scope 2 (indirect emissions from energy bought by the company).¹⁵ Micro, small, and medium-sized enterprises (MSMEs) make up approximately 80% of employment in the country¹⁶ and are often integrated into

3 [The Global Risks Report 2021: 16th Edition Insight Report](#). 2021. World Economic Forum.

4 Safanov, G. 2019. [Social Consequences of Climate Change: Building Climate Friendly and Resilient Communities via Transition from Planned to Market Economies](#). Friedrich Ebert Stiftung.

5 Bevere, L. and Weigel, A. 2021. [sigma 1/2021 - Natural catastrophes in 2020](#). SwissRe Institute.

6 ["World economy set to lose up to 18% GDP from climate change if no action taken, reveals Swiss Re Institute's stress-test analysis."](#) SwissRe Institute News Release. 22 April 2021.

7 Islam, S. N. and Winkel, J. 2017. [Climate Change and Social Inequality](#). United Nations Department of Economic and Social Affairs.

8 [Climate Change Country Profile: Kenya](#). USAID. Accessed 9 December 2022.

9 Odhengo, P. et al. 2021. [The Landscape of Climate Finance in Kenya](#). Republic of Kenya: The National Treasury and Planning.

10 [Climate Risk Profile: Kenya](#). U.S. Agency for International Development. Accessed 20 November 2022.

11 Goldstone, J. "The Battle for Earth's Climate Will Be Fought in Africa." 24 March 2021. Wilson Center.

12 [Population growth rate in Africa 2000-2030](#). Statista. Accessed February 18, 2023.

13 Sun, Y. et al. 2022. [Emission accounting and drivers in East African countries](#). *Applied Energy*.

14 Bové, A. and Swartz, S. "Starting at the source: Sustainability in supply chains." 11 November 2016. McKinsey Sustainability.

15 S. Read. "What is the difference between Scope 1, 2 and 3 emissions, and what are companies doing to cut all three?" 20 September 2022. World Economic Forum.

16 ["Quarterly Labour Force Report 2021_Quarter_1."](#) 2021. Kenya National Bureau of Statistics.



corporate supply chains. Therefore, they will be critical to achieving Kenya's de-carbonization targets – not only by improving their own environmental practices but also by introducing new solutions to combat climate change and its effects (referred to in this report as “green entrepreneurship”).

Green entrepreneurs introduce new technologies and solutions for delivering goods and services in ways that both avoid negative environmental impacts and help communities adapt to and become more resilient in the face of a changing environment. Not only are Kenyan SMEs potential contributors to climate change solutions, but their future sustainability depends on it. SMEs are especially affected by climate shocks, with increased sensitivity to the resulting price fluctuations and supply shortages.¹⁷ It is imperative, therefore, that decision-makers support green entrepreneurs both for the climate and environmental protections they offer and to increase employment through the growth of sustainable industry.

Small and growing businesses (SGBs) are the primary focus of this report. They differ from the broader category of SMEs in that they have ambition for growth yet often lack access to the financial and knowledge resources required to scale. Green SGBs, defined in detail in the Methodology section, have business models that pursue both environmental and economic goals. While countries grapple with the trade-offs between traditional and more inclusive and sustainable industrial development (SDG 9), green SGBs can provide solutions that drive employment and environmental protection simultaneously within the broader context of sustainable industrialization.

This report establishes a baseline understanding of the state of green entrepreneurship in Kenya by assessing existing business models, the available financial and technical support for entrepreneurs, and key sectoral issues regarding the policy landscape and market opportunity. The purpose of the study is to inform decision-makers, such as policymakers, donors, investors, and business development service providers, of the primary trends, opportunities, and challenges in the green entrepreneurial ecosystem to help them with their planning and deployment of resources in the coming years.

Key questions explored in this report include:

- ✓ What are the characteristics of the existing green entrepreneurial ecosystem in Kenya?
- ✓ Which sectors are most active and provide the greatest opportunity for additional growth?
- ✓ How many entrepreneurship service providers are supporting green entrepreneurs in Kenya, what services do they provide, where are they based, and where are there gaps in support?
- ✓ What are the key opportunities, challenges, and recommendations for building the green entrepreneurial ecosystem in Kenya based on insights from experts and stakeholders?

The report is divided into two parts. Part 1 provides a high-level review of green entrepreneurial activity in Kenya, the support available to enterprises, and key challenges and opportunities. Part 2 provides deep dives by sector, reviewing common business models, relevant policies, and estimated market opportunity for green enterprises.

17 From *Climate Risk to Resilience Small Business in Value Chains*. 2022. International Trade Centre.



PART 1: THE STATE OF GREEN ENTREPRENEURSHIP IN KENYA

Overview of Climate Risks and Government Response in Kenya

Climate change and environmental degradation pose a significant threat to Kenya's economy. The country is already experiencing extreme weather events and varying temperatures resulting from climate change. Since 1960, temperatures in Kenya have risen by an average of 1.0°C and are projected to increase by an extra 1.0–2.8°C by the 2060s.¹⁸ Increased frequency and severity of weather events and rainfall variability will continue to exacerbate stresses on key economic sectors. The wide-ranging topography of Kenya means that climate change will impact different regions in different ways. For example, in the lowland and coastal regions, flooding caused by rising sea levels may affect up to 86,000 people each year by 2030, costing the economy up to US \$58 million annually and significantly damaging the transportation, building infrastructure, and energy sectors.¹⁹ Meanwhile, droughts currently affect an average of 6.5 million Kenyans annually,²⁰ putting many of the almost two-thirds of Kenyans who work in agriculture at significant risk, and are expected to increase in severity and length. Kenya's arid and semi-arid lands (ASALs) in the north and east are especially vulnerable to food security and water availability issues.

Droughts, flooding, and landslides will continue to significantly affect some energy sources and infrastructure. Hydropower, which accounts for about one third of domestic electricity production²¹ and is reliant on dependable water flow, is especially threatened, as was demonstrated in 2018 when Kenya's Masinga Dam was at risk of shutting down due to drought.²² In addition to the physical climate risks, Kenya is also facing the transition risks associated with moving to a net-zero economy. Changes in market dynamics, climate-related policies, and technology all contribute to financial asset climate risks in Kenya.

Human health also bears an immediate toll from climate change. The millions of Kenyans with limited access to safe water sources (37% of the rural and 9% of the urban population²³) are especially at risk for waterborne diseases such as cholera. Droughts have contributed to hunger and deaths in already vulnerable local communities due to crop failure and loss of livestock.²⁴ This is exacerbated by an increase in pest infestations, such as the 2020 local infestation which affected food security for millions. These are just some examples of the many challenges faced by the Kenyan people and the small businesses that operate in this changing context. Further sector specific challenges are described in detail in Part 2 of this report.

18 [Kenya: Climate Vulnerability Profile](#). 2012. U.S. Agency for International Development.

19 [Climate Fact Sheet: Kenya](#). 2021. Climate Centre.

20 Ibid.

21 [Energy Profile: Kenya](#). 2022. International Renewable Energy Agency.

22 Kamau, M. 2018. "KenGen set to shutdown Masinga Dam." Standard Media Group Kenya.

23 [The World Factbook: Kenya](#). CIA.gov. Accessed 26 September 2022.

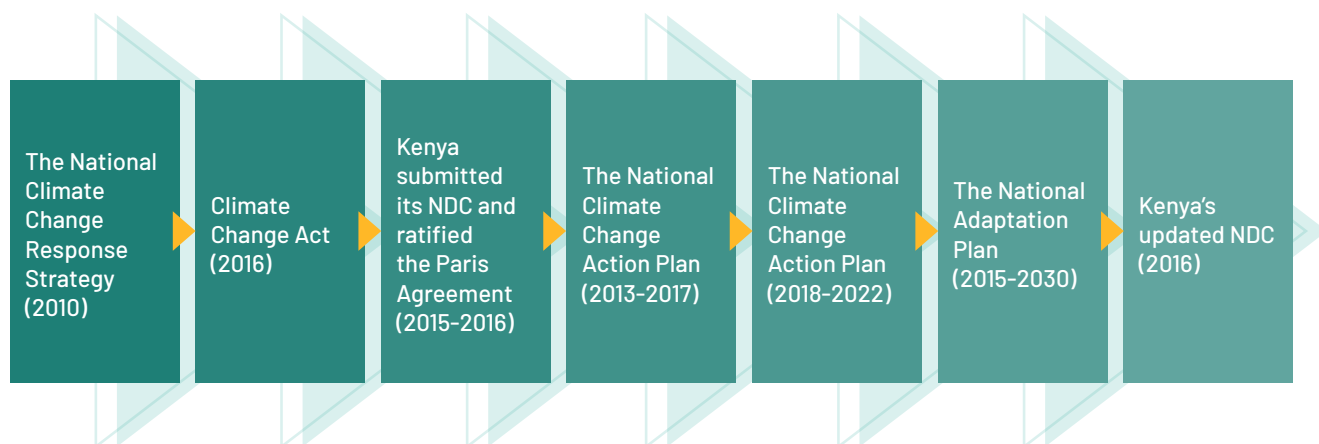
24 "Children face devastating drought in the Horn of Africa." UNICEF. Accessed 15 January 2023.



While experts have warned of climate risks for decades, there has been an accelerated response and mainstreaming of climate and environmental protection worldwide in the past fifteen years. The term *green economy* became mainstream in 2008 as economies considered how to respond to various global economic challenges in ways that prioritized sustainability.²⁵ The same year, the United Nations Environment Programme (UNEP) launched its Green Economy Initiative, which urged governments to direct investment into green sectors and to improve sustainability in sectors traditionally harmful to the environment.

Kenya responded to that call through its National Climate Change Response Strategy (2010), a National Climate Change Action Plan (2013), and by adopting the Paris Agreement in 2015 through its Nationally Determined Contribution (NDC) toward emissions reduction. In 2020, Kenya increased its NDC from a 30% to a 32% reduction by 2030 compared to its 'business-as-usual' GHG emissions of 143 metric tons of CO2 equivalent (MtCo2e).²⁶ Short, medium, and long-term actions to improve the country's ability to adapt to the changing climate were outlined in the National Adaptation Plan (2015). Most recently, Kenya updated its National Climate Change Action Plan (NCCAP) to specify the country's climate commitments from 2018 to 2022, highlighting seven high priority areas for climate adaptation: disaster risk management; food and nutrition security; water and blue economy; forestry, wildlife, and tourism; health, sanitation, and human settlements; manufacturing; energy and transport.²⁷

Figure 1: Timeline of key policies addressing climate change



Source: Odhengo, P. et al. 2021. *The Landscape of Climate Finance in Kenya*. Republic of Kenya: The National Treasury and Planning.

Based on these foundational guiding strategies, the government has moved toward actionable policies and initiatives to enable the necessary changes. The Climate Change Act (2016) laid out a legal framework for national and county governments to mainstream climate action, and the Green Economy Strategy and Implementation Plan 2016–2030 (published in 2016) outlined a macro policy framework that aims to align various governmental bodies and policies to improve the enabling environment for the country's transition to a green economy, taking into consideration socio-economic aspects such as decent work.²⁸

25 [Green Economy](#). United Nations Sustainable Development Goals Knowledge Platform. Accessed 9 December 2022.

26 [Kenya's Updated Nationally Determined Contribution \(NDC\) 2020-2030](#). Food and Agriculture Organization of the United Nations FAOLEX Database. Accessed 9 December 2022.

27 [National Climate Change Action Plan \(Kenya\) 2018-2022](#). 2018. Government of Kenya.

28 [Green Economy Strategy and Implementation Plan 2016 - 2030](#). 2016. Government of Kenya.



Notably, local climate change funds were established in five counties through the Climate Change Fund: Makueni (2015), Wajir (2016), Isiolo, Kitui, and Garissa (2018). As of 2020, the funds had disbursed over KES 260 million to at least one hundred local projects, focused primarily on adaptation and resilience efforts.²⁹ The National Policy on Climate Finance (2018) has also sought to improve the ability of the public and private sectors to access international and national climate finance resources.³⁰

By setting strategies and consolidating goals across initiatives, the government continues to streamline and improve its mitigation, adaptation, and resilience efforts. However, the role of the private sector and how climate finance will be distributed to support those efforts is less clear. For example, a 2022 academic review of climate finance readiness in Kenya pointed out that the Kenya National Adaptation Plan acknowledges that the private sector has a role to play, yet does not detail specific ways in which its resources can be leveraged to achieve national goals.³¹ The same study goes further by stating that, “While the private sector is acknowledged as a key player in enhancing climate investments, evidence of active support to the sector through policy guidelines or the establishment of institutional structures could not be found.” However, in a more recent development, in late 2022 Kenya released a draft National Green Fiscal Incentives Policy Framework, which sets out fiscal and economic mechanisms such as tax policies, regulatory instruments, subsidies, and expenditure programs to enhance the pathway for low-carbon, climate-resilient green development in the country and mobilize climate finance.³² In addition, certain policies and regulations have already been established at a sector level to ease burdens that have restricted private sector activity. These are discussed in Part 2 of this report.

In addition to need for more clarity around private sector engagement, most financing for climate action is directed to mitigation efforts, leaving significant gaps around adaptation. As noted in a 2021 study on climate finance in Kenya, “the majority of supportive policies and subsidies have targeted the energy sector, which has translated to the greatest volume of private investment in this sector.”³³ The study found that over 99.5% of the KES 65 billion in investment from foreign private sector actors in 2018 was directed to renewable energy projects and that philanthropic foundations are the primary source of private capital being channeled to other climate sectors focused on adaptation, health, and water access.

29 Crick, F. et al. 2020. [Early Outcomes of Climate Finance in Kenya: Case Study of Seven Investments Funded by the Country Climate Change Fund Mechanism](#). Building Resilience and Adaptation to Climate Extremes and Disasters (BRACED).

30 [National Policy on Climate Finance](#). Food and Agriculture Organization of the United Nations FAOLEX Database. Accessed 31 January 2023.

31 Kiremu, M. et al. 2022. [Climate finance readiness: A review of institutional frameworks and policies in Kenya](#). *Sustainable Environment*.

32 [Draft National Green Fiscal Incentives Policy Framework](#). 2022. The Republic of Kenya National Treasury and Economic Planning.

33 Odhengo, P. et al. 2021. [The Landscape of Climate Finance in Kenya](#). Climate Policy Initiative.



Overview of Green Entrepreneurial Activity in Kenya

Enterprises can take climate action by introducing new solutions, developing technical innovations, creating and meeting consumer demand for sustainability, and changing habits and cultures.³⁴ Green entrepreneurs tackle climate change from multiple angles by mitigating its effects (e.g., carbon sequestration technologies), helping communities adapt to its impacts (e.g., drought-resistant crop seeds), and creating more resilient industries (e.g., reducing reliance on price-volatile fossil fuels and shifting toward renewable energy). Green enterprises also contribute toward biodiversity and environmental conservation by participating in forest and landscape restoration activities, restoring depleted ecosystems, conserving water, preserving soil, and more.³⁵ Importantly, green enterprises can not only reduce negative environmental and health impacts through their products and services but also create sustainable employment and livelihood opportunities, particularly for marginalized groups, women, and youth.³⁶

Green entrepreneurial activity in Kenya can be categorized into five sector groups: low-carbon energy, land and ocean management, transportation, water and waste management, and the built environment. Within each group, there are distinct sectors (listed in Table 1), which contain numerous business models and address different portions of the market. These sectors and associated business models are discussed in depth in Part 2.

Table 1: Green sector groups and sectors*

LOW-CARBON ENERGY	LAND AND OCEAN MANAGEMENT	TRANSPORTATION	WATER AND WASTE MANAGEMENT	BUILT ENVIRONMENT
Energy Efficiency and Storage	Sustainable Agriculture and Aquaculture (e.g., crop diversification, micro-irrigation)	Sustainable Transportation (e.g., electric vehicles, charging infrastructure)	Water Management (e.g., collection, treatment, supply)	Green Buildings (e.g., retrofitting, new builds)
Renewable Energy (e.g., grid-tied renewables, off-grid renewables)	Sustainable Forestry (e.g., reforestation, carbon-sequestration, afforestation)		Waste Management and Circular Economy (e.g., solid waste, sewerage, post-use processes)	Disaster Management (e.g., developing monitoring and response systems)
Cleaner Fuels (e.g., biofuels, green hydrogen)	Eco-tourism (e.g., eco-lodging, eco-tours, agro-tourism)			

***Note:** Capital-intensive industries like rail, aviation, and pipeline transport are not listed as they are dominated by large corporations, and small business entrepreneurial opportunity in such industries is limited. Other business segments, like biogas-powered vehicles, are also excluded from the scope since there are limited SGB activities in those segments in Kenya.

34 Rafi, T. 2021. "How Entrepreneurs Could Shape The Climate Change Battle" Forbes.

35 Ibid.

36 *Greening Economies, Enterprises, and Jobs: The role of employers' organizations in the promotion of environmentally sustainable economies and enterprises*. 2016. International Training Centre of the International Labour Organization.



To identify trends in green entrepreneurial activity in Kenya, a sample of 100 green enterprises in the SGB range were identified through publicly available sources such as Crunchbase and portfolios of investors and accelerator programs (see the Methodology section for more information on the sampling technique). Within this sample (referred to as “entrepreneur data” throughout the report), the most common sector is sustainable agriculture and aquaculture (Figure 2). This is not surprising, given agriculture’s role as the backbone of Kenya’s economy, having contributed up to 22% of the country’s GDP in 2021.³⁷ A range of business models aim to increase yields while reducing waste and negative environmental externalities. Examples include producers of agricultural inputs like [BIOSORRA](#), which provides affordable sustainable fertilizers, as well as service providers such as [Grey Edge Monitoring](#), which uses soil sensors and drone technology to consult farmers on ways to improve yields and reduce crop waste.

Renewable energy and cleaner fuels are also common sectors for growth-oriented entrepreneurial activity in Kenya. For entrepreneurs in the renewable energy sector, off-grid electricity solutions for last-mile customers are the most promising (e.g., [Usafi Green Energy Ltd.](#)), while SGBs are also active in the renewable energy mini-grid sector (e.g., [Kijiji Power Ltd](#)). On the other hand, grid-tied renewable energy projects are mainly undertaken by the government and large-scale players. The cleaner fuels sector commonly includes enterprises developing and distributing biodiesel, bioethanol, and biogas.

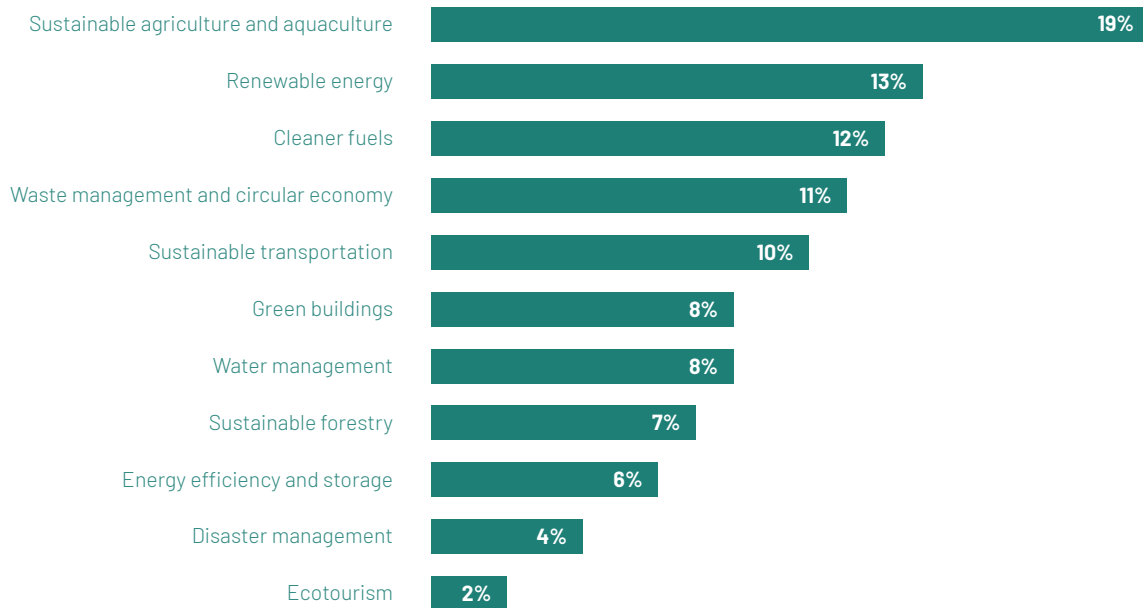
Waste management is also a growing sector in Kenya’s green entrepreneurial ecosystem. While many of the entrepreneurs therein tend to be informal micro and small enterprises that do not fit the SGB category, such as those operating in waste picking and sorting, there are a growing number of SGBs, such as [Vintz Plastics](#), that have ventured into plastics recycling and manufacturing with the goal of growing the circular economy.

Disaster management and ecotourism have the least entrepreneurial activity for different reasons. Entrepreneurial activities in the disaster management sector are scarce by the sector’s nature. Pre- and post-disaster activities, such as disaster prevention, preparedness, and response, require central government control for the efficient use of information and swift action. Thus, entrepreneurial activities in this sector are generally limited to providing technology and consulting services. In contrast, ecotourism is not a sector that needs to have central government control. However, the lack of clear government targets, policies, or incentives makes the sector less appealing to potential investors than other sectors.

37 Kenya National Bureau of Statistics. [Economic Survey 2022](#). Accessed 11 February 2023.



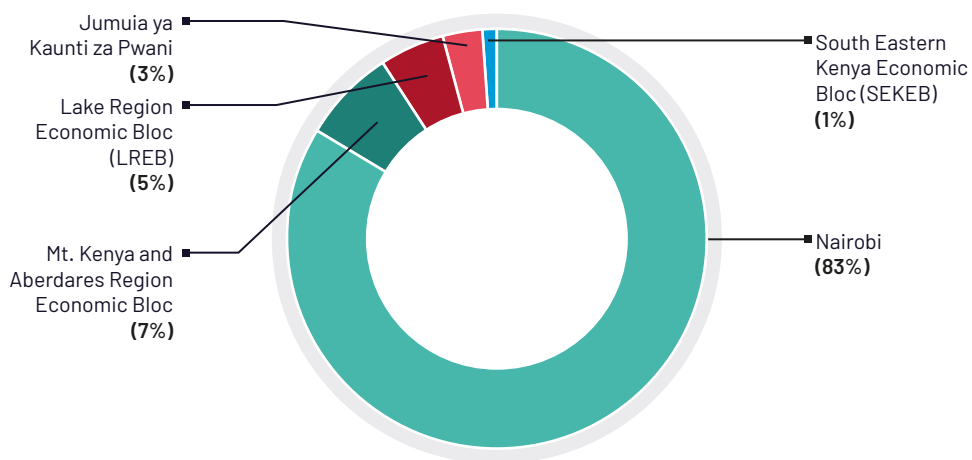
Figure 2: Sample green SGBs by sector



Source: Entrepreneur data (N=100)

Over 80% of the green SGBs identified for this study are headquartered in Nairobi. Given Nairobi’s status as an economic hub not just in Kenya but across Africa, it is logical that most growth-oriented enterprises would be based in an area with sufficient business services and adequate connections to investors, partners, and advisors. However, it is important to note that this reflects prominent green SGBs and not all green business activity in Kenya (for instance, the Kenya Agribusiness and Agroindustry Alliance (KAAA) reports close to a thousand SMEs across the country participating in their Green Growth program). Rather, this shows that green SGBs with the most traction and acknowledgment among stakeholders are typically located in the capital.

Figure 3: Sample green SGBs by headquarters

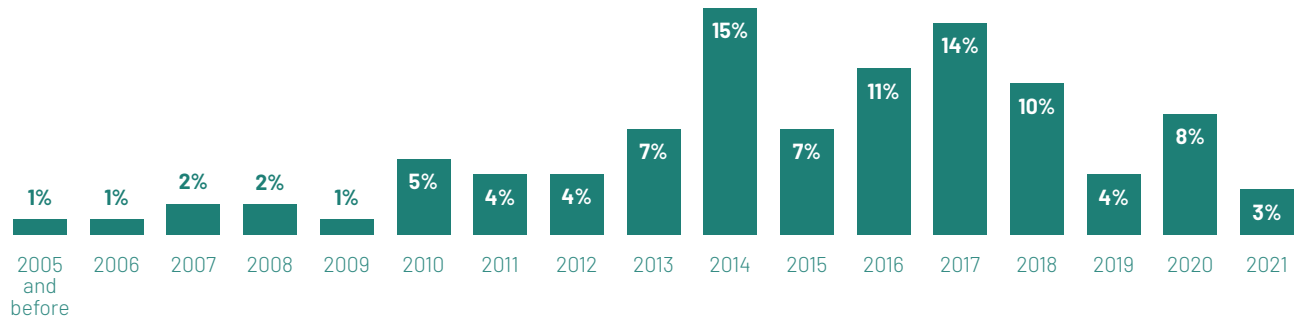


Source: Entrepreneur data (N=94). Six of the businesses are headquartered outside Kenya, most commonly in the United States.



Most green SGBs identified for the study were founded in the past decade, with only about a quarter having been started before 2014 (Figure 4).

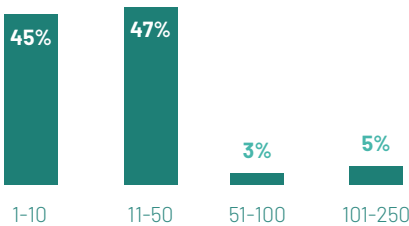
Figure 4: Founding year of sample green SGBs



Source: Entrepreneur data (N=100)

Though the definition of an SGB covers companies ranging from 5 to 250 employees, most companies in this sample are at the smaller end, with nearly all employing less than 50 staff (Figure 5).

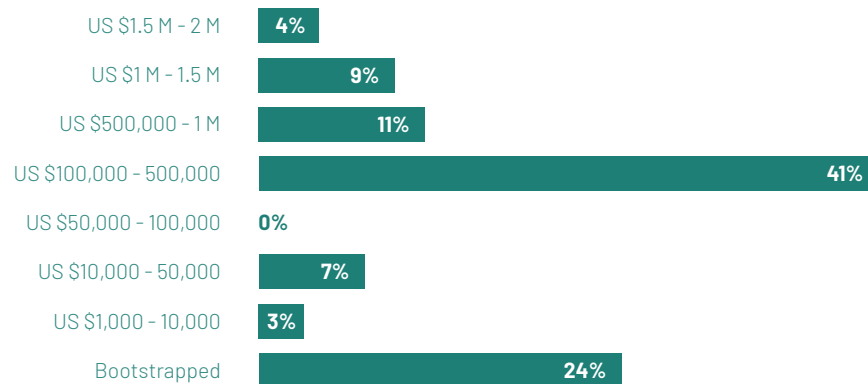
Figure 5: Number of employees in sample green SGBs



Source: Entrepreneur data (N=100)

Funding information was identified for roughly two-thirds of the sample. Of these, roughly 25% were bootstrapped, without any outside funding sources. Among those with funding information publicly available (approximately 30), most commonly it totals in the US \$100,000 – \$500,000 range pulled from multiple rounds of funding combining grants, loans, and/or equity.

Figure 6: Funding raised by sample green SGBs



Source: Entrepreneur data (N=69)



GREEN ENTREPRENEURSHIP AND GENDER EQUALITY

Women in developing economies are disproportionately affected by climate change and environmental degradation, as they are largely dependent on natural resources for their livelihoods and are subject to social and economic inequalities such as limited access to finance and land ownership rights.³⁸ However, women are not only threatened by climate change but are also change agents in supporting climate action. Women are active in climate entrepreneurship in Africa, as indicated by the more than 500 submissions to ANDE’s Accelerating Women Climate Entrepreneurs fund from intermediaries seeking to increase capital flow to women-led climate SGBs.³⁹ As shown in the figure below, gender equality is essential to achieving several other SDGs, including those directly tied to climate and environmental action.

GENDER EQUALITY AND OVERLAP WITH OTHER SDGS

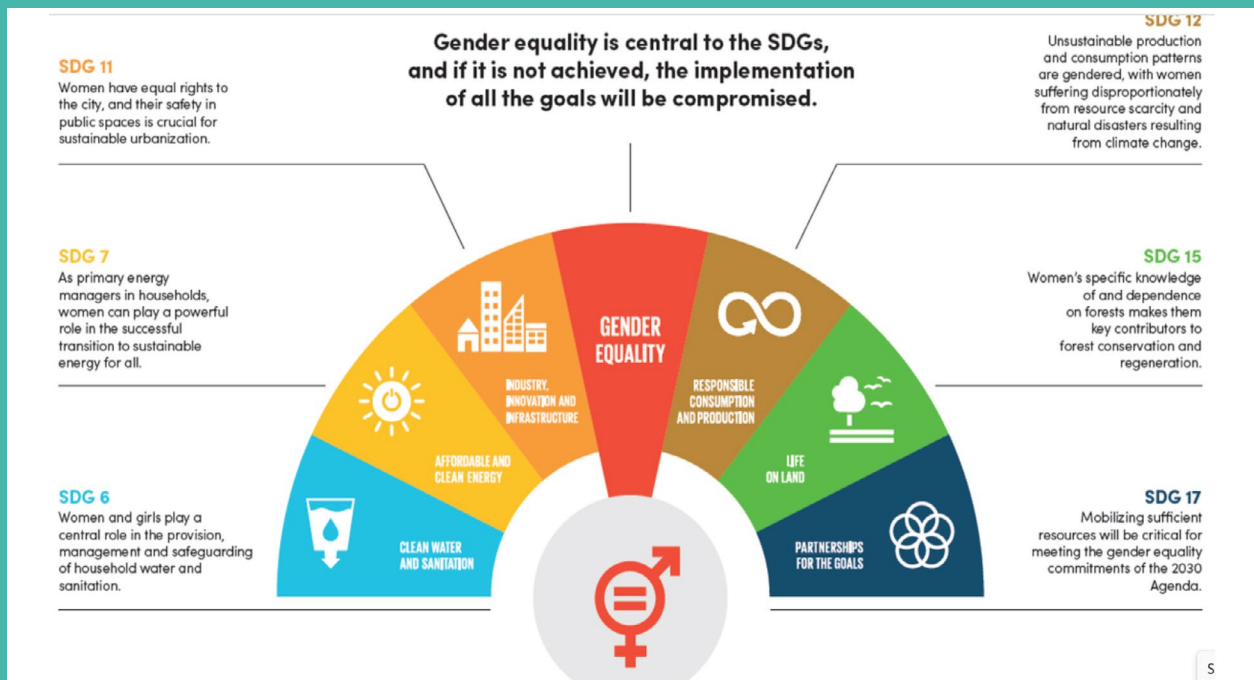


Image Source: UN Women/GenUrb

However, SGBs led by women face several barriers to scale. Within the sample of green SGBs identified for this study, which captures businesses with a well-established web presence and traction in the ecosystem, only 21% have a woman founder or co-founder. This, at least in part, reflects gender imbalances present worldwide regarding access to finance. Women entrepreneurs attract a minority of global investments, having received only 2.3% of global VC funding in 2020.⁴⁰ The concept of “gender lens investing” has been gaining momentum in terms of awareness and capital allocated across private and public finance providers. Project Sage identified 2016 global funds that apply a gender lens and found that 30% are focused on Sub-Saharan Africa.⁴¹

38 Vizaki, M. et al. 2021. 2X Climate Taskforce. *Ways to Gender-Smart Climate Finance: Financial Services.*

39 Kyalo, D. and Eastham, S. 2022. *Strengthening Gender and Climate-Lens Investing in Sub-Saharan Africa.* Aspen Network of Development Entrepreneurs.)

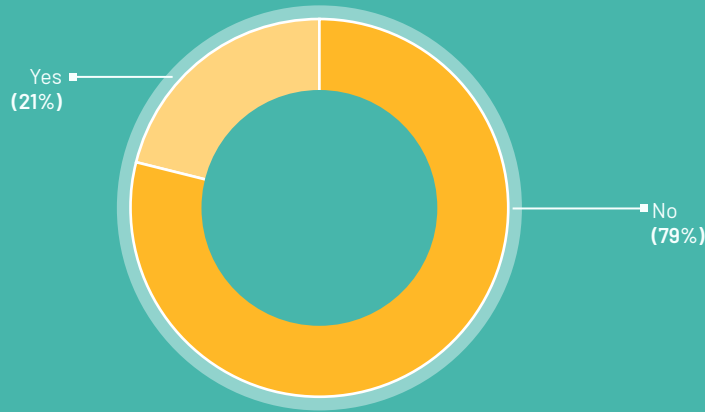
40 Global Entrepreneurship Monitor. “Global Entrepreneurship Monitor Releases Ranking of Countries for Conditions to Start a Business.”

41 Biegel, S. et al. 2021. *Tracking Venture Capital, Private Equity, and Private Debt with a Gender Lens.* Project Sage 4.0.



However, these efforts have a long way to go in closing the gender finance gap, currently estimated at US \$285 billion worldwide.⁴²

PERCENT OF SGBS WITH A WOMEN FOUNDER OR CO-FOUNDER



Source: Entrepreneur data (N=62)

In Kenya, nearly 50% of support organization surveyed as part of ANDE’s Ecosystem Snapshot process indicated that they target their green entrepreneurship support to women-led SGBs. Examples include Kenya Climate Ventures (KCV), with a portfolio of supported businesses of which 43% are women-owned.⁴³ Gender is an important part of the criteria for investments for Goodwell Investments as well, an investor based in the Netherlands that works across Africa, looks at gender in four ways: whether a venture is woman-led/ owned business, how many women are in leadership in managerial seats, whether the staff is gender diverse, and whether it committed to have women in leadership.⁴⁴

Few SGBs in Kenya have put in the effort to ensure their business activities and employment structures are gender inclusive. Examples of some SGBs with this focus include **Dashcrop Ltd**, a woman-owned SGB that supports women producers of climate-resilient crops (sorghum, finger millet, amaranth, and cassava) by providing them with quality seeds, agronomic support services, and input financing to ensure they deliver quality products to the designated collection centers promptly after harvest and receive immediate payment for their produce. **Kilifi Moringa** supports hundreds of smallholder women farmers to grow Moringa and sell the seeds back to them for production of oil for the cosmetics industry.

The Kenyan government has made strong commitments towards women’s economic empowerment and gender equality through policies, legal frameworks, and direct interventions. However, policies and frameworks incentivizing gender lens investing in the country remain limited. For example, the Access to Government Procurement Opportunities Program (AGPO) that targets women, youth, and people with disabilities in the formal sector only gives access to government procurement opportunities but does not provide all encompassing support that SGBs need such as access to finance, business development support, marketing, training and mentorship.⁴⁵

42 IFC. 2017. Investing in Women: New Evidence for the Business Case.
 43 Lemma, C. 17 May 2022. “The Gender Lens Within Kenya Climate Ventures Investment Process.” Kenya Climate Ventures.
 44 Primary research insight.
 45 Intelicap and Plan International. 2022. Disruptive Gender Lens Investing in Kenya.

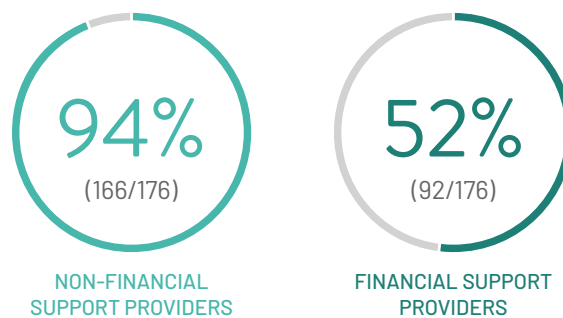


Support Available to Green Entrepreneurs

Using its Entrepreneurial Ecosystem Snapshot methodology, ANDE identified 176 organizations that offer programs, initiatives, research, or investment targeted to green entrepreneurship in Kenya (referred to as “intermediary data” throughout the report).⁴⁶ Unlike the entrepreneur data explored in the previous section which is meant to represent a sample of prominent SGB activity in the country, the intermediary data captures all – or nearly all – organizations supporting green entrepreneurship in Kenya.

Nearly all provide some sort of non-financial support to either entrepreneurs or other intermediaries, and roughly 50% offer some financial assistance (Figure 7). Most entrepreneur support organizations that provide financial support also provide non-financial support.

Figure 7: Percent of organizations that offer financial support vs. non-financial support



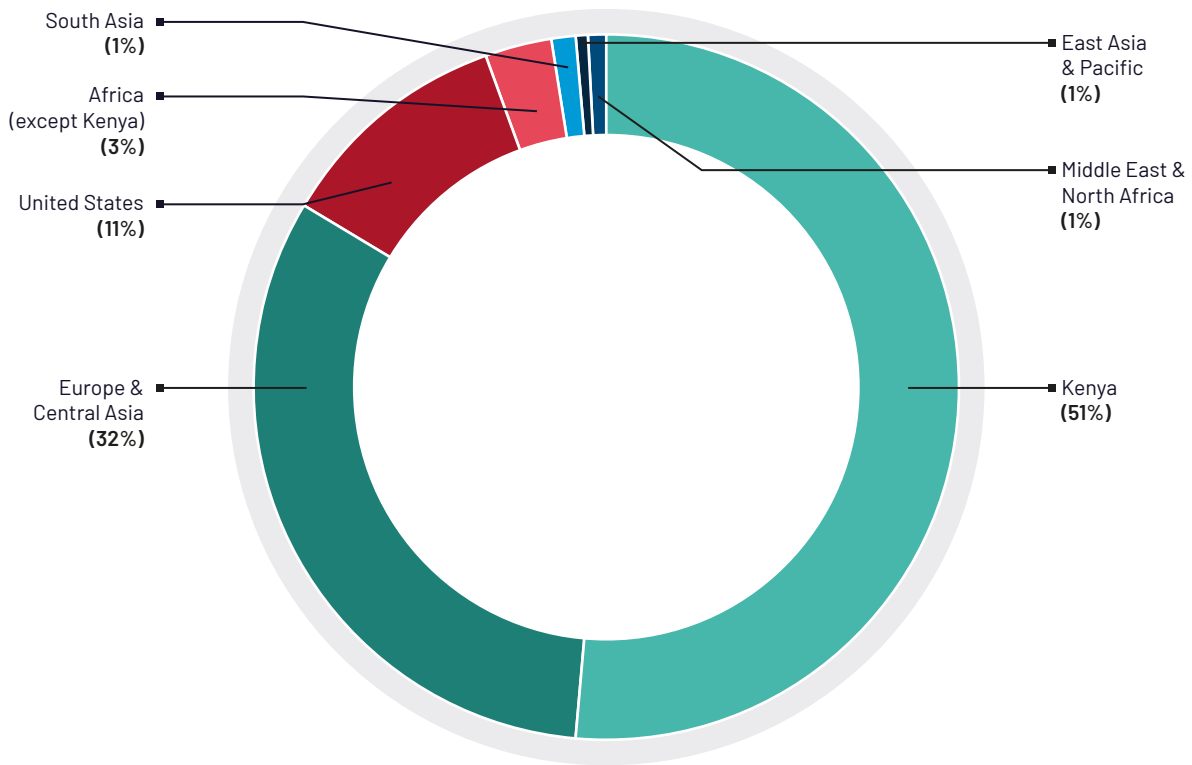
Source: Intermediary data (N=176)

The entrepreneurial ecosystem in Kenya is heavily influenced by international players, with about half of the organizations being headquartered outside of Kenya, most commonly in Europe or the United States (Figure 8). Over 90% of Kenyan-based organizations are headquartered in Nairobi. Most are fairly young as well, with about two-thirds of the organizations having started focusing on the green economy in the last ten years.

⁴⁶ Kyalo, D. et al. 2023. *Entrepreneurial Ecosystem Snapshot: Green Entrepreneurship in Kenya*. Aspen Network of Development Entrepreneurs.



Figure 8: Headquarters of organizations supporting green entrepreneurship in Kenya



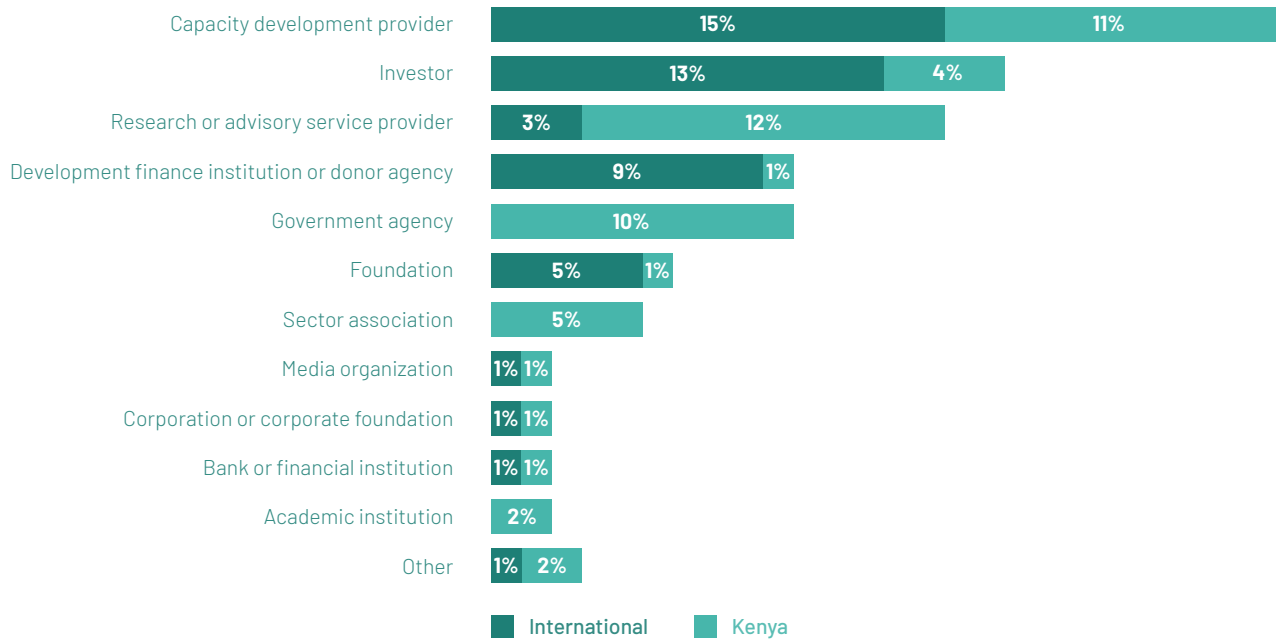
Source: Intermediary data (N=165)

Roughly 50% of support organizations work exclusively in green entrepreneurship. For example, [Kenya Climate Ventures](#) is an impact investment fund that provides financial, technical, and business growth support to innovative early and growth-stage enterprises working in agribusiness, commercial forestry, renewable energy, water management, and waste management. [Kenya Climate Innovation Center](#) is another example, offering incubation, capacity building, and financing options to new small and medium-sized business ventures who are developing innovations to address the challenges of climate change. Others have historically provided more generalist support and have more recently added targeted programming for green entrepreneurs. An example is [Pangea Trust](#), an accelerator and investment readiness provider which has supported social and environmental ventures broadly since 2019 but more recently has created programming dedicated to the blue economy.

Capacity development providers and investors are the most common types of organizations supporting green entrepreneurs in Kenya. Notably, the majority of organizations offering direct technical and financial support (capacity development providers, investors, donor agencies, and foundations) are headquartered internationally (Figure 9).



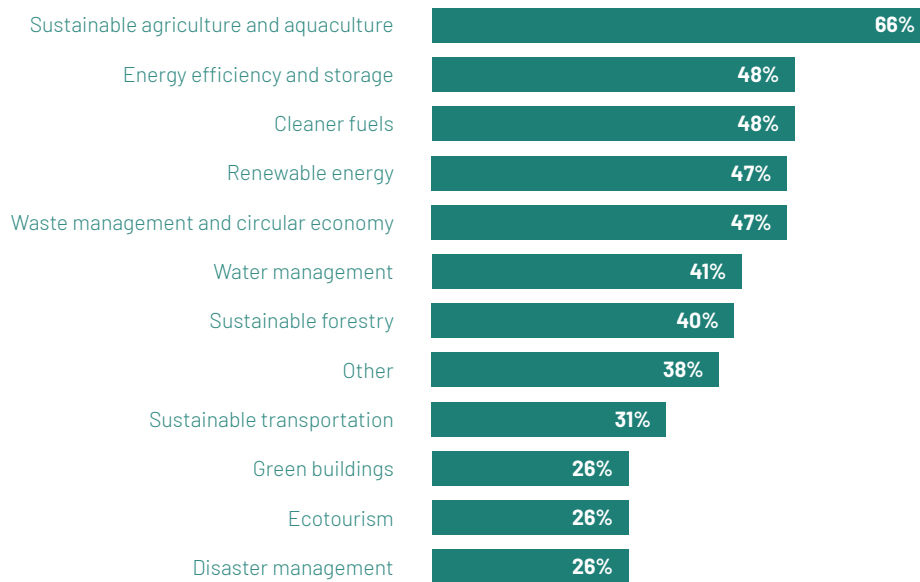
Figure 9: Organization type by headquarters location



Source: Intermediary data (N=165)

Most organizations support entrepreneurs in two or more green sectors. Similar to the rates of entrepreneurship by sector displayed in Figure 2, intermediaries’ support for sustainable agriculture and aquaculture is most common, while ecotourism and disaster management are least common.

Figure 10: Percent of support organizations by target green sector

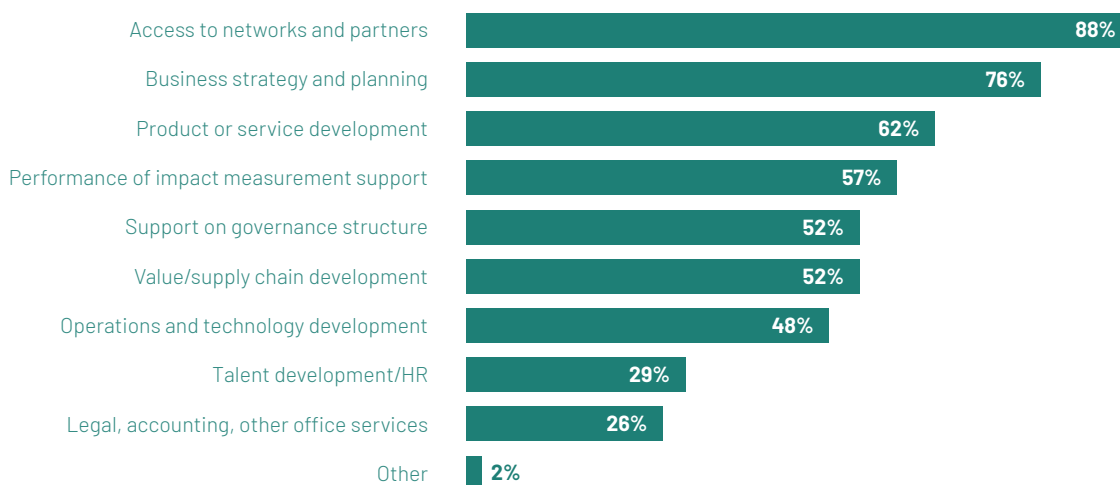


Source: Intermediary data (N=176; respondents could select more than one)



Non-financial support is most commonly delivered in the form of market research on the sector (65%), direct support like providing technical assistance (62%), and event hosting (50%). Direct support providers such as accelerators and incubators focus most commonly on access to networks and business strategy and planning (Figure 11). Very few offer support regarding talent development, despite entrepreneurs reporting challenges finding qualified employees to fill high-skill positions. For example, an SGB which distributes briquettes and clean cookstoves shared that it takes them two months to train employees, so employee turnover is a major setback. Similarly, a drone technology company shared that the lack of expertise in drone technology makes the skillset expensive and most commonly available among foreigners.

Figure 11: Types of capacity development support available to green SGBs



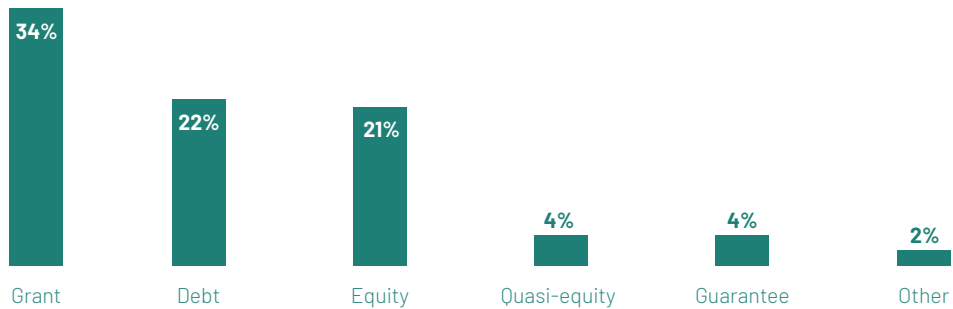
Source: Intermediary data (N = 42; respondents could select more than one)

Under 13% of organizations offer market linkage services, such as access to new markets/customers and support to meet market standards. A similarly small proportion of non-financial service providers focus on access to investors, such as pitch readiness, access to financing information, technical support, and legal due diligence. This lack of support is notable, as interviewed investors cited a lack of financial sophistication and accurate valuation among potential investees. Similarly, interviewed entrepreneurs noted significant challenges in securing the financing they need.

Just over half (52%) of organizations provide some sort of financial support (not all are categorized organizationally as investors, as some are primarily capacity development providers or foundations that provide non-return-seeking funding). The most common type of funding available to entrepreneurs is grant funding, with under 10% of financial service providers offering quasi-equity or guarantees. While grants play a very important role for idea-stage companies, and indeed most of the successful entrepreneurs interviewed for this study relied on grant funding in the early stages, there is not always a smooth transition from grant financing to larger investment ticket sizes for investment and debt.



Figure 12: Instruments offered by financial support providers



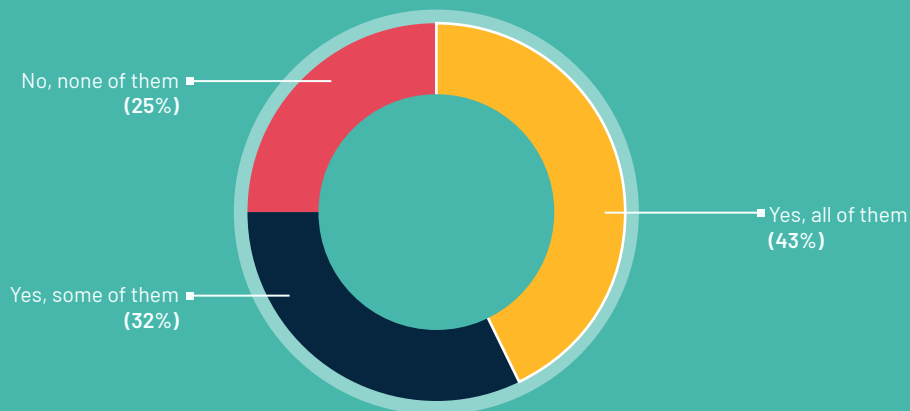
Source: Intermediary data (N=176; respondents could select more than one)

A CLOSER LOOK AT IMPACT MEASUREMENT

Measuring results and assessing outcomes directly or indirectly (through proxy indicators) helps enterprises to understand and communicate the social and environmental value they create through their product or service. The ability to demonstrate and measure impact not only improves internal decision-making but also makes companies more attractive to potential investors.⁴⁷ However, enterprises across the board struggle to measure their impact. Those working on climate and environmental goals face a particular challenge due to the very technical nature of measurement in those fields. That is especially the case for those working in climate change adaptation and resilience, for which there are significantly fewer available measurement tools in comparison to mitigation.⁴⁸

When asked how many of their supported entrepreneurs measure their climate and/or environmental impact, surveyed support organizations (such as accelerators, investors, and technical assistance providers) reported that in most cases either some or all of their entrepreneurs do have some sort of impact measurement practice in place.

PROPORTION OF SUPPORTED ENTERPRISES THAT MEASURE CLIMATE/ENVIRONMENTAL IMPACT



Source: Intermediary data (N=47)

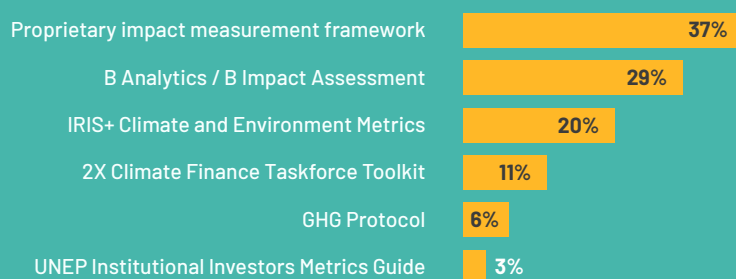
47 Musyoka, S. "Why Is Measuring Impact in SMEs Important?" 18 July 2019. Kenya Climate Innovation Center.

48 Joshi, J. et al. 2022. *Measuring the Impact of Climate Small and Growing Businesses*. Aspen Network of Development Entrepreneurs.



The entrepreneurs who measure their results and try to assess their impact most commonly use a proprietary framework created to fit their specific business model. Some interviewed entrepreneurs shared that they leverage research by prominent entities. For instance, **Acacia Innovations** – an enterprise that produces briquettes and affordable cooking stoves – relies on United Nation Environmental Programme (UNEP) research, which estimates that every ton of briquettes used saves approximately 23 trees. Others conduct their own research to understand how their products contribute to climate goals. For instance, **Safi Organics** – an enterprise that produces organic fertilizers – conducted research that enabled them to calculate that for every ton of organic fertilizer used, about 1.7 tons of carbon is sequestered. Other commonly used frameworks include B Analytics and IRIS+. When asked how they measure their own organization’s impact, support organizations reported a similar breakdown, preferring proprietary tools over other established frameworks.

IMPACT MEASUREMENT FRAMEWORKS USED BY ENTERPRISES



Source: Intermediary data (N=36). Support organizations were asked which frameworks were most commonly used by supported enterprises.

When support organizations were asked about the challenges entrepreneurs face regarding impact measurement, the most common responses were a lack of knowledge and organizational capacity. Research conducted by Kiva also found that one in five social enterprises lack qualified staff to undertake impact measurement.⁴⁹ While relatively few support organizations noted that cost is a major barrier, this may differ for SGBs not actively receiving capacity development support. Among interviewed entrepreneurs, finances were mentioned more frequently. To address financial and personnel constraints, funders and investors can subsidize impact measurement efforts. For example, impact investors that require impact reporting can help cover costs for new technology, staff training, and database setup.

IMPACT MEASUREMENT CHALLENGES FACED BY ENTERPRISES



Source: Intermediary data (N=36; respondents could select up to three). Support organizations were asked what challenges their supported entrepreneurs face when measuring impact.

49 MacColl, S. “Why social enterprises struggle to measure impact – and what impact investors can do about it.” 8 August 2022. NextBillion.



Top Sectors by Market Opportunity and Level of Support

Table 3 compiles the information shared in Parts 1 and 2 of this report to compare the market opportunity and levels of funding, policy, and accelerator/incubator support for each green sector in Kenya. This information is specific to ventures operating within the SGB segment, meaning they are typically formalized, already have at least five employees, and are seeking growth capital.

The methodology and data sources used and their respective limitations are as follows:

- **Market opportunity:** The market opportunity estimates are based on either an identified government set target or relevant SDG indicator to be achieved by 2030. The market opportunity covers the gap between 2022 (i.e., baseline) and 2030 (i.e., endline) and provides a cumulative figure for the period assuming a constant growth rate to reach 2030 targets. The advantage of this approach is that it allows for comparable figures across different sectors by applying a similar methodology without overly complicating the process. This exercise did not account for all possible factors that affect market potential (e.g., the different infrastructure required for each sector and incentives that affect consumer behavior) and instead uses government-identified targets as proxies for possible growth. Importantly, these estimates do not necessarily reflect all private sector activity in a given sector but rather only the business segments in which SGBs are active. For instance, Kenya has a large geothermal industry, but it was not considered when estimating the market opportunity in this report since SGBs do not actively engage in that sector. Details on how the market opportunity was calculated for each sector are provided in Appendix B.
- **Funding support:** The level of funding support was evaluated based on the availability of funding for each key area of business activity identified within each sector (as described in Part 2 of the report). Within each sector, the authors searched for four types of key financiers: development finance institutions (DFIs), foundations, commercial banks, and private investors such as venture capitalists or impact investors. While not exhaustive, the funding support captures prominent financiers in the Kenyan green ecosystem for each category regardless of their funding or deal size. The high/medium/low classification was based on whether each type of financier provides funding to all (high), one or more (medium), or none of the identified key areas of a sector for each type of funder, and the overall classification depended on the average of the four funder types' support.
- **Policy support:** Policy support was assessed based on the extent to which the government's strategies and policies aimed to promote the private sector, entrepreneurial, and SGB activities. The research team documented a fairly comprehensive list of policies and strategies relevant to the sector and then removed some from the list that have no bearing on business. It should be noted that this evaluation focused on formulated policies and strategies rather than the degree to which they are effectively implemented. However, Part 2 indicates some gaps in the policies and strategies, such as whether they lack specific targets or plans to achieve their stated goals.
- **Accelerator/incubator support:** The level of accelerator/incubator support was based on the number of identified accelerators and incubators targeting each green sector in Kenya. This information was pulled from the intermediary data collected for this report through ANDE's Entrepreneurial Ecosystem Snapshot methodology. This dataset is comprehensive of all actors currently supporting green SGBs in Kenya and should be seen as representative.

The market opportunity and levels of support were categorized as high, medium, or low for each sector *relative* to the other sectors.


Table 2: Definitions of categories used in the analysis

MARKET OPPORTUNITY	FUNDING SUPPORT	POLICY SUPPORT	ACCELERATOR/ INCUBATOR SUPPORT
SMALL (< US \$1 billion)	LOW (Financiers provide support to none of the key areas of business activity)	LOW (Policy/strategies promote entrepreneurial activity in none of the key areas of business activity)	LOW (< 10 accelerators/incubators work in sector)
MEDIUM (US \$1 – 15 billion)	MEDIUM (Financiers provide support to some key areas of business activity)	MEDIUM (Policy/strategies promote entrepreneurial activity in some key areas of business activity)	MEDIUM (11–19 accelerators/ incubators work in sector)
LARGE (> US \$15 billion)	HIGH (Financiers provide support to all key areas of business activity)	HIGH (Policy/strategies promote entrepreneurial activity in all key areas of business activity)	HIGH (20+ accelerators/incubators work in sector)

Table 3: Overview of market opportunity size and support levels by sector

SECTOR GROUP	SECTOR	MARKET OPPORTUNITY	FUNDING SUPPORT	POLICY SUPPORT	ACCELERATOR/ INCUBATOR SUPPORT
Low-Carbon Energy	Energy Efficiency & Storage	MEDIUM	MEDIUM	MEDIUM	HIGH
	Renewable Energy	SMALL	HIGH	HIGH	MEDIUM
	Cleaner Fuels	MEDIUM	MEDIUM	HIGH	MEDIUM
Land and Ocean Management	Sustainable Agriculture & Aquaculture	LARGE	HIGH	HIGH	HIGH
	Sustainable Forestry	MEDIUM	MEDIUM	MEDIUM	MEDIUM
	Ecotourism	N/A	LOW	LOW	LOW
Transportation	Sustainable Transportation	SMALL	LOW	MEDIUM	MEDIUM
Water and Waste Management	Water Management	LARGE	MEDIUM	MEDIUM	MEDIUM
	Waste Management & Circular Economy	LARGE	MEDIUM	MEDIUM	MEDIUM
Built Environment	Green Buildings	MEDIUM	MEDIUM	MEDIUM	LOW
	Disaster Management	N/A	LOW	LOW	LOW

Note: Market opportunity is not estimated for ecotourism and disaster management due to lack of SGB activity.



Several conclusions can be drawn from compiling these various data sources. Some highlights include:

Some sectors already have significant market traction and are receiving broad levels of support from policy, funders, and capacity development providers.

- Sustainable agriculture and aquaculture** stands out as a sector with significant traction and opportunities for SGB activity in the Kenyan market. The government has formulated various policies aimed at promoting sustainable agriculture. For instance, through the Kenya Climate Smart Agriculture Strategy 2017–2026, the government has allocated US \$5 billion to support adaptation and mitigation actions in agriculture up to 2026.⁵⁰ A significant number of investors have also taken an interest in the sector, such as Kenya Climate Ventures (KCV), which directs roughly 65% of its portfolio into sustainable agriculture.⁵¹ DOB Equity, Acumen, Alphamundi Group, AHL Venture Partners, GroFin, Gray Matters Capital, and Village Capital, among others, are also focused on the sector. There are also several examples of entrepreneurial ventures in the sector that have achieved scale, such as [Apollo Agriculture](#), which uses satellite data to assess crop health and offers mobile technology for credit assessments and raised US \$40 million Series B funding in 2022.⁵² Another is [Twiga](#), a technology-driven company that addresses food security by streamlining supply chains and connecting consumers, vendors, and suppliers, which has raised US \$157 million in over 19 rounds. Examples of sustainable agriculture and aquaculture SGBs in KCV's portfolio include [Lentera Africa](#), [Hydroponics Africa](#), and [Dashcrop Limited](#). There is also a considerable number of capacity development providers focused on this sector, such as AIM for Climate, Africa Enterprise Challenge Fund (AECF), Aquaculture Business Development Programme, Gatsby Africa, Global Alliance for Improved Nutrition (GAIN), Kenya Agribusiness and Agroindustry Alliance, and Somo Africa.
- Renewable energy** has also gained traction within Kenya as a promising sector for SGB activity. The adoption of renewable energy is critical for the achievement of Kenya's NDC target of a 100% transition to clean energy by 2030, and annual growth in demand for electricity is estimated at 6.7%.⁵³ Solar energy is one of the lowest cost and most effective renewable energy solutions for achieving universal access to electrification in Kenya and has thus witnessed the emergence of several high-growth enterprises and SGBs, particularly those providing off-grid solar solutions such as solar home systems (SHS), solar mini-grid, and solar lanterns. Kenya is the market leader in SHS sales in Africa. For instance, [Powergen Renewable Energy Ltd](#), which installs solar microgrids and commercial and industrial solar, has raised US \$20.5 million⁵⁴, and [Bboxx Kenya](#), which manufactures and distributes decentralized solar-powered systems, has raised over US \$100 million.⁵⁵ Some examples of SGBs in the off-grid solar energy space include [Deevabits Green Energy](#), [Kenya Green Supply Ltd](#), and [Pfoofy Power and Light Ltd](#). The off-grid solar energy space also continues to gain interest from impact investors, DFIs, foundations, and traditional finance providers (e.g., commercial banks).

Other sectors, however, have high potential but are lacking certain types of support.

- The **waste management and circular economy** sector has a tremendous market opportunity and high levels of SGB activity but receives only moderate levels of policy and funding support. As noted in Part 2, the funding available for waste management and circular economy highly depends on DFIs but has not attracted support

50 [Kenya Climate Smart Agriculture Strategy 2017–2026](#). Government of the Republic of Kenya.

51 Primary research insight from Kenya Climate Ventures.

52 [Apollo Agriculture – Crunchbase Profile](#). Accessed 15 Dec 2022.

53 USAID. 2019. [Off-Grid Solar Market Assessment: Kenya](#). Power Africa Off-grid Project.

54 [Powergen Renewable Energy – Crunchbase Profile](#). Accessed 21 Feb 2023.

55 Bboxx Unlocking Potential. 2019. [Snapshot and Annual Report 2019](#).



from other financiers. The circular economy receives less support as it is still in its infancy stage, whereas waste management needs more policy support to unlock its potential. As this is a relatively new green entrepreneurship sector in Kenya, some business models are more complex and require extra time to scale to a level where mainstream financiers can feel confident financing them. This calls for patient catalytic capital to showcase scalable models while demonstrating quantifiable impact and financial returns from investments in such sectors within the circular economy.

Other sectors require further research as SGBs in those sectors are still struggling to develop their businesses despite a decent level of funding, policy, and accelerator/incubator support.

- **Cleaner fuels**, for example, has a high level of policy support, but that has not translated into the required increases in support from funders and capacity development providers. Similarly, **sustainable forestry** has garnered medium-level support from policy, funding, and capacity development providers, and its market size is not small, but the number of SGBs operating in that space remains low. These sectors call for further studies examining the challenges entrepreneurs there are facing that entrepreneurs in other sectors are not.
- The **sustainable transportation** sector is an interesting case where the estimated market opportunity is not very large relative to other sectors, but where some SGBs are already operating with low or medium levels of ecosystem support. One explanation for the relatively small market opportunity for the sector is that the national target for electric vehicle (EV) sales in Kenya is less ambitious than the goals set for other sectors; the goal used for the market opportunity assessment for the sustainable transport sector is to increase EV sales to take up 5% of the annual vehicle sales by 2030. Developing EV markets requires a huge infrastructure change, and Kenya is not yet prepared for it. While 75% of the Kenyan population had access to electricity as of 2021,⁵⁶ the unstable supply may dissuade consumers from buying EVs. Moreover, even if the demand for EVs exists, installing EV charging stations requires large-scale upfront capital as it requires building a network of charging stations. The market opportunity is also not large because e-transport is quite capital intensive, thus it tends to attract large companies rather than SGBs.

56 Gakunga, M. 9 June 2021. "Kenya Lauded for Achieving 75% Electricity Access Rate." COMESA.



Key Challenges and Opportunities

ANDE surveyed 176 intermediaries active in supporting green entrepreneurship in Kenya and interviewed entrepreneurs and other stakeholders to gather their perspectives on key challenges and opportunities in the coming years. Several common themes emerged, which are described below.

TOP CHALLENGES

CHALLENGE 1:

Limited access to finance

Nearly 90% of surveyed support organizations reported that limited access to finance is the primary challenge facing green entrepreneurs in Kenya. While entrepreneurs from all sectors report struggling with a lack of capital for expansion, those in capital-intensive sectors (such as sustainable transportation and renewable energy) mention difficulty obtaining upfront investment, while tech-heavy sectors (such as energy storage) have high research and development costs. However, the challenge reflects more than a lack of available capital. Rather, there are several barriers and misalignments between stakeholders contributing to this gap, including:

- **Low investor confidence in green business models:** Many green business models – with the exception of renewable energy and sustainable agriculture and aquaculture – are still comparatively new, or new to the Kenyan market, and the private sector has been hesitant to invest in businesses that have not yet proved profitability in the local context. Stakeholders point to perceived high transaction costs, high risk-return profiles, and a long runway toward profitability. Investors face difficulty discerning which business models are more promising than others due to a lack of knowledge and examples of scalable models.
- **Predominantly international financing sources:** More than 75% of the financial support providers identified (which includes investors) in this study are headquartered outside of Kenya, leaving a missed opportunity for local investors more familiar with the local market and needs. In addition, interviewed entrepreneurs commonly pointed out that local entrepreneurs are often overlooked for ventures with connections to expatriates.
- **Limited financing directed toward adaptation and resilience:** Climate finance in Kenya disproportionately targets mitigation measures, while climate adaptation sectors remain underfunded. In 2018, climate mitigation accounted for approximately 80% (approx. Ksh. 194 billion or US \$1.6 billion) of total climate financing in Kenya.⁵⁷ Kenya has a multitude of adaptation needs, particularly in the water, disaster management, and sustainable forestry sectors, which need targeted financing from DFIs, government, and grant funders.
- **Limited number of investment-ready business models:** Nearly 40% of surveyed support organizations pointed to a limited number of investable green business models as a primary challenge in the ecosystem. Investors, incubators, and accelerators interviewed pointed out that the majority of SGBs applying for their financial and non-financial services lack financial education regarding the implications and working logic of financing models as well as poor incorporation of technology in their accounting processes. Interviewed support organizations also perceive that entrepreneurs have a fixed idea that financing is their first and only challenge to tackle despite being unprepared to effectively absorb the investment.

57 Odhengo, P. et al. 2021. [The Landscape of Climate Finance in Kenya](#). Climate Policy Initiative.



- **Limited access to patient capital:** Interviewed entrepreneurs shared that they often rely on grant funding from accelerators and other support organizations and have trouble accessing commercial capital due to their early stage and lack of profitability. In addition, loans often do not fit the needs of green SGBs due to the short repayment period, high interest rates, and strict eligibility criteria. Introducing different funding structures and instruments including debt, mezzanine, guarantees, and more patient risk-taking capital can better meet the needs of promising, though not yet profitable, businesses.

CHALLENGE 2:

Insufficient SME-specific policy support

An unsupportive policy environment was listed as the one of the greatest challenges among support organizations in Kenya. While Kenya has made significant strides in clarifying its climate and environmental goals and creating roadmaps to meet those goals, there is a lack of a clear and cohesive strategy regarding how the government plans to leverage and incentivize the private sector's contribution to its targets. Specific challenges noted by stakeholders include:

- **Need for improved competitiveness:** The government is responsible for providing incentives, including tax concessions for manufacturers, subsidies, removal of value-added tax (VAT) on various products, and reduction of licensing fees, among other incentives. For example, there are incentives for consumers mainly in the form of the removal of VAT for biofuels in the cleaner fuels sector and specialized solar equipment and accessories in the renewable energy sector, but more are needed across all green sectors to improve competitiveness.
- **Need to reduce barriers to formality:** With access to finance being the most commonly cited challenge, it is also necessary to address how lack of formalization limits potential opportunities for investment. For instance, many green enterprises, particularly in the water and waste management sectors, operate informally due to a lack of licenses, which is attributable to high license fees and difficulty navigating time-consuming and often convoluted registration processes. The government has an important role to play in enabling enterprises to formalize more seamlessly and to ensure that policies aimed to support green enterprises are not only in place but implemented in such a way that entrepreneurs are incentivized to formalize rather than remain informal. Such an approach would, in the short term, save on registration costs and time navigating bureaucratic systems. In other words, official government policy needs to translate into an improved reality on the ground for early-stage enterprises.
- **Need for more cohesive and tailored policy approaches to SMEs:** While various frameworks to support SMEs exist, there is unnecessary overlap between strategies and unclear policy integration between national, regional, and local governments. The Green Fiscal Incentives Policy Framework, currently in draft form, proposes green fiscal policy reforms and incentives toward greener development pathways. However, it takes a "one size fits all" approach to private sector engagement, whereas SMEs need targeted policies and incentives.

CHALLENGE 3:

Lack of collaboration and clarity around best practices

This study identified more than 40 capacity development providers supporting green enterprises in Kenya. Despite the prevalence of this technical support, when asked about challenges in the ecosystem, interviewed stakeholders commonly shared that they feel there is a lack of clarity on best practices, whether there are duplicated efforts, and how collaborations can improve effectiveness. The lack of clear standards in capacity development support is evidenced by the following challenges:



- **Generic support for green business models:** Some of the investors and accelerators interviewed expressed concerns about a high rate of duplication of business ideas and limited new solutions for solving climate challenges in the country. Specifically, most entrepreneurship programs, even those that exclusively focus on green businesses, focus on generic models. Customized exclusive programs for green enterprises could encourage more diversified business approaches at the idea and start-up stage. African Management Institute (AMI) is partnering with the Ugandan government to establish business development support (BDS) standards to improve the quality of support for entrepreneurs.⁵⁸ Similar efforts in Kenya focusing on green entrepreneurs would provide better support across the ecosystem.
- **Impact measurement:** Due to a lack of tools to assess the potential impact created by green SGBs, it is difficult to identify those that provide the greatest benefits. The Organisation for Economic Co-operation and Development (OECD) recognizes that lack of evidence of impact as a major challenge for private sector engagement to promote green growth.⁵⁹ In order to mainstream green enterprises, standardized impact measurement frameworks are needed.⁶⁰ However, most available frameworks focus on measuring mitigation rather than adaptation and resilience.⁶¹ That challenge is exacerbated by entrepreneurs' lack of knowledge and human and financial resources to dedicate to impact measurement, as reported by surveyed support organizations.

CHALLENGE 4:

Lack of dedicated support for women and locally led green enterprises

The data and interviews compiled for this report show that most investment and services are made available to SGBs led by men, with preference for those with ties to expatriates, based in Nairobi. This leaves opportunity gaps for potentially impactful founders outside of this scope of influence. Specific challenges regarding equal access to support include:

- **Concentration of support programming in Nairobi:** Capacity development providers are highly concentrated in Nairobi. However, there are many green enterprises located outside of the capital, particularly in other major cities such as Mombasa and Kisumu, that need support to grow and obtain investment. Collaboration with non-governmental organizations (NGOs) can help support providers connect with communities outside Nairobi as well as in rural areas which need targeted capacity development support. Support to green enterprises outside of major cities could also be provided through virtual incubation programs, although technical restrictions such as limited internet bandwidth are likely an inhibiting factor. Further, existing incubators and accelerators could consider establishing satellite stations in secondary cities to bring capacity building closer to entrepreneurs outside Nairobi.
- **Preference for expatriate-led enterprises:** Most of the locally owned green enterprises interviewed indicated that raising capital is difficult due to competition from well-established foreign-owned green enterprises. More green investment funds are entering the country, but most investors are risk averse, and they tend to invest in the same enterprises, with the majority of funding being allocated to the larger expatriate-founded companies. There is a need to mobilize local funds, such as the [Youth Enterprise Development Fund](#) and [Women Enterprise Fund](#) under the Ministry of Public Service, Gender and Youth Affairs, to specifically support locally owned green enterprises.

58 Africa Management Institute. 18 November 2022. "AMI Partners with Private Sector Foundation Uganda (PSFU) to Develop Standards for Strengthening SME Support Ecosystem."

59 Private Sector Engagement to Address Climate Change and Promote Green Growth. OECD.

60 Krishna, C. et al. 9 March 2022. "How (And Why) We Measure Climate Impact." Third Derivative.

61 Joshi, J. et al. 2022. [Measuring the Impact of Climate Small and Growing Businesses](#). Aspen Network of Development Entrepreneurs and Climate Collective Foundation.



- **Underrepresentation of women-led enterprises:** Roughly 70% of the high performing SGBs identified for this study do not have any women on their founding team. In addition, many identified SGBs do not have specific policies or practices to encourage gender equality in their management or customer base. However, nearly 50% of support organizations serving the green entrepreneurial ecosystem in Kenya specifically target women entrepreneurs, and a growing number of funds are incorporating gender-lens investing practices. Further research on the specific needs of women entrepreneurs will help improve effectiveness of support services.

CHALLENGE 5: Access to talent

A generalized perception among interviewees is that a specialized local workforce is scarce and therefore puts pressure on jobs in green sectors, such as renewable energy technicians, machinery and drone operators,⁶² and battery maintenance staff. Interviewed SGBs often depend on consultants and related expertise from abroad which are costly and insufficient. The limited local specialized workforce is therefore in high demand and retention is challenging for employers. For example, one company shared that it takes them two months to train employees and that it is difficult to sustain staffing. Similarly, a specialized technology company stated that because their sector is so nascent, the skillset it requires is rare, expensive, and mostly only available among foreigners.

CHALLENGE 6: Limited local awareness of the importance of sustainable practices

Interviewed entrepreneurs commonly reported that limited consumer demand for green products and services limits their market expansion opportunities. This challenge is felt especially direly among entrepreneurs working in sustainable agriculture, cleaner fuels, and waste management. Safi Organics – an organic fertilizer provider – mentioned that it had to run awareness campaigns since farmers did not understand the positive effects of organic fertilizers on crop yields and preferred subsidized synthetic fertilizers. Stakeholders in the cleaner fuels sector stated that a massive campaign is needed to facilitate the transition to cleaner cooking and that the waste management sector also requires a public awareness shift as households are still reticent about using available waste management services. Costs exacerbate the limited awareness challenge among would-be consumers, who tend to seek products that minimize their expenditure over sustainable practices and products.

62 Drone operators are relevant to the disaster management sector, as monitoring and preparing for disasters require drone technology.



TOP OPPORTUNITIES

OPPORTUNITY 1:

Increased environmental awareness

While interviewed SGBs reported a lack of consumer awareness and demand for green products as a challenge, it is notable that support organizations listed an increased awareness of the need to transition to a green economy as a key area of improvement over the past three years, likely reflecting the many policy shifts within the Kenyan government. There is an opportunity to build on this positive momentum through awareness campaigns, particularly by the government, which can play a role in sensitizing consumers and increasing uptake of environmentally friendly products. For instance, there is very low awareness among Kenyan households of the various types of biofuels for cooking. More than 75% of Kenyan households still use firewood and charcoal for cooking,⁶³ although cost also remains a limiting factor. Likewise, there is a lack of awareness of organic fertilizers among smallholder farmers who still rely on subsidized synthetic fertilizers. Increased awareness must also be complemented by innovative products that match the price levels of competitor non-eco-friendly products.

OPPORTUNITY 2:

An increasing number of support providers working with green enterprises

An increase in the number of green accelerators was listed as the second greatest improvement in the green entrepreneurial ecosystem in the past three years by surveyed support organizations. That perspective is substantiated by the data, as roughly 90% of the capacity development providers identified that have dedicated programming to support green enterprises in Kenya began focusing on green sectors in the past ten years. Most interviewed entrepreneurs have received a combination of technical and financial assistance from multiple programs, and in many cases grants and awards from these programs helped entrepreneurs survive through the idea and start-up stages. For example, networks and partners, such as the Clean Cooking Alliance, Clean Cooking Association of Kenya (CCAK), Energy 4 Impact, and the Kenya Climate Innovation Center, helped SGB Acacia Innovations to raise funding and to lobby for business-friendly policies. However, a lack of coordination among support organizations was listed as a primary challenge as well. Support organizations, through the help of network and sector associations, can work together better to identify best practices, clarify their unique value add to the ecosystem, and ensure key gaps in enterprise support are covered. This is especially pertinent for investment readiness, with a clear need for greater technical support for idea-stage enterprises to ensure their models are scalable, investable, and not duplicative.

63 Republic of Kenya Ministry of Energy. 2019. [Kenya Household Cooking Sector Study: Assessment of the Supply and Demand of Cooking Solutions at the Household Level](#).

**OPPORTUNITY 3:****Green policy support and interest from international players**

The Kenyan government's goals, initiatives, and incentives have a significant impact on private sector activity. For example, the government recently set renewable energy goals to be achieved by 2030, accompanied by tax exemptions for renewable energy products, which have increased the affordability of the products. A lobbying campaign for drone policies by the private sector from 2017 to 2020 contributed to the development of drone regulations in 2020 and a corresponding emergence of many drone companies. The Finance Act 2021 removed the VAT on fuel briquettes and fuel efficient cookstoves, increasing the affordability of briquettes and leading to increased demand from households and other customers. However, there are several sectors that are still in need of more targeted and broad-reaching support. For example, even though the government has set targets for EVs and lowered the excise duty of fully electric cars from 20% to 10%, it has not provided clear guidelines on how this target will be achieved, and relatively high import duties continue to limit their importation. Also, the government currently has no policies directly supporting the production of organic fertilizer locally,⁶⁴ thus incentivizing continued high importation of synthetic fertilizers.

Across the board, the government can develop more targeted and informed policies to incentivize private sector, and particularly SGB, activities. Interviewed SGBs shared that license payments are inhibitive, exacerbating financing issues for unregistered enterprises. The government can also introduce subsidies to reduce imports, stimulate domestic industry, and encourage the adoption of more environmentally friendly products in more sectors, following the example of sectors that are already making such efforts like cleaner fuels. Support organizations, such as network organizations and conveners, can play a key role in expressing those specific needs, in a concerted way, to policymakers.

64 A draft of organic agriculture policy was developed in 2016 and was waiting for approval, but the government ordered to formulate a new national organic policy in 2019. Source: Nwogwugwu, N. 16 October 2021. "Kenya to Set Up Organic Agriculture Policy." Nature News.



THE PROMISE OF GREEN JOBS

The transition to a green economy presents enormous potential for job creation. The ILO estimates that the economic transitions needed to achieve the Paris Agreement’s 2°C goal by 2030 will result in net employment creation of 18 million new jobs globally.⁶⁵ This is a critical topic for Kenya, which in its 2030 Vision committed to creating 1.3 million new jobs annually.⁶⁶

The ILO defines green jobs as “decent jobs that contribute to preserve or restore the environment, be they in traditional sectors such as manufacturing and construction, or in new, emerging green sectors such as renewable energy and energy efficiency.”⁶⁷ A study by the Ministry of Environment and Forestry and the United Nations Economic Commission for Africa point to energy and waste management as sectors with high potential for job creation, as they are cross-cutting across all sectors.⁶⁸ Agriculture is also critical to green job creation, contributing over 50% of employment in the country.⁶⁹

DEFINING A GREEN JOB



Source: International Labour Organization. **What is a green job?**

As Kenya transitions to a green economy, the demands for both skilled and unskilled labor will shift. Existing employees will need to learn new technologies, termed as “reskilling” or “upskilling”, whereas new job seekers will need technical skills and knowledge relevant to emerging green sectors. Some sectors also require specialists, a constraint already noted by interviewed green SGBs in Kenya. However, SGBs are constrained in finding and training the right talent due to financial limitations. Accelerators and incubators will be instrumental in helping SGBs access the talent they need to grow.

65 International Labour Organization. *Greening with jobs*. Accessed 12 December 2022.

66 *Kenya Vision 2030*. Accessed 12 December 2022.

67 International Labour Organization. *What is a green job?* Accessed 12 December 2022.

68 Kaimuri, B. 2020. *Unleashing the potential of the private sector to drive green growth and job creation in Kenya*.

69 World Bank. 2021. *Kenya Economic Update: From Recovery to Better Jobs*.



Case Studies of Successful Green SGBs

This section presents case studies of five green SGBs in Kenya that have established a sustainable business model in their respective sectors. The businesses were selected from the entrepreneur dataset described in the Methodology section and then categorized into three groups depending on how many of the following conditions were met: 1) the presence of women in a founding team, 2) the number of women employees, 3) experience working with accelerators or incubators, 4) positive revenue growth trajectory over time, and 5) commitment to measuring their climate impact. The researchers prioritized the enterprises that met the most criteria (4+) first, and then moved on to those that satisfied fewer criteria next. However, most of the enterprises featured in this section meet more than four of the mentioned conditions, meaning that they are likely to champion gender equality and impact measurement, work with ecosystem stakeholders, and show a successful record in growing their business. As the goal of the section is to show successful venture models, the selected SGBs are, by design, not representative of all SGBs in the ecosystem.

Each profile describes the selected company's business model, financial and nonfinancial support received, and key milestones in its growth journey. Specific challenges and solutions identified by the companies are described to inform sector stakeholders of the types of obstacles faced by early-stage green companies and provide examples of successful pathways toward growth. The information was gathered through interviews with company founders.

The recurring success factor themes observed throughout the case studies include:

- 1 Channeling diverse funding sources and/or revenue streams.
- 2 Investing in networking, such as maintaining membership in associations or capacity-building networks.
- 3 Receiving technical support from accelerators/incubators or having business advisors who help develop proprietary products/services.
- 4 Seeking partnerships with various stakeholders in the ecosystem to create business collaboration opportunities, build consumer bases, etc.



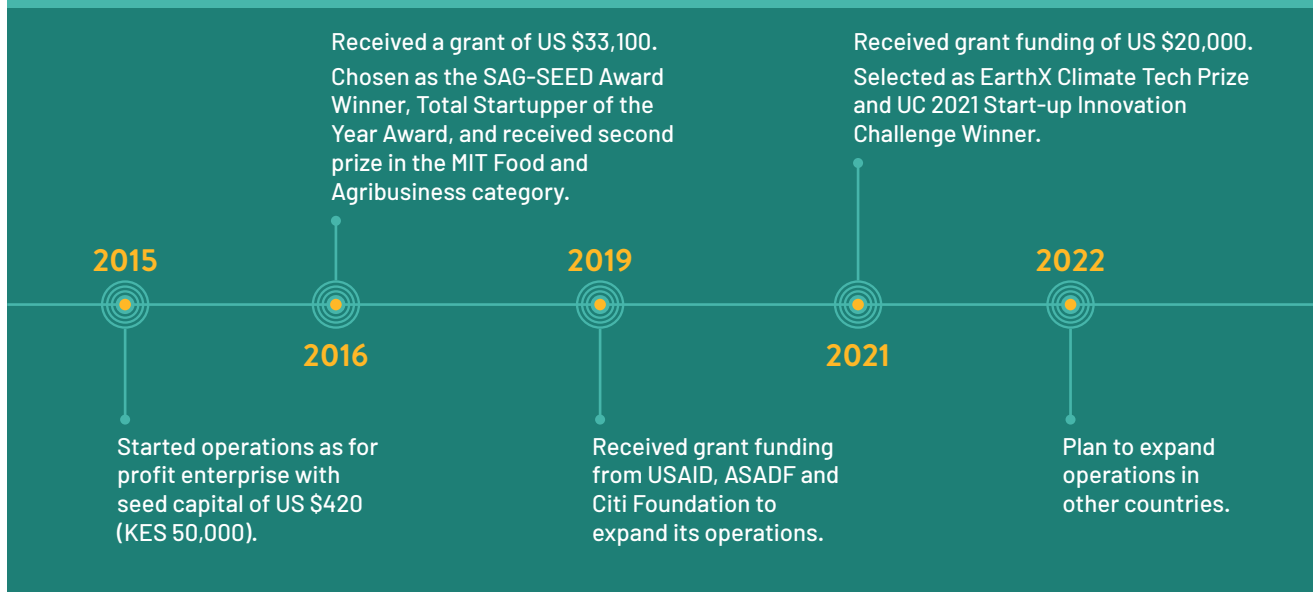
SGB PROFILE:
Safi Organics

Safi Organics was established in 2015 with the mission of helping rural smallholder farmers by converting crop waste to high-yielding organic fertilizers. The company grew to eighteen staff by 2022 and has reached over 10,000 farmers spread across about 20 counties. It established its brand through its anchor product Safi Sarvi in the organic fertilizer market and has since released Safi Sarvi Topper fertilizer, Safi Biochar, Safi Foliar fertilizer, and Safi Planting fertilizer. While organic fertilizers are the main products that contribute about 40% to gross profits, the founders identified opportunities to diversify their revenue streams and recently started offering consulting services to farmers. The various revenue streams of Safi Organics include direct sales via local distributors (short-term), customizable fertilizer software user fees (mid-term), technology sales (medium-to-long-term), and the sale of carbon credit (long-term).



Over the past seven years, Safi Organics transformed from a Massachusetts Institute of Technology (MIT) spin-off into a fully integrated company. The venture achieved profitability in 2021 by generating revenues of US \$206,000 and plans to expand operations to seven sites and increase its earned revenue to over US \$1 million in 2023. At the current scale of operations, Safi Organics has reduced the following pollutants: 18.3 tons of methane (CH₄); 154 tons of carbon monoxide (CO); 1.7 tons of nitrogen oxide (NO_x); 17.8 tons of particulates (PM_{2.5}); 1.8 tons of black carbon; and 24,000 tons of CO₂.

SAFI ORGANICS' JOURNEY





Despite its success, Safi Organics faces several challenges. To address the limited awareness among farmers of the impact of organic fertilizers on crop yields, the company works with cooperatives to sensitize farmers about the benefits of organic fertilizers. Other challenges include the high cost of machinery needed for an effective carbonization process and reluctance among commercial banks to lend to agribusinesses due to farming risks, such as seasonality and unpredictable yields. Several key success factors have, however, enabled Safi Organics to scale up.

Key success factors that have contributed to the growth of Safi Organics

SUCCESS FACTORS	DETAILS
Proprietary products	<ul style="list-style-type: none"> ▶ Offers proprietary and customized organic solutions which increase the productivity of farms by 30% to 70%.
Technology	<ul style="list-style-type: none"> ▶ Technology allows waste to be converted into fertilizer 100 times faster than traditional processes. The processes are also 50% more thermally efficient and reduce pollution by 98%.
Funding	<ul style="list-style-type: none"> ▶ Received grant funding from the Elon Musk Foundation, USAID, Citi Foundation, XPRIZE, and the United States African Development Foundation (USADF) to expand its operations. ▶ Raised on-equity assistance from the MassChallenge, a non-profit, zero equity, and impact-focused accelerator.
Technical assistance	<ul style="list-style-type: none"> ▶ Collaborated with MIT to develop its proprietary technology used to convert waste into fertilizer.⁷⁰ ▶ Received mentorship and financial modeling support from several incubation programs, including Kenya Climate Innovation Center (KCIC), Kenya National Innovation Agency (KeNIA), E4Impact Accelerator Program, Ashoka Social Investment Challenge, O-Farms, and Yunus Social Business. ▶ Collaborated with Egerton University for research.
Partnerships	<ul style="list-style-type: none"> ▶ Works in partnership with farmer cooperatives to provide training and financial support to farmers. ▶ Works with NGOs who serve as middlemen between the venture and farmers.

70 Winn, Z. "A life-changing fertilizer for rural farmers in Kenya." 17 February 2022. MIT D-Lab.



SGB PROFILE:

Acacia Innovations, Limited

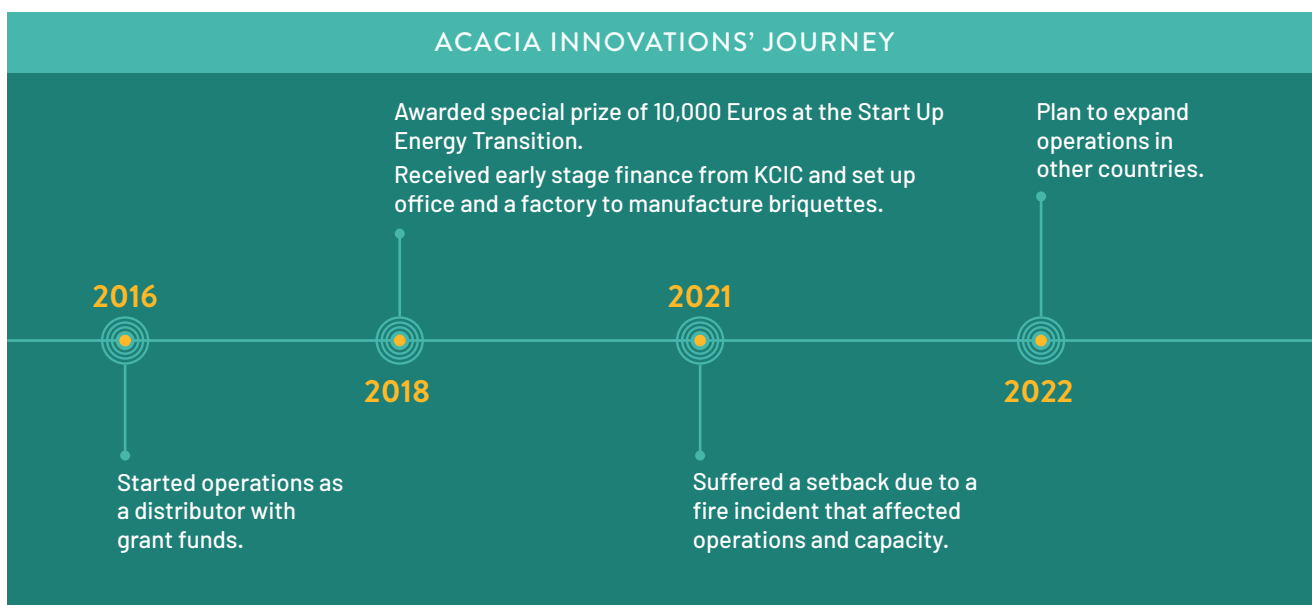
Kenya aims to achieve universal access to modern cooking solutions by 2030. Contributing to meeting this national goal, Acacia Innovations supplies eco-friendly and cost-saving cooking solutions as a leading manufacturer and distributor of cookstoves and non-carbonized briquettes made of recycled sugarcane waste. The venture was founded in 2016 by Elana Laichena, who has previous experience in a briquette start-up in Kenya, and Mark Laichena, who has expertise in development finance. The enterprise has gradually grown from a small-scale distributor to a fully-fledged for-profit enterprise.



Acacia Innovations leverages an integrated tool-and-fuel operational model which involves the provision of both cooking appliances and fuel. Their main products are Kuni Safi, non-carbonized briquettes, and Kuni Safi Jiko, an affordable, modern, improved cookstove solution designed for facilitating cleaner, economical, and quick cooking. While cooking devices and stoves are not a major revenue stream for Acacia, the sales of devices and stoves drive demand for the briquettes. Schools account for over 60% of their financial portfolio, with the rest coming from commercial and industrial customers, including small factories, vegetable oil refineries, and hotels. As the upfront cost of briquettes and improved cook stoves can be a significant barrier for consumers, especially schools, Acacia Innovations supports customers by providing discounts and flexible repayment schedules spread over 30–90 days.

Acacia Innovations has enabled customers to switch from fuelwood and charcoal, thus saving trees and reducing environmental pollutants. According to their sales record, the company has saved 100,000 trees and provided a smoke-free learning environment to 45,000 children. The company has also contributed to livelihood creation by employing a total of 94 workers, of which 60% are low-income women.

ACACIA INNOVATIONS' JOURNEY





The founders of Acacia Innovations have been able to raise an external round of funding and have won several competitions, expanding the company's profile in the cleaner cooking sector. The enterprise has also received international recognition for deploying innovative solutions to energy efficiency and decreasing pollution. However, like other cleaner cooking SGBs, Acacia Innovation's journey is not devoid of challenges and setbacks.⁷¹ Cleaner cooking is one of the most underfunded sectors,⁷² with access to finance generally limited to impact investors with a specific focus on cleaner cooking. Other deterring factors include a prolonged shift toward cleaner fuels and stringent conditions and requirements. However, a small but growing number of business models have emerged which have proven commercially viable. Acacia Innovations attributes their success to several key factors.

Key success factors that have contributed to the growth of Acacia Innovations

SUCCESS FACTORS	DETAILS
Funding	<ul style="list-style-type: none"> ▶ Raised US \$45,000 from KCIC to set up a manufacturing plant and acquire assets including a briquetting machine, hammermill, and grinder. ▶ Received US \$350,000 of grant support from the Energy and Environment Partnership Trust Fund (EEP Africa) over three years.
Accelerators	<ul style="list-style-type: none"> ▶ Participated in an accelerator program in 2017 through KCIC and received technical support and office space in the first year of operations.
Partnerships	<ul style="list-style-type: none"> ▶ Maintain an affiliation in capacity building networks such as Kenya Climate Ventures, Clean Cooking Alliance, Clean Cooking Association of Kenya (CCAK), and Energy 4 Impact. Through the CCAK membership, the company was able to access investors.
Proprietary products	<ul style="list-style-type: none"> ▶ Developed proprietary cooking solutions in the industry which enabled the company to retain 90% of clients (i.e., schools).
Customer management	<ul style="list-style-type: none"> ▶ Leverages a high-touch model to manage customers. Through a decentralized team of marketing and technical staff, Acacia Innovation provides after-sales support to customers through training, advisory, and maintenance of the cookstoves.

71 [Clean Cooking Industry snapshot](#). 2019. Clean Cooking Alliance.

72 Njugi, D. "Milestones in the clean cooking sector." Clean Cooking Association of Kenya.



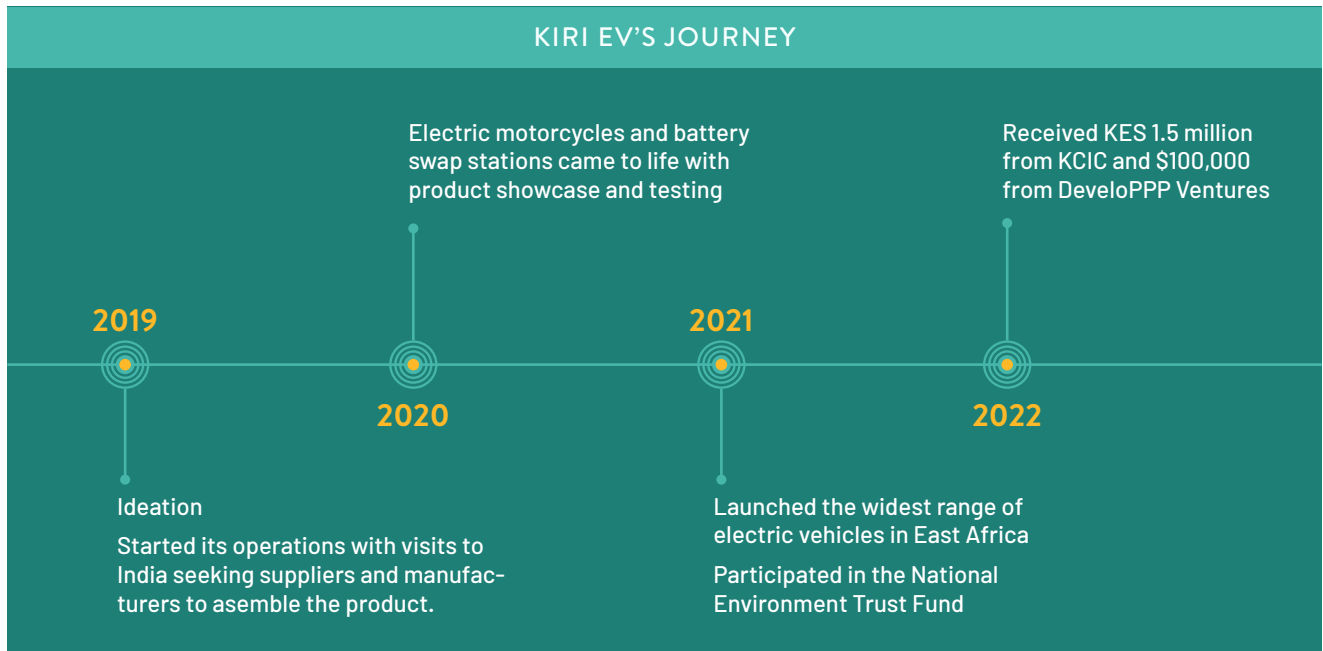
SGB PROFILE:

Kiri EV

Kiri EV was founded in 2019 by positioning itself to become a market leader in electric two-wheelers and three-wheelers. The venture designs, manufactures, sells, and leases high-performance electric motorcycles, scooters, bicycles, and spare parts. It aims to prove that electric vehicles can and will play a big role in the future of transportation across Kenya and the continent. Kiri EV has a product portfolio consisting of six series that address the various needs of different segments of modern urban residents and resolve the demands of different scenarios of urban travel.



Kiri EV provides different models of electric motorcycles, Kiri EV spares, and Carrier AdBox (a light-up food delivery box that affixes to any delivery scooter). About 90% of Kiri EV revenues come from motorbikes, but Kiri EV management intends to increase revenues through developing leasing services. Based on projections, the enterprise founders anticipate 70% of revenue will come from motorbikes, 20% from charging stations, and 10% from spare parts. The venture is projected to break even in 2023 through consistently generating revenues ranging from US \$10,000 - \$15,000.





As a relatively new venture, Kiri EV has struggled with a variety of challenges, ranging from high competition from local and international companies in the industry, difficulty raising funds because of uncertainty in the African e-mobility market, and challenges attracting local talent with the requisite skillsets.

Despite those reported challenges, Kiri EV has experienced consistent growth and is on the path to scaling its operations nationwide.

Key success factors that have contributed to the growth of Kiri EV

SUCCESS FACTORS	DETAILS
Funding	<ul style="list-style-type: none"> ▶ Used personal savings as start-up capital and raised funds from family and friends. ▶ Received a government grant (Mbele na Biz) of Kes. 900,000 in 2020. ▶ Received US \$12,301 (Kes. 1.5 million) from KCIC in 2022. ▶ Received US \$100,000 grant from develoPPP Ventures in 2022.
Suppliers	<ul style="list-style-type: none"> ▶ Signed a memorandum of understanding (MoU) with Jitendra New EV Tech Pvt to supply EV components.
Advisors	<ul style="list-style-type: none"> ▶ Had two advisors since the inception of the company.
Partnerships	<ul style="list-style-type: none"> ▶ Formed partnerships with local manufacturers that enabled immediate scaling of their product at a low cost. ▶ Established partnerships with companies and local stakeholders such as Kenya Vehicle Manufacturers Ltd., Karibia, Boda Boda Safety Association of Kenya, Auto Springs Kenya, Solar e-cycles, E-Safiri, Mantle Africa Limited, develoPPP Ventures, and P4G.



SGB PROFILE:
WEEE Centre

Waste Electrical and Electronic Equipment Centre (WEEE Centre) sprung out of a take-back program of Computers for Schools Kenya (CFSK) – an NGO distributing computers to schools in Kenya – in 2010. In an effort to remove collected obsolete computers from schools, CFSK trained their staff in electronic waste management with the help of their European partners. WEEE Centre collects all ten categories of e-waste, such as small IT equipment, small and large equipment, screens, lamps, and temperature exchange equipment (e.g., fridges, freezers, air conditioning) from local companies, schools, institutions, embassies, the government, and the general public.



WEEE Centre generates its revenue by charging disposal and transportation fees to clients (e.g., individual disposers and public learning institutions), selling repurposed and refurbished equipment and raw materials (e.g., copper, aluminum, plastics), and bidding for grant-funded projects aimed at impact creation. WEEE Centre collects waste from across the country and as of January 2023 has served over 10,000 customers, including local and multinational corporations, schools, and the government. The business has trained over 3,000 youth and women on the dangers of poor waste management and over 630 small business owners in the informal sector on how to handle electronic waste. It has also set up over 100 e-waste bins nationwide.

WEEE CENTRE'S JOURNEY





Despite its achievements, WEEE Centre reported several challenges, including low levels of public e-waste awareness, a lack of legislation and regulatory frameworks, poor separation and disposal systems, and limited infrastructure and facilities that deal with the most toxic materials, such as metals from circuit boards, batteries, toners, and cartridges. WEEE Centre handled some of these challenges by raising public awareness through programs and proactively reaching out to informal sectors to sign commitment letters to dispose of e-waste fractions properly. While not all the challenges were addressed, other success factors below contributed to their growth.

Key success factors that have contributed to the growth of WEEE Centre

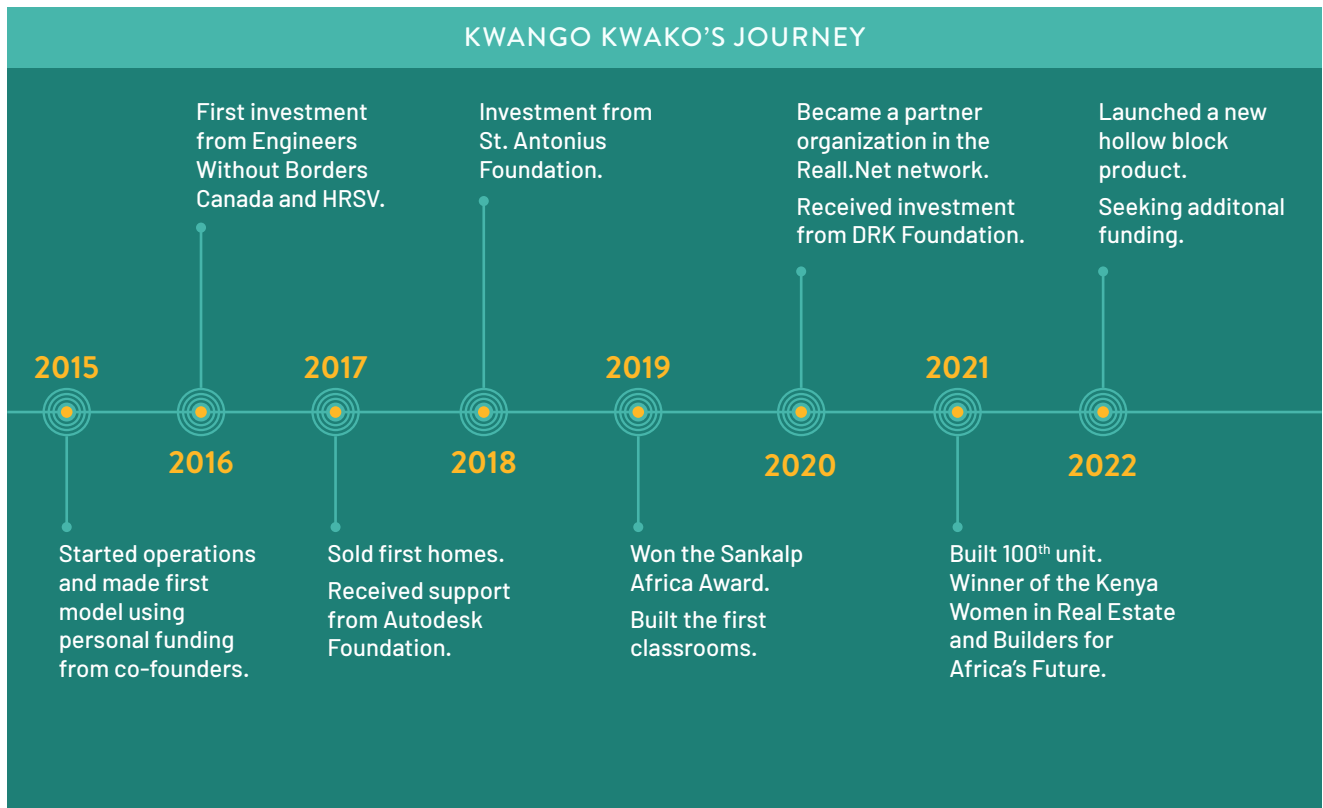
SUCCESS FACTORS	DETAILS
Funding	<ul style="list-style-type: none"> ▶ Received about US \$1.2 million in grant funding since its inception. ▶ Funding availability contributed to awareness creation activities for the public, capacity-building training for staff, and the creation of direct and indirect jobs for youths across the country.
Accelerators	<ul style="list-style-type: none"> ▶ The enterprise participated in the Cohort 10 Elemental Excelsator, Plug-and-Play, and the Scale For ClimateTech Manufacturing Bootcamp.
Partnerships	<ul style="list-style-type: none"> ▶ Expanded operations by jointly implementing with partners ▶ Partners have provided support, including Kenya Private Sector Alliance (KEPSA), Base, Global Waste Cleaning Network, the Norwegian Agency for Exchange Cooperation (NOREC), The Kilimani Project Foundation, Carrefour, Digital Pipeline Africa, Total Energies, National Environment Management Authority of Kenya (NEMA), Umicore, Close the Gap, Multimedia University of Kenya (MMU), Shell Foundation, Absa, Computers for Schools Kenya (CFSK), Safaricom, Oracle, Communication Authority of Kenya, Arrow Electronics, Samsung, IBM, International Committee of the Red Cross (ICRC), Bright, Isuzu, The National Treasury and Planning, and the German Agency for International Cooperation (GIZ). ▶ In 2021, became a new member of the Global Waste Cleaning Network and partnered with PANELTECH.US Corp to foster a circular economy in Kenya in alignment with SDG 17.



CASE STUDY:
Kwangu Kwako

The housing deficit in Kenya continues to rise annually, exacerbated by urbanization.⁷³ Kwangu Kwako was set up in 2015 to provide affordable and dignified living that is accessible to underserved communities. The venture is a manufacturing and construction limited company and serves its mission by designing, manufacturing, and delivering affordable, dignified, and safe buildings.

Kwangu Kwako constructs affordable housing for low-income earners and institutions, as well as running water and sanitation facilities that are either shared among a small number of units or fully private. They build both residential units and classrooms which typically replace metal, wood, mud shanties, or bare-bones school buildings that lack electricity and sanitation. The customer segments of Kwangu Kwako comprise micro landlords who mostly live in, or come from, low-income communities. The company uses two solutions for its business model. The first solution is to design, then manufacture, then build. The second solution is to manufacture components and then sell them to contractors or self-build homeowners. Over the past two years, Kwangu Kwako has transformed itself into a fully integrated company.



⁷³ Mukundi, D. "Kenya Needs 2 Million More Low-income Homes: Building Them Would Boost Its Economic Growth." April 2017. World Bank.



Kwangu Kwako measures its impact through results aligned with several of the SDGs and conducts research on the impact of their products in informal settlements. As of January 2023, the company has built over 131 homes, 13 classrooms, and 21 shops and community buildings. The total number of beneficiaries that will utilize these units is estimated to be more than 20,000 by 2025. The enterprise is currently prototyping recycled plastic door frames and recycled plastic modular utility walls. More than 50% of the supervisors and managers are women, and the board consists of 50% female members.

Kwangu Kwako's journey is not devoid of the challenges and setbacks that are common to SGBs in the housing sector. The venture received many complaints about the lack of financing options from their customers, who often do not meet commercial banks' requirements for lending. However, the company has worked with Financial Sector Deepening (FSD) Kenya, the Centre for Affordable Housing Finance Africa, and Zero Kap to design and test alternative financing structures. Ensuring quality materials was a challenge at the initial stage, but with a stronger team and supplier/sub-contractor partnerships, the company has made a substantial improvement over the last few years. Lastly, external crises, such as inflation and the pandemic, have created further financial challenges over the last 2–3 years. Despite such struggles, Kwangu Kwako is writing a successful venture story.

Key success factors that have contributed to the growth of Kwangu Kwako

SUCCESS FACTORS	DETAILS
Funding	<ul style="list-style-type: none"> ▶ Received loans from Engineers Without Borders Canada, Draper Richards Kaplan (DRK), St Antonius Foundation, and Hooge Raedt Social Venture (HRSV). ▶ Received grant funding from FSD Kenya, Reall.net, DEG (Deutsche Investitions- und Entwicklungsgesellschaft), develoPPP Ventures, and Siemens.
Networking	<ul style="list-style-type: none"> ▶ Won the Sankalp Africa Award in 2019. ▶ Attended the Kenya Green Building Association program. ▶ Received support from Autodesk Foundation in the form of design software to accelerate the development of its products. ▶ Participated in Growth Africa and Santa Clara University's GSBI accelerator. ▶ Winnie (co-founder) is an MIT D-Lab East Africa Fellow.
Partnerships	<ul style="list-style-type: none"> ▶ Worked with FSD Kenya to share their experiences of using the EDGE platform developed by the IFC and the World Bank.



PART 2: SECTOR DEEP DIVES

Part 2 examines each green sector in detail to inform stakeholders of the support available to entrepreneurs in each sector and to identify the gaps preventing further growth. Each sector narrative aims to address the following questions:

- What are some examples of successful SGBs in each sector and business segment?
- What policies are in place to support entrepreneurial activities, and which policies exist in words but lag in action?
- What type of funding is available in each sector, and how big are the ticket sizes?

The sector narratives follow the structure described below:

- **Background and Business Segments:** Provides an overview of the sector globally, the Kenya country context, a list of business segments in which SGBs are active, and examples of SGBs.
- **Policy Landscape:** Identifies national policies, strategies, and government initiatives that directly or indirectly support entrepreneurship. The policies are assessed on likelihood to contribute to SGB growth and do not attempt to determine their effectiveness to date.
- **Funding Landscape:** Description of the funding landscape by identifying closed deals by four types of funders: DFIs; foundations; impact investors/private equity investors/venture capitalists; and commercial banks.
- **Estimated Market Opportunity (2022 – 2030):** The market opportunity estimates use either a government-set target or relevant SDG indicator to estimate the gap between 2022 (i.e., baseline) and 2030 (i.e., endline) and provide a cumulative figure for the period assuming a constant growth rate to reach 2030 targets. This exercise did not account for all possible factors that affect market potential (e.g., the different infrastructure required for each sector and incentives that affect consumer behavior) and instead uses government-identified targets as proxies for possible growth to allow for comparison across sectors. Importantly, these estimates do not necessarily reflect all private sector activity in a given sector but rather only the business segments in which SGBs are active and for which a government target has been set. Details on how the market opportunity was calculated for each sector are provided in Appendix B.





Readers interested in the high-level overview of each sector can use the following links under the Sector Group column, and those who want to know more about the sector landscape in detail can go directly to the relevant sectors using the links under the sector column.

SECTOR GROUP	SECTOR
LOW-CARBON ENERGY	Energy Efficiency and Storage
	Renewable Energy
	Cleaner Fuels
LAND AND OCEAN MANAGEMENT	Sustainable Agriculture and Aquaculture
	Sustainable Forestry
	Ecotourism
TRANSPORTATION	Sustainable Transportation
WATER AND WASTE MANAGEMENT	Water Management
	Waste Management and Circular Economy
BUILT ENVIRONMENT	Green Buildings
	Disaster Management




Sector Group: Low-Carbon Energy

ENERGY EFFICIENCY AND STORAGE

KEY AREAS	BUSINESS SEGMENTS	MARKET OPPORTUNITY (2022-2030)
 <p>Energy Efficiency (EE)</p>	<ul style="list-style-type: none"> ✓ Smart energy management providers ✓ Energy-efficient appliance providers 	<p>US \$2.2 billion</p>
 <p>Energy Storage</p>	<ul style="list-style-type: none"> ✓ Battery recycling/reuse service providers 	<p>US \$43 million</p>

RENEWABLE ENERGY

KEY AREAS	BUSINESS SEGMENTS	MARKET OPPORTUNITY (2022-2030)
 <p>Solar Energy</p>	<ul style="list-style-type: none"> ✓ Solar consumer products providers ✓ Solar energy system providers ✓ Support service providers 	<p>US \$873 million</p>

CLEANER FUELS

KEY AREAS	BUSINESS SEGMENTS	MARKET OPPORTUNITY (2022-2030)
 <p>Biofuel</p>	<ul style="list-style-type: none"> ✓ Biogas ✓ Bioethanol ✓ Biodiesel ✓ Briquettes and pellets 	<p>US \$1.2 billion</p>



Energy Efficiency and Storage

► BACKGROUND AND BUSINESS SEGMENTS

ENERGY EFFICIENCY (EE)

Background: Energy efficiency (EE) refers to processes that use a reduced amount of energy to provide products, services, or amenities. Improving energy efficiency is one of the most cost-effective and environmentally safe ways of achieving economic growth. The International Energy Agency (IEA) estimates that adoption of energy efficiency as the first choice could lead to a US \$18 trillion economic increase globally by 2035.⁷⁴ In addition to reducing emissions, other benefits of energy efficiency mentioned by the IEA include employment creation, reduced pollution, industrial productivity, and improvements in human health.

Kenya context: Kenya has championed energy efficiency in the public and private sectors since the early 2000s. Kenya's National Energy Efficiency and Conservation Strategy outlines energy efficiency targets to be achieved by 2025 in five sectors: households, buildings, industry and agriculture, transport, and power utilities.⁷⁵ More specifically, that strategy aims to guide the country toward achieving its established EE goals, which include:

- Reducing the national energy intensity by 2.8% per year.
- Achieving a 30% emissions reduction by 2030 relative to business as usual and meeting its national targets for SDG 7 by 2030.

According to the strategy, the key drivers of energy efficiency in Kenya include:

- Limited energy sources and increasing energy demand.
- Negative environmental and health impacts caused by highly polluting fuels.
- High prices of electricity and charcoal, which have caused energy consumers to consider energy efficiency (e.g., electric pressure cookers) and conservation measures to lower energy costs.
- Increased visibility within the government and the international community of energy efficiency and conservation needs.
- More affordable energy efficient technology.

Business segments: The primary EE business segments relevant in which Kenyan SGBs are active include *smart energy management*, *energy-efficient appliance providers*, and *energy audit service providers*. This report focuses on smart energy management and energy-efficient appliance providers as the primary segments relevant for SGBs.

74 Capturing the Multiple Benefits of Energy Efficiency. 2013. International Energy Agency.

75 Kenya National Energy Efficiency and Conservation Strategy. 2020. Ministry of Energy.


Table 4: Business segments and examples of SGBs in energy efficiency

BUSINESS SEGMENT	DESCRIPTION	EXAMPLES OF SGBS
Smart energy management providers	Offer technologies and software that improve efficiency in energy consumption for buildings, industries, households, etc. as well as technology solutions for managing or monitoring energy usage, such as smart sensors, smart grids, energy-saving air conditioners, and washing machines.	<ul style="list-style-type: none"> ▶ Drop Access ▶ Zuhura Solutions
Energy-efficient appliance providers	Offer products that minimize energy consumption, such as LED lighting systems, energy-efficient cookstoves, and energy star appliances.	<ul style="list-style-type: none"> ▶ Consumers Choice Limited ▶ Develatech ▶ EcoZoom

ENERGY STORAGE

Background: Energy storage refers to capturing the energy produced at a given point for later use to reduce imbalances between energy demand and energy production.⁷⁶ For instance, electricity storage devices help to manage the amount of power required to supply customers during grid peak load times. Pumped hydro, capacitors, accumulators, and compressed air energy are the most commonly used energy storage devices. There are also emerging energy storage technologies, such as battery energy storage systems (BESS), which store additional energy when price and/or demand is low and then release it back to the grid when price/demand is high.⁷⁷

In 2020, global battery storage capacity additions rose to a record high of five gigawatts (GW), up by 50% compared to 2019.⁷⁸ Lithium-ion batteries are one of the most prominent technologies in this field. Thanks to recent innovations that have reduced the cost of the technology, it is expected to capture the majority of energy storage growth in all markets by the next decade.⁷⁹ In particular, the lithium-ion battery market is driven by expanding EV markets and related economies of scale in battery manufacturing. Lithium-ion battery prices fell by about 80% between 2010 and 2017, and the growing support generally for a shift to renewable energy sources to reduce emissions is a key driver of the increasing popularity of battery storage solutions.⁸⁰ Switching to low-carbon alternatives, such as EVs, requires the use of energy storage technology. Hence, energy storage is indirectly driving the transition towards greener technologies.

Kenya context: Energy storage is still a nascent area in Kenya. In 2021, the government, through the Ministry of Energy, developed the Least Cost Power Development Plan (LCPDP) 2021–2030.⁸¹ The plan provides a roadmap for the installation of 250 megawatts (MW) of battery energy storage systems (BESS) by 2030, which will require a significant increase from the current level of 50 MW in 2022. The LCPDP aims to improve national grid stability. The deployment of grid-sized batteries will ensure that energy is stored and utilized during peak hours to alleviate stress on the national grid that leads to issues like voltage instability and load shifting.⁸²

76 [Energy Storage](#). ClarkeEnergy. Accessed 21 February 2023

77 World Bank. 2020. [Economic Analysis of Battery Energy Storage Systems](#).

78 IEA. 2022. [Grid-Scale Storage Tracking Report](#).

79 Ibid

80 Deloitte. 2018. [Supercharged: Challenges and opportunities in global battery storage markets](#).

81 Ministry of Energy. 2021. [Least Cost Power Development Plan 2021-2030](#).

82 International Trade Administration. 2021. [Kenya Energy Storage System](#).



Business segments: Energy storage solutions provided by businesses include *battery recycling/reuse service providers, innovative battery technology manufacturers, and traditional battery manufacturers* (lead acid and lithium-ion technology). However, SGBs in the last two business segments are less prevalent in Kenya.⁸³

Table 5: Business segments and examples of SGBs in energy storage

BUSINESS SEGMENT	DESCRIPTION	EXAMPLE OF SGBS
Battery recycling/reuse service providers	Help to reduce the number of batteries being disposed of as municipal solid waste by recycling or repurposing old batteries for reusable energy storage.	Inno-Neat Ltd

► POLICY LANDSCAPE

Kenya has developed various policies and strategies aimed at improving energy efficiency aligned with the climate mitigation target set out in the country's NDC. These policies are supportive of private sector enterprises, including SGBs, that provide energy-efficient appliances or smart energy management solutions. However, the main challenge affecting the performance of SGBs in this sector is the high cost of energy-efficient appliances, which leads to low demand. Other challenges include "limited technical capacity, high upfront costs, few consumer incentives, low awareness of existing credit facilities," and low enforcement of Minimum Energy Performance Standards (MEPS), which leads to increased competition from low-cost energy-inefficient appliances.⁸⁴ The government is addressing these challenges by introducing and enforcing new MEPS for energy-efficient appliances and introducing tax incentives for energy-efficient products.⁸⁵

Unlike the energy efficiency sector, the energy storage market is a nascent space in Kenya. Existing energy storage policies do not have a clear framework for the engagement of private sector enterprises.

83 [Associated Battery Manufacturers \(ABM\) East Africa Ltd](#) is the only large battery manufacturing company in Kenya that produces solar and automotive batteries (both vented and maintenance free).

84 [Kenya National Energy Efficiency and Conservation Strategy](#). 2020. Ministry of Energy.

85 *Ibid.*


Table 6: Key policies and strategies for Kenyan energy efficiency and storage

POLICY/STRATEGY	AIM (drawn directly from policy/strategy document)	SUPPORT AND GAPS FOR SGB ACTIVITY
Energy (Appliances' Energy Performance and Labeling) Regulations	Appliances manufactured in Kenya or imported into the country must undergo energy performance tests, be registered with the ERC, and display proper energy star labeling.	By ensuring that only approved EE appliances are supplied in the market, the regulations provide a favorable business environment for SGBs that supply approved energy-efficient appliances.
Green Economy Strategy and Implementation Plan (GESIP) 2016-2030	Outlines the following objectives: 1) develop sector-specific energy efficiency targets and benchmarks, 2) roll out demand-side energy efficiency programs in buildings and facilities, 3) roll out supply-side energy efficiency programs through system reinforcement, efficient transformers, and grid extension projects, 4) adopt MEPS for lighting and industrial products, 5) develop technical and infrastructural capacity for energy audits, equipment testing, and certification, and 6) review national and county policies to respond to new technology and innovation.	Achieving the listed objectives requires investment in smart energy management solutions and energy-efficient appliances. This, in turn, is expected to create opportunities for private sector enterprises that provide energy-efficient appliances or smart energy management solutions.
Least Cost Power Development Plan (LCPDP) 2021-2030	Provides a roadmap for installing 250MW of battery energy storage systems (BESS) by 2030.	While the installation of BESS is expected to create opportunities for private sector enterprises that supply energy storage devices, the government is yet to provide a clear framework on how private sector enterprises will be engaged in the installation of BESS as of 2022.
National Climate Change Action Plan (NCCAP) 2018-2022	Lays out goals to realize low carbon climate resilient development and identifies seven priority areas which include energy and transport as well as disaster risk management, water and the blue economy, forestry, wildlife and tourism, health/sanitation/human settlements, manufacturing.	Presents the private sector with an opportunity to distribute 3.3 million compact fluorescent lamps (CFLs) to households and double the number of companies participating in EE initiatives to total 1,000. The goal is expected to be achieved by June 2023.



POLICY/STRATEGY	AIM (drawn directly from policy/strategy document)	SUPPORT AND GAPS FOR SGB ACTIVITY
National Energy Efficiency and Conservation Strategy (NEECS)	Aims to guide the country toward achieving its established EE targets, which include: 1) reducing the national energy intensity by 2.8% per year and 2) enabling the country to achieve 30% emissions reduction by 2030 relative to business as usual and meet its national targets for SDG 7 by 2030.	The introduction of MEPS is expected to create opportunities for enterprises that provide energy-efficient appliances such as improved cookstoves. The government is addressing the high cost of EE appliances by introducing tax exemptions. For instance, the Finance Act 2021 proposes a 16% VAT exemption on improved cookstoves. ⁸⁶
Sustainable Energy for All (SE4All): Kenya Action Agenda	Aims to achieve a 100% transition to modern cooking solutions, including the use of improved cookstoves, by 2030 and double the rate of improvement of energy efficiency by reducing energy intensity by 2.8% every year.	Doubling the rate of improvement of energy efficiency will require investment in smart energy management solutions, which can create opportunities for SGBs that provide such solutions.
The Energy Act, 2019	Created the Energy and Petroleum Regulatory Authority (EPRA), which is responsible for enforcing MEPS for appliances. It uses a 5-star labeling scheme to rank appliances based on energy efficiency.	The introduction of MEPS has contributed to increased awareness and demand for the highest-performing appliances, creating opportunities for enterprises that supply energy-efficient appliances.
The Energy (Energy Management) Regulations of 2012	Requires all commercial buildings and industrial and institutional facilities for which energy consumption exceeds 180,000 kilowatt hour (kWh) per year to either 1) develop an energy management plan, 2) carry out energy audits at least once every three years, or 3) implement at least 50% of the energy savings recommendations within 3 years.	This requires investments in smart energy management and energy-efficient appliances for use in buildings and industrial and institutional facilities and will present opportunities for enterprises that provide such services and products.

► FUNDING LANDSCAPE

The funding landscape for energy efficiency and storage enterprises in Kenya consists of DFIs, foundations, impact investors, private equity investors, venture capitalists (VCs), and commercial banks. Energy efficiency attracts most of the investments and different types of financiers. In contrast, investment in energy storage remains in its nascent stage, having witnessed financing from a few DFIs, impact investors, and private equity investors but not from foundations and commercial banks.

- **DFIs** investing in energy efficiency include the Danish Climate Fund, GIZ, the World Bank, and the African Development Bank (AfDB). The AfDB is providing a US \$1 million grant to support the Government of Kenya in creating a super Energy Service Company (ESCO) under the Sustainable Energy Fund for Africa (SEFA) project. The ESCO supports the efficient utilization of energy in the public sector and promotes energy efficiency investment in the private sector.⁸⁷

86 Government of Kenya. 2021. [The Finance Act 2021](#).

87 African Development Bank Group. ["African Development Bank's SEFA grant to support first Super ESCO in East Africa."](#)



- Many **impact investors** and **VCs** are providing financing to energy-efficiency enterprises. Examples of such investors include Accion Frontier, AHL Venture Partners, Spark+ Africa Fund, Energy Access Ventures Fund, Kenya Climate Ventures, AlphaMundi Group, KawiSafi Ventures, DOB Equity, and Yunus Social Business. The Accion Frontier Inclusion Fund from Accion Frontier launched in 2014, targeting enterprises in the energy efficiency space with ticket sizes range from US \$1 million to US \$5 million.⁸⁸ **BioLite**, an enterprise that provides energy-efficient cooking, charging, and lighting appliances, raised US \$12 million Series E financing from KawiSafi Ventures in 2020,⁸⁹ and **Burn Manufacturing**, an enterprise that manufactures and distributes fuel-efficient cooking appliances, raised US \$4 million in debt financing from Spark+ Africa Fund in May 2022 and more funds from Acumen, AHL Venture Partners, Yunus Social Business, and OPIC.⁹⁰
- **Foundations** promoting energy efficiency include the Sustainable Energy Foundation Africa, the United States African Development Foundation (USADF), and Green Africa Foundation. In 2016, **Boma Safi** won a grant of US \$100,000 from USADF to distribute energy-efficient cookstoves to low-income households in Kenya.⁹¹
- **Commercial banks** in the energy efficiency space include Equity Bank and Kenya Commercial Bank. In 2021, Equity Bank launched the Clean Cooking Initiative to support learning institutions' transitions to cleaner cooking and lighting technology.⁹²

In contrast, investment in energy storage remains in its nascent stage. As there are few enterprises in the energy storage ecosystem, few investors have invested in this space. Energy storage has attracted financing from a few DFIs, impact investors, and private equity investors but not from foundations and commercial banks.

- **DFIs** active in energy storage include GIZ, Finnfund, the World Bank, and FMO. Through the Startup|Energy Award supported by GIZ and Kenya Climate Ventures, both **Inno-Neat Ltd** and **Drop Access** received awards of 2,500 euros in 2021 to expand their business ideas.⁹³
- **Impact investors**, such as Kenya Climate Ventures, Metair Investments, Acumen, and Energy Access Ventures, provide financing to energy storage enterprises. In 2016, Metair Investments invested US \$7.2 million in **Associated Battery Manufacturers (ABM) East Africa Ltd**, a company that manufactures solar and automotive batteries, to expand its operations in the East Africa region. to support the company in expanding its operations in the East African region. However, the engagement from philanthropic foundations and commercial banks in this business segment is minimal.

► MARKET OPPORTUNITY (2022 – 2030)

This report estimates a market opportunity for energy efficiency and storage of **US \$2.18 billion between 2022 and 2030**. The methodology used to calculate the market opportunity leverages government-set targets based on the assumption that government policies or strategies are key indicators of business activity in a sector.

17 September 2021.

88 [Impact Funds in SDG Goal 7: Double the improvement in energy efficiency](#). Impact Yield. Accessed 12 December 2022.

89 [BioLite - Crunchbase profile](#). Accessed 12 December 2022.

90 [Burn Manufacturing - Crunchbase profile](#). Accessed 12 December 2022.

91 USADF. 2016. [Solving the Energy Crisis by Mobilizing Women Entrepreneurs](#).

92 Equity Bank "Equity Launches Clean Cooking Initiative to Support Learning Institutions Transition to Cleaner, Sustainable and Environmentally Friendly Sources of Cooking and Lighting." 8 March 2021.

93 Startup|Energy. "Drop Access and Inno-Neat win the Startup|Energy Award." 30 September 2021.



- **Energy efficiency (est. market opportunity of US \$2.15 billion)** is a cross-cutting key area since energy is used in various sectors, including households, industries, agriculture, power utilities, buildings, and transport. To avoid overlap with other sectors, the market size assessment for energy efficiency focuses on energy savings achieved as a result of investment in energy efficiency. Based on the Kenyan energy intensity rate in 2018 (i.e., 0.595 kWh/USD)⁹⁴ and the energy intensity target of 2.8%, the annual energy intensity rate was calculated to determine market opportunity.
- **Energy storage (est. market opportunity of US \$43 million)** represents the grid-scale battery storage market size. The Government of Kenya focuses on grid-scale battery storage as this is expected to help the country transition to 100% clean energy by 2030. Kenya has a target of installing 250MW of BESS by 2030, which is in line with the government's ambition to achieve a 100% transition to clean energy by 2030. With the BESS installed capacity in 2022 standing at 50MW,⁹⁵ the compound annual growth rate required to achieve the national goal of 250 MW remains at 22.28%. EV battery storage and consumer electronics battery storage segments are not included since the government did not set a target for these. The consumer electronics battery storage segment is nascent in Kenya.

Renewable Energy

► BACKGROUND AND BUSINESS SEGMENTS

Background: Renewable energy is defined as “energy derived from natural processes and replenished at a faster rate than it is consumed.”⁹⁶ According to the International Renewable Energy Agency, renewable energy sources include bioenergy, geothermal energy, hydropower, ocean energy, solar energy, and onshore and offshore wind energy.⁹⁷ Tides, waves, and currents can be harnessed for electricity generation, but the technologies are still in the research and development stage and are yet to witness commercial deployment. The share of renewable energy sources in global electricity generation increased from 27% in 2019 to 29% in 2020,⁹⁸ and the renewable generation capacity rose by 9.1% in 2021 compared to the previous year.⁹⁹ However, as per IEA estimates, the share of renewable power in global electricity generation would have to increase to 60% by 2030 to meet the net zero emissions by 2050 scenario.

Kenya Context: Kenya aims to achieve universal access to electricity with 100% renewable energy sources.¹⁰⁰ According to the Kenya National Electrification Strategy 2018, access to electricity (both on-grid and off-grid) was estimated at 75% of Kenyan households as of 2018.¹⁰¹ This consisted of 53.5% of the households having access to electricity through the national grid (on-grid) and 21.5% relying on off-grid solutions.¹⁰² To achieve universal access to electricity, the government is investing in both off-grid and on-grid electrification. Renewable energy sources contribute about 73% of the total installed on-grid power generation capacity.¹⁰³ The main on-grid renewable energy

94 Ritchie, H. and Roser, M. [Kenya: Energy Country Profile](#). Our World in Data. Accessed 12 December 2022.

95 Ministry of Energy. 2021. [Least Cost Power Development Plan 2021-2030](#).

96 [About Renewable Energy](#). Government of Canada. Accessed 12 December 2022.

97 [International Renewable Energy Agency \(IRENA\)](#). Accessed 12 December 2022.

98 International Energy Agency. 2021. [Renewables: Global Energy Review 2021](#).

99 IRENA. 2022. [Renewable Capacity Highlights](#).

100 Ministry of Energy. 2018. [The Kenya National Electrification Strategy 2018](#).

101 Ministry of Energy. 2018. [Kenya National Electrification Strategy: Key Highlights](#).

102 Dubey, S. et al. 2018. [Energy Access Diagnostic Report Based on the Multi-Tier Framework](#). World Bank.

103 Ibid.



sources are geothermal (27%), hydro energy (28%), wind (11%), bioenergy (3%), and solar (4%).¹⁰⁴ On-grid power generation in Kenya is mainly undertaken by the government with support from independent power producers.

The off-grid electricity solutions mainly serve low-income populations spread across 14 underserved counties in Kenya.¹⁰⁵ The main sources of off-grid electrification are SHS and mini-grids. Other solar consumer products, such as solar lanterns/solar lighting systems, rechargeable solar batteries, and small portable lighting devices, are also important in off-grid electrification.¹⁰⁶ The SHS and solar consumer products are mainly used for lighting or heating by households, institutions, and businesses. Both private and public companies are major providers of mini-grids installation,¹⁰⁷ while the private companies lead in the distribution of SHS and solar consumer products.¹⁰⁸

This report focuses on solar energy instead of other energy sources, such as wind power, hydropower, geothermal energy, and biogas, as most SGBs in Kenya focus on solar energy. The other listed renewable sources are mainly a focus of the government and/or large private corporations (e.g., [Kipeto Energy PLC \(KEP\)](#) for wind power and [Akiira Geothermal Limited](#) for geothermal energy) as they require high upfront investment.

SOLAR ENERGY

Background: Solar energy encompasses technologies that capture and make usable light and heat from the sun. Specific forms include solar photovoltaic, solar thermal energy, solar heating, and solar architecture.¹⁰⁹

Kenya context: According to the Energy and Petroleum Regulatory Authority, Kenya receives between four- and six-kilowatt hours of sunlight per square meter (kWh/m²) per day, one of the highest solar capacities in sub-Saharan Africa.¹¹⁰ However, only a small portion of this energy opportunity has been harnessed. As of 2020, the installed capacity of solar energy in Kenya was estimated at 106 MW, accounting for only 4% of the total installed capacity.¹¹¹ However, investment in the solar industry has grown in recent years. The Government of Kenya's Ministry of Energy has launched programs that will implement solar energy systems to electrify schools and health facilities in rural areas.¹¹² Some private stakeholders have turned to bespoke energy solutions to electrify rural areas, such as solar home systems, solar lanterns, solar refrigerators, and air conditioners. Additional measures to provide energy solutions in areas that cannot be effectively serviced by the grid include retrofitting existing mini-grids to become solar hybrids or installing new solar mini-grids. SGBs also provide support services, including financial support services (pay-as-you-go solutions), solar product marketplaces, and energy advisory services.

Business segments: The business segments identified under the solar energy key area are *solar consumer product providers* (e.g., SHS, solar lanterns), *solar energy system providers* (e.g., mini-grids, rooftop solar), *solar component providers*, *utility-scale solar plants*, and *support service providers*. Among the identified business segments, SGBs are most commonly operate as *solar consumer products providers*, *solar energy system providers*, and *support service providers*.

104 [Energy Profile: Kenya.2022](#). IRENA. Accessed 21 February 2023.

105 Ibid.

106 World Bank. 2017. [Kenya Off-grid Solar Access Project \(KOSAP\) Appraisal Report](#).

107 Ibid.

108 USAID. 2019. [Power Africa Off-grid Project: Off-Grid Solar Market Assessment Kenya](#).

109 EPRA: Renewable Energy Sources. Available [here](#)

110 Ibid.

111 Ibid.

112 Ibid.


Table 7: Business segments and examples of SGBs in solar energy

BUSINESS SEGMENT	DESCRIPTION	EXAMPLES OF SGBS
Solar consumer products providers	Provide products such as SHS and solar lanterns.	<ul style="list-style-type: none"> ▶ Cobitech Solar ▶ Deevabits Green Energy ▶ Usafi Green Energy Ltd
Solar energy system providers	Develop or install mini-grids.	<ul style="list-style-type: none"> ▶ Kijiji Power Ltd ▶ Kudura
Support service providers	Provide services that enable the uptake of solar power.	<ul style="list-style-type: none"> ▶ African Solar Designs ▶ Deevabits Green Energy ▶ SunnyMoney Africa

▶ POLICY LANDSCAPE

The overall policy landscape is supportive of the renewable energy sector. Kenyan government policies champion both grid-tied and off-grid electrification, with a keen interest in off-grid and mini-grid electrification. This section focuses on solar energy, as it receives the most support from the Kenyan government as a cost-effective means to provide electricity to many households. The Ministry of Energy has developed and adopted policies and regulations to promote the growth and expansion of off-grid electrification by the private sector. As a result, the number of SGBs engaged in off-grid electrification has increased, and the market mainly consists of private sector companies, including SGBs.

However, SGBs in the renewable energy sector still face several challenges, such as the erosion of consumer confidence because of inappropriate system standards, faulty installations, importation of sub-standard systems and poor after-sales service, rampant theft of solar photovoltaic panels which discourages their installation, high importation costs for SHS components and lengthy procedures for obtaining tax exemption for solar equipment.¹¹³

Table 8: Key policies and strategies for Kenyan renewable energy

POLICY/STRATEGY	AIM (drawn directly from policy/strategy document)	SUPPORT AND GAPS FOR SGB ACTIVITY
Draft National Energy Policy 2014	An all-encompassing policy that proposes the following to promote the use of solar energy: 1) rolling out a program to distribute solar lanterns to replace kerosene in rural, poor peri-urban, and urban areas, 2) ensuring that all commercial buildings adopt solar and hybrid solar energy sources for water heating and lighting, 3) providing fiscal incentives on solar panels and equipment, 4) providing incentives for the local production and use of efficient solar systems. ¹¹⁴	Rolling out a program to distribute solar lanterns as a substitute for kerosene impacts SGBs that provide solar lanterns by generating more demand for these products. Ensuring that all commercial buildings adopt solar or hybrid solar energy sources creates demand for solar lighting and heating products. Providing fiscal incentives on solar panels and equipment makes them more affordable and thus contributes to increased demand.

113 Ministry of Energy. 2018. [The Kenya National Electrification Strategy 2018](#).

114 Additional promotions include: 5) providing a framework for connecting electricity generated from solar energy to national and isolated grids through direct sale or net metering, 6) promoting the use of hybrid power generation systems to complement the intermittent availability of solar energy, 7) formulating and enforcing minimum standards for solar energy technologies, 8) increasing awareness on the potential opportunities and economic benefits of solar energy technologies, 9) partnering with financiers to enable the public to access credits schemes, and 10) installing solar photovoltaic (PV) systems in 50% of all the remaining public facilities in the off-grid areas.



POLICY/STRATEGY	AIM <i>(drawn directly from policy/strategy document)</i>	SUPPORT AND GAPS FOR SGB ACTIVITY
Energy Act, 2019	Led to the establishment of energy sector entities, such as the Energy and Petroleum Regulatory Authority (EPRA). EPRA undertakes due diligence for SHS companies to enable them to qualify for tax exemptions from the Kenya Revenue Authority (KRA).	The tax exemption is expected to make SHS more affordable which will impact SGBs by generating more demand for SHS.
Energy (Electricity Licensing) Regulations 2012	Requires mini-grid systems with a capacity below 3MW to obtain a permit and those above the threshold to obtain a license.	Provides guidance to enterprises, including mini-grid developer SGBs, on the acquisition of licenses or permits for power generation, distribution, and retail sale.
Energy (Mini-grids) Regulations, 2021	Notes that EPRA has a responsibility of issuing licenses to entities (public and private sector players) that develop mini-grids and applies to developers of mini-grids with an installed capacity of up to 1 MW.	The targeted stakeholders include public mini-grids, the owners, operators, and users of the mini-grids, as well as all other private or public stakeholders.
Energy (Solar Water Heating) Regulations 2012	Requires all premises within a local authority's jurisdiction with a hot water capacity exceeding 100 liters per day to install and use solar heating systems.	These regulations create demand for solar heating systems through their requirements.
Feed-In-Tariffs Policy on Wind, Biomass, Small-Hydro, Geothermal, Biogas, and Solar Resource-Generated Electricity 2012 (FIT)	Allows independent power producers to sell renewable energy-generated electricity to an off-taker at a predetermined tariff for a given period and removes taxes for the importation and production of solar panels.	The removal of tariffs lowers the cost barrier for entrepreneurs.
Kenya National Electrification Strategy (KNES) 2018	Provides a roadmap for achieving universal access to electricity for all Kenyans by 2022 by both on-grid (grid densification, intensification, and expansion) and off-grid electrification (SHS and mini-grids), with a strong emphasis on the off-grid component. Over 1 million new connections – out of 5.7 million total connections – were expected to be supplied via SHS and mini-grids by 2022.	The strategy identifies the private sector as key stakeholders that will provide power and off-grid solutions, which presents opportunities for the suppliers to collaborate with the government on projects like the Last Mile Connectivity.
The Finance Act, 2018	Introduced VAT exemption for all specialized solar equipment and accessories and an 8% VAT on petroleum products (kerosene and diesel). This has resulted in a significantly increased price for petroleum products and a lowered price of solar-powered energy.	The VAT increases the price of petroleum products and lowers the comparative price of solar energy, both of which are expected to boost demand for solar products and create opportunities for SGBs.



POLICY/STRATEGY	AIM (drawn directly from policy/strategy document)	SUPPORT AND GAPS FOR SGB ACTIVITY
<p>The Kenya Action Agenda</p>	<p>Kenya opted into the Sustainable Energy For All (SE4All), a sector-wide, long-term vision covering 2015–2030 to achieve universal access to modern energy services and increase the share of renewable energy in the energy mix to 80% by 2030. Actions proposed are 1) developing a mini-grid policy that fosters the use of renewable energy and increases the confidence of the private sector to invest in these projects, 2) fostering the development of several innovative funding mechanisms (e.g., grants and challenge funds), 3) reviewing the feed-in-tariffs (FiT) in place to provide adequate incentives to investors in renewable energy projects, and 4) implementing a governmental subsidy for supporting the development (pre-investment, capital, and operation) of micro/mini-grids in off-grid areas.</p>	<p>As of 2022, the government is yet to provide any subsidies for the development of mini-grids.</p>

► FUNDING LANDSCAPE

Renewable energy accounts for the largest share of investment in climate finance in Kenya. The investments flowing into renewable energy generation totaled US \$1.33 billion,¹¹⁵ which represents 66% of the total investment in climate finance in Kenya as of 2018.¹¹⁶ While the sector receives investments from all types of financiers (including DFIs, foundations, private investors, and commercial banks), the bulk of the funding comes from private investors thanks to supportive policies and direct subsidies.¹¹⁷ The funding from DFIs and foundations mainly flows to large-scale projects, whereas impact investors, VCs, and traditional finance providers mainly invest directly in enterprises, including SGBs.¹¹⁸ The funding landscape described in this section specifically covers the funding opportunities for solar energy.

- DFIs** active in solar energy include the World Bank and the African Development Bank. The World Bank is financing the implementation of the US \$150 million five-year (2018–2023) Kenya Off-grid Solar Access Project (KOSAP) that aims to increase access to off-grid energy solutions in 14 underserved counties of Kenya by developing 121 mini-grids for community facilities, enterprises, and households. The project is engaging private sector enterprises in the development of mini-grids and distribution of SHS. In 2021, the World Bank, together with Netherlands Enterprise Agency, Energy and Environment Partnership, SNV, and AECF REACT Kenya provided a grant of US \$1.7 million to [Pawame](#), a high-growth enterprise that allows customers to access solar home systems via a pay-as-you-go (PAYG) subscription model. In 2018, the AfDB approved a US \$18.17 million loan for the Kopere project, which encompassed the design, construction, and operation of a 40 MW solar PV power project in Nandi County. Between 2013 and 2018, GIZ implemented the Promotion of Solar-Hybrid Mini-grids (PROSOLAR) project that aimed to improve the planning, technical and commercial skills of the private sector in order to ensure high-quality installation and operation of solar-hybrid mini-grid systems.

115 Conversion of Kshs. 161.1 billion to USD using [Oanda Rates](#) as of 6 September 2022.

116 Odhengo, P. et al. 2021. [The Landscape of Climate Finance in Kenya](#). Republic of Kenya: The National Treasury and Planning.

117 Ibid.

118 Odhengo, P. et al. 2021. [The Landscape of Climate Finance in Kenya](#). Republic of Kenya: The National Treasury and Planning.



- **Impact investors and VCs** are putting money into solar energy enterprises. Acumen launched KawiSafi, an impact fund focused on off-grid solar in East Africa, which provided financing to [Angaza](#), a B2B software-as-a-service (SaaS) company that facilitates PAYGO financing for solar-powered home systems and appliances in emerging markets.¹¹⁹ Kenya Climate Ventures, in partnership with the Kenya Climate Innovation Centre and in collaboration with the Ministry of Foreign Affairs of Denmark (Danish MoFA), implemented the GreenBiz Programme, which supports green enterprises in various sectors, including solar energy.¹²⁰ Other funds available include Energy Access Ventures Fund (EAVF), which specializes in the technology and energy sectors, including solar power,¹²¹ and the Launch Africa Fund.¹²²
- **Foundations** (e.g., Shell Foundation, Mulago Foundation, and OVO Foundation) are providing funding to enterprises in solar energy. Shell Foundation, for example, collaborated with FMO to launch the US \$120 million Energy Entrepreneurs Growth Fund (EEGF) in 2019, which provided catalytic financing to early-to-growth stage companies in sub-Saharan Africa, especially solar energy enterprises.¹²³
- **Commercial banks** – such as Equity Bank – are also providing finances to solar energy enterprises. Equity Bank has partnered with Orb Energy to provide consumers with loan packages to facilitate affordable access to solar power and solar heating systems for Kenyans¹²⁴ and has also partnered with the International Finance Corporation (IFC), FMO, and British International Investment to provide raise US \$165 million in financing for enterprises under the Africa Recovery and Resilience Plan.¹²⁵

► ESTIMATED MARKET OPPORTUNITY (2022–2030)

As noted above, solar energy is the key area with high potential for SGB contribution and growth and is critical in helping Kenya achieve universal access to electricity. For these reasons, the market opportunity is estimated for off-grid solutions (SHS and mini-grids) focusing on solar energy. The market opportunity, based on the government targets-based approach, is estimated at **US \$873 million between 2022 and 2030**, which is composed of US \$67 million for mini-grids, US \$661 million for SHS, US \$103 million for solar lanterns, US \$42 million for tier 0 off-grids (small portable task light device), and US \$73 million for rechargeable batteries.¹²⁶

The market opportunity for renewable energy is estimated based on the target set in the Kenya National Electrification Strategy 2018 to achieve universal access to electricity by 2030. Universal access to electricity is determined by the national population with access to off-grid or on-grid electricity, but the analysis in this report focuses on off-grid electricity only since that is where SGBs are active. Further detail on the methodology used to estimate market potential is available in Appendix B.

119 [KawiSafi Portfolio: Angaza](#). Accessed 12 December 2022.

120 Kenya Climate Innovation Centre. [GreenBiz Programme](#). Accessed 12 December 2022.

121 British International Investment. [Energy Access Ventures Fund](#). Accessed 12 December 2022.

122 Jackson, T. "Kenyan solar startup Pawame banks \$2.45m in grant, equity funding for geographic expansion." *Disrupt Africa*. 8 June 2021.

123 "Shell Foundation and FMO Collaborate to help achieve Clean Energy Access in Sub-Saharan Africa." Shell Foundation. 5 December 2019.

124 KBC. [Renewable Energy: Equity Bank Partners with Orb Energy to Provide Affordable Solar Home Systems](#).

125 "Equity Group, IFC Expand Partnership and Investment to Support Small Business and Climate Smart Projects." Equity Group Holdings. 10 May 2022.

126 This figure is greater than the Kenyan Ministry of Energy's estimate of US \$0.5 billion. The Ministry's estimate covers the investment required to provide off-grid solutions (i.e., SHS and mini-grids) to more than 2 million households in 14 underserved counties and accounts for not only SHS and mini-grids but also solar lanterns, tier 0 off-grids, and rechargeable batteries as well.



Cleaner Fuels

► BACKGROUND AND BUSINESS SEGMENTS

Background: There is no universally agreed definition of “clean” fuels, and the term cleaner fuels has different connotations as per different organizations. Synthesizing the definitions used by the World Health Organization (WHO), the United States Environmental Protection Agency (EPA), the United Nations Environment Program (UNEP), and the Union of Concerned Scientists, cleaner fuels can be defined as fuels that emit lower levels of greenhouse gasses and pollutants relative to conventional gasoline and are derived from renewable energy sources. While non-renewable energy sources, such as liquefied petroleum gas (LPG) and compressed natural gas (CNG), also fall under the category of cleaner fuels according to the definition, this report only focuses on those that are derived from renewable energy sources (e.g., biofuels and green hydrogen).

Cleaner fuels contribute to climate change mitigation since they emit lower levels of greenhouse gasses and pollutants. The feedstocks (plant-based) used to make biofuels absorb the CO₂ that they require from the atmosphere. Similarly, green hydrogen, which is made through the electrolysis of water using renewable electricity, emits only water vapor and warm air.

Kenya Context: Kenya is highly dependent on petroleum fuels to meet its domestic consumption needs in the transport, residential, manufacturing, and commercial sectors.¹²⁷ To reduce dependence on petroleum fuels, Kenya has set a national target of a 10% ethanol blend.¹²⁸ The aim was to produce bioethanol and biodiesel for blending with conventional petroleum fuel. As part of the strategy to improve biofuel production, Kenya has developed a roadmap for bioethanol and biodiesel production, although biodiesel production in Kenya is still in its nascent stage.¹²⁹ On the other hand, Kenya is yet to start producing green hydrogen, and policies or strategies specifically focusing on the production, storage, and distribution of green hydrogen do not exist in Kenya as of 2022. Thus, the scope of this sector analysis focuses on biofuels.

BIOFUELS

Overview: A biofuel is a liquid, solid, or gaseous fuel produced from biomass.¹³⁰ The various types of biofuels include biogas, biodiesel, bioethanol, briquettes, and pellets.¹³¹ Bioethanol is produced from sugarcane, maize, sugar beets, molasses, cassava, and wheat, among other feedstocks.¹³² Biodiesel is produced from vegetable oils (soybean oil, palm oil, rapeseed oil, etc.), animal fats or used cooking oil. Briquettes and pellets are produced from organic materials such as rice husk, sawdust, bagasse, groundnut shells, and other agricultural waste.¹³³ Biogas is produced from the anaerobic decomposition of waste and can be used as fuel for cooking, heating, cooling, and power generation.¹³⁴

Kenyan Context: In Kenya, biofuels such as biogas, biodiesel, bioethanol, briquettes, and pellets, are produced locally. Among them, biogas is the most promising business segment, given that there are over 8,000 biogas plants

127 EPRA. 2019. [Energy and Petroleum Statistics Report 2019](#).

128 Ministry of Energy. 2020. [Bioenergy Strategy 2020-2027](#).

129 Ibid.

130 OECD. 2020. [OECD-FAO Agricultural Outlook 2020-2029](#).

131 Briquettes and pellets are generally not perceived to be cleaner fuels. However, it is a cleaner option for low-income families in rural areas, where most still use wood or charcoal.

132 Ndegwa G. et al. 2011. [Potential for biofuel feedstock in Kenya](#). World Agroforestry Centre.

133 Hosier, R. et al. 2017. [Scalable Business Models for Alternative Biomass Cooking Fuels and Their Potential in Sub-Saharan Africa](#). World Bank.

134 Ibid.



countrywide.¹³⁵ The government has also set a target of 6,500 biogas digesters every year, which will help to improve biogas production.¹³⁶

Business Segments: SGBs like [Afrisol Energy](#) and [SimGas Kenya Ltd](#) produce and distribute biogas to end customers. Other business segments – bioethanol, biodiesel, and briquettes and pellets – are still in their nascent stage. Biodiesel production in Kenya is still very low due to insufficient quantities of feedstocks, lack of access to quality seeds for feedstock production, and the high cost of raw materials which leads to high production costs.¹³⁷ However, the EPRA has developed a biofuel guideline to monitor and promote the biodiesel market,¹³⁸ and SGBs such as [Zijani, Nilger Ventures Limited](#), and [Giloil Company Ltd](#), are active in this business segment.

Bioethanol production in Kenya is very low (about 1.2 million liters per year) due to insufficient quantities of feedstock. However, SGBs like [Aqua Ethanol Technologies Limited](#), [Koko Networks](#), and [Consumers Choice Limited](#), source raw materials and produce and distribute bioethanol. Similarly, the production and consumption of briquettes and pellets are hindered by inadequate biomass feedstock quantities, lack of capacity to fabricate and maintain briquetting machines, and the high cost of briquettes compared to the competition from other alternative, and often cheaper, forms of fuel such as firewood, although the following SGBs – [Acacia Innovations](#), [Vuma Biofuels](#), [Kencoco Ltd](#), [BioAfriq Energy Limited](#), [Maa Briquettes Limited](#), [Iko Briq Limited](#) – operate across the briquette and pellets value chain. However, bioethanol, and the briquettes and pellets business segments are likely to grow in the coming years, given the government's focus on a 100% transition to clean cooking by 2028 and the introduction of incentives such as the removal of VAT on biogas, bioethanol, briquettes, and pellets to create demand for these biofuels.

► POLICY LANDSCAPE

The Government of Kenya has developed various policies and strategies to promote the development of biofuels, including biodiesel, bioethanol, biogas, and briquettes and pellets. Some policies provide incentives for the consumption of biofuels while others aim to promote biofuel production. These policies do not directly target SGBs but are expected to create opportunities for SGBs indirectly, such as tax concessions which lower production costs.

While the government has actualized the implementation of some policy actions aimed at promoting biofuel production, other actions are still pending. As of 2022, the government is yet to set aside land for feedstock production due to competition for land between food crops and energy crops. Also, the government is yet to provide incentives such as tax concessions for biodiesel production. As such, SGBs still face challenges, including high production costs, insufficient raw materials, and competition from alternative and cheaper fuels.

135 [Energy and Petroleum Regulatory Authority](#). Accessed 12 December 2022.

136 Ministry of Energy. 2020. [Bioenergy Strategy 2020-2027](#).

137 Primary research insight.

138 Energy & Petroleum Regulatory Authority. 2020. [Energy & Petroleum Regulatory Authority: Strategic Plan 2020/21-2022/23](#). Kenya Literature Bureau.


Table 9: Key policies and strategies for Kenyan biofuels

POLICY/STRATEGY	AIM (drawn directly from policy/strategy document)	SUPPORT AND GAPS FOR SGB ACTIVITY
Bioenergy Strategy 2020-2027	Indicates that there is a potential for biodiesel production in Kenya given the availability of land for growing feedstocks such as castor, croton, and jatropha. However, the strategy identifies several challenges affecting biofuel production, including the high cost of raw materials, ¹³⁹ high production costs, low demand due to a lack of consumer awareness, and lack of access to seeds for feedstock production.	The strategy mentions actions such as equipping existing energy centers with briquetting technology, disseminating knowledge, and commercializing it through technical and vocational education and training (TVET) institutions across the country can promote the development of briquette and pellet value chains.
Finance Act 2021	Proposes removing the 16% VAT for sustainable briquettes, biogas, and bioethanol to encourage the household use of biofuels.	The VAT exemption is expected to make biofuels more affordable to households and increase demand. The government has also removed excise taxes and levies for petroleum regulation, petroleum development, and road maintenance when bioethanol is used as a transport fuel, which increases demand for bioethanol. However, a similar tax exemption is yet to be introduced for briquette manufacturers which could bring down the high cost of imported briquette equipment.
Kenya National Bureau of Standards (KEBS)	Developed standards for B5 (a fuel compound of 5% biodiesel and 95% petroleum) and B100 (100% biodiesel) biodiesel blends. This standard is intended to provide guidelines on how to blend biodiesel with conventional petroleum fuel. The EPRA has also developed a biofuel guideline that provides a regulatory framework for SGBs involved in biodiesel production. ¹⁴⁰	The guideline is intended not only to monitor activities in biodiesel production but also to promote the development of the biodiesel market, which may, in turn, support SGBs in this segment.
National Energy Policy, 2018	Notes that the government will provide land for feedstock production such as jatropha, castor, croton, sugarcane, sweet sorghum, and cotton. This will ensure that there are sufficient raw materials for biodiesel and biodiesel production and, in turn, lower biofuel production costs.	As of 2022, the government is yet to set aside land for feedstock production, and the challenge of insufficient raw materials for biofuel production persists.
Strategy for the Development of the Biodiesel Industry in Kenya (2008-2012)	Outlines strategic actions for promoting biodiesel production, which include forming the Kenya Biodiesel Association (KBDA) that brings together all players along the biodiesel production chain, such as farmers, SGBs, private investors, and the government, and encourages private investors to support biodiesel production.	The strategy indicates that the government will introduce incentives such as tax concessions to encourage local production of biodiesel and reduce importation; however, these are not yet in place as of 2022.

139 As raw materials such as edible vegetable oils and animal fats are imported due to low production in the country, they are expensive and not readily available for the economical production of biodiesel.

140 [Giloil Company Ltd](#) is one of the first companies in Kenya to get EPRA approval to participate in large-scale biodiesel production.



► FUNDING LANDSCAPE

As of 2022, there are no investors in the green hydrogen space in Kenya.¹⁴¹ However, the biofuels key area receives investments from all types of financiers (including DFIs, foundations, private investors, and commercial banks).

- **DFIs** including the World Bank, African Development Bank, GIZ, FinnFund, Norfund are involved in implementing renewable energy projects in Kenya. For example, the World Bank is implementing the [Promoting Biogas as Sustainable Clean Cooking Fuel for Rural Households Project \(2016–2025\)](#), which aims to improve access to biogas energy among rural households.
- Active **impact investors and VCs** in biofuels include Kenya Climate Ventures, Acumen, DOB Equity, EEP Africa, Energy Access Ventures Fund, Spark+ Africa Fund, Alphamundi Group, KawiSafi Ventures, and Village Capital among others. Kenya Climate Ventures has provided funding to cleaner fuels SGBs such as [Acacia Innovations](#), [Kings Biofuels](#), and [Vuma Biofuels](#). Village Capital has provided funding to [EcoFix \(K\)](#) (formerly EcoFuels Kenya).
- **Foundations** such as the Shell Foundation, Green Africa Foundation, and Mulago Foundation also provide funding to SGBs working in cleaner fuel production. Through its biofuel project, Green Africa Foundation focuses on the “cultivation and processing of jatropha oil, an environmentally safe, cost-effective renewable source of non-conventional energy and a promising substitute for diesel, kerosene, fuel wood, charcoal, and LPG, among others.”¹⁴²
- **Commercial banks** in Kenya, such as SBM Bank Kenya, Equity Bank, Kenya Commercial Bank, and Victoria Commercial Bank, also provide funding to SGBs in the cleaner fuels subsector.¹⁴³ However, commercial banks charge higher interest rates. Hence, SGBs mostly prefer impact investors and VCs since they have better terms.¹⁴⁴

► ESTIMATED MARKET OPPORTUNITY (2022–2030)

Of the two identified key areas (i.e., biofuels and green hydrogen), this report only captures the market size for biofuels as Kenya is yet to start producing green hydrogen. Using the government targets-based approach, the market potential for biofuels is estimated at **US \$1.21 billion between 2022–2030**, which consists of US \$683 million for bioethanol, US \$286 million for biodiesel, US \$204 million for biogas, and US \$38 million for briquettes and pellets.

141 The National Green Hydrogen Working Group established by the government of Kenya is expected to provide guidelines on private investor participation. Read more at N. Tena. 2022. [Kenyan Government to Pilot Green Hydrogen Production](#). Green Building Africa.






142 [Green Africa Foundation- Renewable Energy Project](#). Accessed 12 December 2022.

143 Primary research insight

144 Ibid.



Sector Group: Land and Ocean Management


SUSTAINABLE AGRICULTURE AND AQUACULTURE		
KEY AREAS	BUSINESS SEGMENTS	MARKET OPPORTUNITY (2022-2030)
 Pre-production and production	<ul style="list-style-type: none"> ✓ Data-driven advisory services ✓ Green equipment providers ✓ Environment-friendly input providers ✓ Innovative production services 	<p>US \$32.6 billion combining all key areas and business segments</p>
 Post-production	<ul style="list-style-type: none"> ✓ Green storage ✓ Processing equipment providers 	
 Sustainable livestock management	<ul style="list-style-type: none"> ✓ Data-driven advisory services ✓ Green fodder providers ✓ Green equipment providers ✓ Animal products marketplaces 	
 Aquaculture	<ul style="list-style-type: none"> ✓ Green equipment providers ✓ Fish marketplaces 	
 Cross-cutting activity	<ul style="list-style-type: none"> ✓ Farm to home 	



SUSTAINABLE FORESTRY

KEY AREAS	BUSINESS SEGMENTS	MARKET OPPORTUNITY (2022-2030)
 Agroforestry	<ul style="list-style-type: none"> ✓ Tree seedling production and provision of tree management services ✓ Production of bamboo seedling and bamboo-based products 	<p>US \$438 million</p>
 Forest conservation	<ul style="list-style-type: none"> ✓ Tree seedling production and provision of tree management services ✓ Production of bamboo seedling and bamboo-based products ✓ Production and sale of sustainable wood forest products 	<p>US \$934 million</p>
 Non-timber forest products	<ul style="list-style-type: none"> ✓ Processing and sale of non-timber forest-based products 	<p>US \$2.8 million</p>

ECOTOURISM

KEY AREAS	BUSINESS SEGMENTS	MARKET OPPORTUNITY (2022-2030)
 Ecotourism	<ul style="list-style-type: none"> ✓ Eco-lodging ✓ Eco-tours ✓ Agro-tourism 	<p>No estimate due to the lack of SGB activities in this sector</p>



Sustainable Agriculture and Aquaculture

► BACKGROUND AND BUSINESS SEGMENTS

Background: Sustainable agriculture refers to agricultural practices designed to meet the needs of present and future generations while maintaining profitability, environmental health, and social and economic equity.¹⁴⁵ Globally, the agricultural sector is the second largest contributor to climate change,¹⁴⁶ and new data from the Food and Agriculture Organization of the United Nations (FAO) reveal that the GHG produced by agrifood systems made up 31% of the global GHG emissions in 2020.¹⁴⁷ This percentage contribution of GHG is expected to grow as the world will need to produce about 35% more food to feed its population by 2030.¹⁴⁸ Therefore, interventions that increase agricultural productivity and decrease emissions are urgently required to lower the carbon footprint of food production.

There is growing support for aquatic foods as a potential solution for food security and nutrition.¹⁴⁹ Aquaculture already plays a significant role in the global economy, employing 58.5 million people in primary production, and is an important source of protein in Asia and Africa.¹⁵⁰ However, sustainability remains a challenge as aquaculture contributes to GHG emissions during fish capture or growth, processing, transportation, and storage.

Sustainable agriculture and aquaculture play an important role in climate mitigation and adaptation. Sustainable agriculture practices, such as reductions in the use of nitrogen fertilizers, changing livestock and manure management practices, and use of renewable energy sources in agricultural production, help to reduce GHG emissions.¹⁵¹ Sustainable aquaculture involves the use of technologies that increase the efficiency of aquaculture production and reduce fish waste and losses, thus reducing GHG emissions.¹⁵² Sustainable agriculture also contributes to climate adaptation by enhancing the resilience of crops against drought, pests, diseases, and other climate-related risks and shocks.¹⁵³ In sustainable aquaculture, selective fish breeding helps to increase the resilience of fish to diseases and climatic conditions, so they adapt to climate change. It also provides new locations for fishing and economic opportunities for farmers whose crops are affected by climate change.¹⁵⁴

Kenya Context: In Kenya, agriculture is critical for economic growth, employment creation, addressing food insecurity, and managing the degradation of natural resources.¹⁵⁵ It accounts for approximately half of the country's GDP¹⁵⁶ both directly and indirectly through supporting agro-based industries and the service sector. Agriculture in Kenya accounts for roughly 75% of total employment and 65% of exports, as well as supporting over 80% of the

145 FAO. [Sustainable Development Goals – Sustainable agriculture](#). Accessed 23 September 2022.

146 “New FAO analysis reveals carbon footprint of agri-food supply chain.” UN News. 8 November 2021.

147 FAO Stat. [Emission Shares](#). Accessed 23 September 2022.

148 As per current trends, the increase will only be about 20%. See: Kray, H. [Farming for the Future: the environmental sustainability of agriculture in a changing world](#). World Bank Group.

149 FAO. 2022. [The State of World Fisheries and Aquaculture – Towards Blue Transformation](#).

150 Ibid.

151 Horowitz, J. and Gottlieb, J. 2010. [The Role of Agriculture in Reducing Greenhouse Gas Emissions](#). United States Department of Agriculture.

152 FAO. 2022. [The State of World Fisheries and Aquaculture – Towards Blue Transformation](#).

153 [World Bank – Climate Smart Agriculture](#). Accessed 23 September 2022.

154 Shelton, C. 2014. [Climate Change Adaptation in Fisheries and Aquaculture](#). FAO.

155 Ministry of Agriculture, Livestock and Fisheries. 2017. [Kenya Climate Smart Agriculture Strategy-2017-2026](#).

156 Ministry of Agriculture, Livestock, Fisheries and Irrigation. 2019. [Agricultural Sector Transformation and Growth Strategy 2019-2029](#).



rural population.¹⁵⁷ The environmental effect of the agrifood system is immense, contributing 72% of Kenya's total GHG emissions.^{158 159}

The livestock segment contributes about 20% of the AgGDP (agri-food system gross domestic product) and about 5% of Kenya's GDP.¹⁶⁰ Fifty percent of the country's agricultural labor force works in livestock, a percentage that only grows when focusing on the 17.5 million Kenyans living in ASALs.¹⁶¹ Though the segment can provide enough for both domestic needs and exports, it has yet to do so due to a number of poverty-related challenges.¹⁶²

The fisheries segment is currently worth an estimated US \$5 billion. It is also responsible for employing 1.2 million Kenyans either directly or indirectly via supply chains and aquafarming. However, there is even greater untapped potential in the Exclusive Economic Zone that could grow the country's earnings in this segment, which currently contributes about 2% of AgGDP and 0.5% of the national GDP.¹⁶³

Crops, livestock, and fisheries constitute important segments of agriculture in Kenya. Considering these segments of agriculture along with the importance of the value chain for agriculture, five key areas can be identified: *pre-production and production, post-production, sustainable livestock management, aquaculture, and cross-cutting activity*. The pre-production and production and post-production key areas capture value chains in crop production, and the cross-cutting activities apply to crops, livestock, and fisheries.

PRE-PRODUCTION AND PRODUCTION

The pre-production stage refers to the preparatory stage before the sowing of seeds or before the agricultural production process begins. This stage involves innovations in agricultural inputs, such as fertilizer or crop protection products,¹⁶⁴ and the use of innovative technologies, such as drone mapping, soil testing, etc. Production refers to processes such as sowing, irrigation, weeding, harvesting, etc. There are several sustainable agricultural practices, such as intercropping, crop rotation, vermicomposting, etc., that reduce the impact of the agricultural process on the environment and are covered under this key area.

Business segments: The key business segments for Kenya in the pre-production and production key area emphasize optimizing resource use, utilizing smart irrigation techniques, extension services, integrated pest management, organic fertilizers, or minimal use of synthetic fertilizers. The business segments identified under this key area include *data-driven advisory services, green equipment providers, environment-friendly input providers, and innovative production services*.

157 Ministry of Agriculture, Livestock and Fisheries. 2017. [Kenya Climate Smart Agriculture Strategy-2017-2026](#).

158 FAO Stat. [Emission Shares](#). Accessed 23 September 2022.

159 GHG emissions largely come from the conversion of land usage, unsustainable usage of forest products, forest fires, and shifting cultivation (see [Climate Action Tracker](#)). Most of these contributors – except for shifting cultivation – are covered under the sustainable forestry sector in this report.

160 Ministry of Agriculture, Livestock and Fisheries. 2017. [Kenya Climate Smart Agriculture Strategy-2017-2026](#).

161 Ibid.

162 Alila, P. and Atieno, R. 2006. [Agricultural Policy in Kenya: Issues and Processes](#). Future Agricultures.

163 Ministry of Agriculture, Livestock and Fisheries. 2017. [Kenya Climate Smart Agriculture Strategy-2017-2026](#).

164 Farming First. [Innovations for Sustainable Food Systems](#). Accessed 19 September 2022.


Table 10: Business segments and examples of SGBs in pre-production and production

BUSINESS SEGMENT	DESCRIPTION	EXAMPLES OF SGBS
Data-driven advisory services	Refers to insights derived from data to improve the resource efficiency and productivity of agricultural production. This segment includes all kinds of advisory services about the weather, soil preparation, crop selection, use of fertilizers and inputs, etc.	<ul style="list-style-type: none"> ▶ Agrihouse Solutions Kenya ▶ Dashcrop Limited ▶ Farmbetter ▶ FarmDrive ▶ FarmIT
Green equipment providers	Includes all kinds of farm equipment or devices that use renewable energy or are energy efficient like solar pumps, solar tractors, soil testing equipment, and irrigation devices, among others.	<ul style="list-style-type: none"> ▶ Ifarm360
Environment-friendly input providers	Environment-friendly inputs are agricultural inputs that are organic and natural and reduce the negative impact of the agricultural production process on the environment.	<ul style="list-style-type: none"> ▶ Agrihouse Solutions Kenya ▶ Eco Sawa Ltd ▶ Safi Organics
Innovative production services	Include agricultural practices that reduce the environmental impact of agricultural production, such as hydroponics, vertical farming, and organic farming, among many others.	<ul style="list-style-type: none"> ▶ Hydroponics Africa

POST-PRODUCTION

Post-production processes refer to post-harvest processing operations as well as forward linkage for products, such as shelling, milling, packaging, storage, and transportation, among others, and the steps taken to deliver food from the farmer to the consumer.¹⁶⁵ Green post-production processes involve using climate-friendly practices in the process.

Business segments: The main business segments for Kenya identified under this key area are *green storage*, *processing equipment providers*, *testing and certification*, and *green marketplaces*. However, no SGBs were observed under the testing and certification and green marketplace business segments.

SGBs like [Solar Freeze](#), [SokoFresh](#), [InspiraFarms](#), and [FreshBox](#) provide energy-efficient or renewable energy-based storage solutions such as solar-powered cold storage. SGBs like [Elgon Kenya Ltd](#) provide post-harvest equipment that uses renewable energy and is energy efficient such as solar processors and solar dryers.

SUSTAINABLE LIVESTOCK MANAGEMENT

According to the World Bank, the various dimensions of sustainable livestock management include “balancing animal rations and sustainable sourcing of feeds, carbon sequestration in agricultural landscapes, energy-efficient technologies and renewable energy sources, animal health and welfare, better manure management, etc.”¹⁶⁶ Technological innovations such as data-driven feed management for increased yields and predictive disease management help to make livestock farming more sustainable and more resilient to climate change.

¹⁶⁵ FAO. [Sustainable Agriculture Mechanization](#). Accessed 22 September 2022.

¹⁶⁶ World Bank. [Moving Towards Sustainability: The Livestock Sector and the World Bank](#). Accessed 19 September 2022.



Business segments: The business segments identified for sustainable livestock management include: *data-driven advisory services, automated livestock management solutions, green fodder providers, green equipment providers, animal traceability technologies, and animal products marketplaces*. However, no SGBs were identified in Kenya that provide automated livestock management solutions or animal traceability technologies.

Table 11: Business segments and examples of SGBs in sustainable livestock management

BUSINESS SEGMENT	DESCRIPTION	EXAMPLES OF SGBS
Data-driven advisory services	Provide advisory services and leverage data for insights to improve livestock management regarding the kinds of breeds, prediction of diseases, medical treatment, and the safety of animals.	▶ iCow
Green fodder	Green fodder refers to animal feed with lower environmental impact than traditional animal feed.	▶ Biofit Agritech Kenya ▶ LishaBora
Green equipment providers	Provide equipment that uses renewable energy or is energy efficient and is used in the livestock management value-chain.	▶ Simatech Integrated Solutions Ltd.
Animal product marketplaces	SGBs in this segment offer online platforms that provide market linkage for animal products.	▶ iCow

AQUACULTURE

There is potential for aquaculture expansion in Kenya, especially as population and urbanization grow. The business segments under this key area were identified based on activities undertaken by the enterprises in aquaculture management. The list of business segments consists of the following: *fish marketplaces, automated fish management, green equipment providers, and fish feed providers*. However, no SGBs were identified in the automated fish management solutions and fish feed provider segments. SGBs, like [Victory Farms](#) and [Mtaani Fish Farm](#), are green equipment providers that make equipment that uses renewable energy or is energy efficient available to customers in the aquaculture management value chain. In the fish market platforms segment, SGBs like [Aquarech](#) provide a technology platform where fish farmers, fish feed manufacturers, and fish buyers can buy or sell fish feeds and fish.

CROSS-CUTTING ACTIVITY

Cross-cutting activities cover the entire value chain of either sustainable agriculture or sustainable livestock management or aquaculture. The SGBs under the cross-cutting activity key area work across the entire agricultural value chain, beginning at the pre-production stage and ending at last-mile delivery to customers. The relevant business segment under this key area is *farm-to-home*. Farm-to-home or farm-to-fork refers to agricultural, animal, or fish products that reach the final consumer directly from the farm at which they were produced. While the data on the overall market size of the farm-to-home business segment is not available, SGBs like [Tulaa](#), [Farmster](#), [Farmshine](#), and [iCow](#), use mobile technology to connect smallholder farmers to consumers and retailers.



► POLICY LANDSCAPE

The government has formulated various policies and strategies aimed at addressing climate change and climate-smart agriculture issues. However, there are several challenges that persist, including poor enforcement of sustainable agriculture-related policies and overlap of mandates among institutions implementing sustainable agriculture interventions, which contributes to inefficiency in the implementation of programs. The government is addressing these challenges by clearly distinguishing the roles of different institutions at the national and county levels. The ministries at the national level are responsible for formulating the policies, while the county governments are responsible for implementation.

Table 12: Key policies and strategies for Kenyan sustainable agriculture and aquaculture

POLICY/STRATEGY	AIM (drawn directly from policy/strategy document)	SUPPORT AND GAPS FOR SGB ACTIVITY
Agriculture Policy 2021	Aims to transform crop, livestock, and fisheries producers into commercially oriented enterprises that ensure sustainable food and nutrition security. There are several challenges hindering achieving this goal (described in policy). To address these challenges, the policy proposes 1) pursuing sustainable commercial agriculture by increasing and diversifying agricultural production and productivity using appropriate, good quality, and affordable inputs, 2) reducing post-harvest losses of agricultural produce and products by investing in post-harvest technologies, 3) promoting agribusiness, value addition and product development, 4) harnessing resources (finances) for improved agricultural output in partnership with the private sector and introducing appropriate financing and insurance systems in the sector, 5) promoting sustainable natural resource use and management for agriculture, 6) protecting and conserving of biodiversity that is supportive of sustainable agriculture, 7) facilitating access to premium domestic, regional, and international markets to encourage agricultural production, 8) promoting demand-driven research and timely dissemination of research findings in the agricultural sector and conserving the biodiversity of different crops, livestock, and fish.	Addressing the challenges in the sector will require the participation of enterprises, including SGBs, that provide various solutions, including farm inputs, irrigation technologies, post-harvest processing and storage technologies, livestock management, and market linkage support.
Agricultural Sector Transformation and Growth Strategy 2019–2029	Identifies three anchors to drive the 10-year transformation in sustainable agriculture. The specific targets set for the first five years are 1) increase small-scale farmer, pastoralist, and fisherfolk incomes, 2) increase agricultural output and value add through a rapid PPP process, and 3) increase household food resilience.	Achieving each of the targets in the three anchors requires support from enterprises, including SGBs. For example, those that provide farm inputs, processing, and storage equipment (target 1), post-harvest processing and storage solutions (target 2), and innovative food production techniques such as vertical and organic farming (target 3).



POLICY/STRATEGY	AIM (drawn directly from policy/strategy document)	SUPPORT AND GAPS FOR SGB ACTIVITY
Green Economy Strategy and Implementation Plan (GESIP) 2016–2030	Highlights the following actions to promote sustainable agriculture: 1) increasing irrigation using appropriate technologies for enhanced food production, 2) reducing post-harvest losses by improving efficiency along the value chain (transportation, storage, processing, and marketing), 3) expanding roads and other transport infrastructure networks in agriculture areas.	These actions require the participation of private enterprises, including SGBs. For instance, reducing post-harvesting losses will require support from SGBs that provide processing, storage, and market linkage support and increasing irrigation will require the participation of SGBs that provide irrigation technologies and equipment, such as solar-powered irrigation systems.
Kenya Climate Smart Agriculture Strategy 2017–2026	Outlines the adaptation and mitigation actions in agriculture. The key areas that the strategy aims to address include: 1) enhancing the adaptive capacity and resilience of farmers, pastoralists, and fisherfolk to the adverse impacts of climate change, 2) developing mechanisms that minimize greenhouse gas (GHG) emissions from agricultural production systems, 3) addressing cross-cutting issues that adversely impact climate-smart agriculture, and 4) creating an enabling regulatory and institutional framework.	The implementation of KCSAS is expected to create opportunities for enterprises, including SGBs, as it aims to provide solutions for enhancing adaptive capacity and resilience. ¹⁶⁷ Direct financing from the government and investments by the private sector through PPPs are critical to the successful implementation of this strategic initiative.
National Agricultural Marketing Strategy 2021–2030	Aims to improve competitiveness and increase market access for Kenyan agricultural produce and products in all market segments to enhance the incomes and livelihoods of producers and other value chain actors. Some of the objectives of the strategy include achieving a sustainable supply of agricultural produce and products that meet market demand, developing and maintaining modern market infrastructure for efficient marketing of agricultural produce, and improving the value of agricultural produce for increased market access.	These interventions are expected to create opportunities for enterprises, including SGBs, that create market linkages for farm produce to reduce post-harvest losses.
National Agriculture Soil Management Policy 2020	Includes 1) promoting efficient and sustainable use of soil as a resource for increased agricultural productivity and 2) creating an enabling policy environment for public and private investments in agricultural soil management improvement programs and projects, in addition to several others.	The policy calls for the participation of the private sector in agricultural soil management, including soil testing and the production of organic fertilizers that conserve the soil, which creates opportunities for enterprises, including SGBs, that produce organic fertilizers and those that provide soil testing services.

¹⁶⁷ The types of SGBs that may be supported by this strategy include those that provide: data-driven advisory services for optimum crop production, aquaculture, and livestock management; solutions that minimize greenhouse gas emissions from agricultural production systems; and green production equipment, green farm inputs such as organic fertilizers and innovative production technologies such as organic farming.



POLICY/STRATEGY	AIM (drawn directly from policy/strategy document)	SUPPORT AND GAPS FOR SGB ACTIVITY
National Livestock Policy 2019	Identifies measures to enable the livestock segment to enhance its contribution to food and nutritional security, provide raw materials for agro-based industries, and contribute to improved livelihoods in the country. Due to frequent droughts that affect livelihoods that are dependent on livestock, the policy proposes to establish a livestock insurance scheme that will be operated in a public-private partnership model.	The improvement of livestock management systems requires the participation of private sector enterprises, including SGBs, that provide green fodder for livestock and data-driven advisory support.
National Oceans and Fisheries Policy 2008	Proposes ecosystem-based sustainable exploitation of fishery resources, conservation, and management. The policy proposes to use adaptive and environmentally sustainable technologies and best international practices and requires the enforcement of fish handling standards that minimize post-harvest losses.	The policy calls for the participation of private sector players in the development of adaptive and environmentally sustainable technologies for aquaculture. This is expected to create opportunities for enterprises, including SGBs, that produce fish feeds or provide technology for reducing post-harvest losses.

► FUNDING LANDSCAPE

In Kenya, sustainable agriculture and aquaculture have gained traction with several investors. The sector receives investments from all types of financiers (including DFIs, foundations, private investors, and commercial banks) but relies heavily on private investors. While some enterprises successfully raise funds from various investors in the sector, many others struggle due to a lack of sustainable business models for growth.¹⁶⁸

PRE-PRODUCTION AND PRODUCTION

The majority of pre-production and production investors provide financing across the agriculture value chain rather than to a specific segment.

- **DFIs** active in the pre-production and production key areas include Finnfund, Norfund, IFC, Novastar Ventures, the World Bank, GIZ, FMO, and the AfDB. For instance, [Twiga Foods](#) raised US \$3 million from Finnfund to expand its reach to farmers¹⁶⁹ and US \$30 million from the IFC.¹⁷⁰ In 2018, [Apollo Agriculture](#) raised US \$500,000 from FMO and Rabobank Foundation to “fund the farmers’ harvesting cycles, further develop the credit model, and expand geographically.”¹⁷¹
- Other **DFIs** support ventures via projects and funding. The World Bank’s Kenya Climate Smart Agriculture Project (KCSAP) focused on increasing productivity at various points in the value chain while building climate resilience in smallholder farmers and pastoral communities in Kenya over a five-year period (2017–2022).¹⁷² In 2022, Norfund invested US \$20 million in equity to AgDevCo (which has invested in agribusiness enterprises like [Afrimac](#) and

¹⁶⁸ Primary research insight.

¹⁶⁹ “OP Finnfund Global Impact Fund I invests in food distribution platform Twiga to improve food security across Sub-Saharan Africa.” Finnfund. 1 November 2021.

¹⁷⁰ [Twiga Foods - Crunchbase profile](#). Accessed 12 December 2022.

¹⁷¹ [FMO: Apollo Agriculture Limited](#). Accessed 12 December 2022.

¹⁷² [Kenya Climate Smart Agriculture Project](#). World Bank. Accessed 19 September 2022.



Victory Farms.¹⁷³ GIZ is implementing the Water and Energy for Food Grand Challenge (WE4F) project that supports enterprises (e.g., **SokoFresh**) in sustainable agriculture.¹⁷⁴

- **Impact investors, VCs, and PE investors** active in these key areas include Kenya Climate Ventures (KCV), Acumen, SME Impact Fund, A-Spark Good Ventures, GroFin, DOB Equity, Alphamundi Group, Accion Venture Lab, AHL Venture Partners, Gray Matters Capital, Village Capital, Creadev, and ICCO Investments, among others. KCV is one of the most active impact investors in sustainable agriculture in Kenya.¹⁷⁵ They are involved in the implementation of the Danish GreenBiz Programme (2021–2025) that supports 300 enterprises in various sectors, including sustainable agriculture,¹⁷⁶ and have invested in SGBs like **Lentera Africa**, **Hydroponics Africa**, and **Dashcrop Limited**. Gray Matters Capital supports enterprises that serve underserved populations in developing countries and granted US \$220,000 to **Farmers Pride** in 2020. DOB Equity supports businesses that positively contribute to a more sustainable society and provides finances to **Twiga Foods** and **Croprnuts**. **Twiga Foods** also raised US \$50 million from Creadev in 2021 and US \$6.3 million from Alphamundi and OPI in 2019.¹⁷⁷ Accion Venture Lab also invested US \$6 million in **Apollo Agriculture** in 2016.¹⁷⁸
- **Foundations** active in this area include the Gatsby Foundation, Rockefeller Foundation, Bill and Melinda Gates Foundation, Safaricom Foundation, Mastercard Foundation, and Grameen Foundation, among others. The Gatsby Foundation invests in enterprises that facilitate access to and adoption of verified inputs and best practices in an effort to improve outcomes for farmers and increase farm resilience and soil health.¹⁷⁹ The Mastercard Foundation partnered with Kenya Commercial Bank (KCB) Group to raise US \$30 million in 2016 to mobilize and train smallholder and pastoralist farmers on financial literacy and business management.¹⁸⁰
- **Commercial banks** active in this area include Equity Bank and KCB Group. Equity Bank provides loans to farms of all scales and agribusiness. A Kilimo Biashara loan for small-scale farmers ranges between US \$41 and US \$824 and aids in purchasing farm inputs (e.g., certified seeds, fertilizers, chemicals, machinery, the hiring of labor, and harvesting costs).¹⁸¹ The bank also provides a commercial agriculture loan that targets medium and large-scale farmers, agricultural traders, and processors.¹⁸² Their Micro Agribusiness Loan provides financing to agricultural service providers offering equipment and training, among other forms of support.¹⁸³ KCB Group raised US \$200 million in 2016 to provide credit to farmers in the dairy, livestock, and food sectors through the KCB MobiGro program.¹⁸⁴

173 [Norfund invests 20 million USD in African agriculture and food production](#). Norfund. 24 February 2022.

174 [Water and Energy for Food Grand Challenge \(WE4F\)](#). Accessed 19 September 2022.

175 About 65% of KCV's portfolio, both in terms of the number of enterprises and investment value, is in sustainable agriculture. KCV invests in early and growth-stage enterprises that provide climate-smart agriculture solutions. The ticket size ranges between US \$50,000 –200,000 for early-stage ventures and between US \$ 100,000 –1 million in debt, convertible debt, and equity for growth-stage ventures (source: [Kenya Climate Ventures: Products and Services](#)).

176 Kenya Climate Innovation Centre. [GreenBiz Programme](#). Accessed 12 December 2022

177 [Twiga Foods - Crunchbase profile](#). Accessed 12 December 2022.

178 Lewis, A. "Investment firm Accion explains why it backed Nairobi-based Apollo Agriculture." *How we made it in Africa*. 25 May 2020.

179 [Gatsby Africa - Agricultural Inputs](#). Accessed 12 December 2022.

180 "KCB Group and Mastercard Foundation Announce Agricultural Finance Program to Benefit Two Million Farmers." Mastercard Foundation. August 2016.

181 [Kilimo Biashara Loan- Small Scale](#). 1 Kenyan shillings = 0.0082 US dollars based on the conversion rate on 21 September 2022.

182 [Equity Group Holdings - Commercial Agriculture Loan](#). Accessed 12 December 2022.

183 [Equity Group Holdings - Micro Agribusiness Loan](#). Accessed 12 December 2022.

184 "KCB Group and Mastercard Foundation Announce Agricultural Finance Program to Benefit Two Million Farmers." Mastercard Foundation. August 2016.



SUSTAINABLE LIVESTOCK AND AQUACULTURE MANAGEMENT

- **DFIs** active in sustainable livestock and aquaculture management include the World Bank, International Fund for Agricultural Development (IFAD), FMO, GIZ and AfDB among others. In 2019, the Kenyan government and the World Bank launched the Kenya Marine Fisheries and Socioeconomic Development Project, aiming to support sustainable aquaculture practices while ameliorating the ecosystem. IFAD partnered with the Government of Kenya to implement the Aquaculture Business Development Programme, which supports the development of aquaculture support enterprises to ensure increased smallholder aquaculture production and income generation.¹⁸⁵ In the livestock key area, the World Bank provided US \$250 million debt financing to support the implementation of the National Agricultural and Rural Inclusive Growth Project and the Kenya Climate Smart Agriculture Project in 2021, supporting farmers engaged in dairy, poultry, fruits, vegetables, coffee, cotton, cashew nut, apiculture, and pyrethrum value chains.¹⁸⁶
- **Impact investors** include DOB Equity, A-Spark Good Ventures, Grofin, KCV, and Conservation International Ventures, among others. DOB Equity has invested in [Victory Farms](#), a sustainable enterprise that operates a solar-powered cold chain system. Victory Farms also raised US \$500,000 in 2020 from Conservation International Ventures to scale up its platform for sustainable, affordable protein production and expand fish farm operations.¹⁸⁷ A-Spark Good Ventures invests in sustainable aquaculture businesses working toward the production of safe accessible aquatic life such as fish, shellfish, and plants in ways that do not harm the ocean, with ticket sizes starting at US \$250,000.¹⁸⁸
- **Foundations** include the Gatsby Foundation, Open Society Foundations, and Rockefeller Foundation. The Gatsby Foundation works with smallholder farmers and pastoralists at various levels, from policy to farming practices to market interventions, to modernize and maximize the meat sector in the country.¹⁸⁹ Open Society Foundations has also employed a multi-pronged approach as it launched the Strengthening the Aquaculture Ecosystem in Kenya (SAEK) project in 2020 to support the ecosystem through policy, financial, and capacity development services. The project's goal is to promote economic justice through resilient and inclusive aquaculture practices.¹⁹⁰
- **Commercial banks** active in this area include Equity Bank and KCB Group. Through the Micro Agribusiness Loan, Equity Bank provides financing to small and medium-sized agricultural producers and micro agriculture-based entrepreneurs.¹⁹¹ KCB provided funding of US \$491,984 to support fishermen in Mombasa County in Kenya in 2015.¹⁹²

CROSS-CUTTING ACTIVITY

- **DFIs** include British International Investment (BII), Norfund, and FMO. In 2022, [iProcure](#), a high-growth enterprise that provides procurement and distribution solutions for the farming value chain, raised US \$9 million from various investors including Novastar Ventures, BII, Ceniarth, and Investisseurs & Partenaires.¹⁹³

185 [Aquaculture Business Development Programme](#). Accessed 19 September 2022.

186 ["Kenya Secures USD 250 million to help 500,000 smallholder farmers enhance value-addition and access markets."](#) World Bank. 29 March 2021.

187 [Conservation International Ventures: Victory Farms](#). Accessed 19 September 2022.

188 [A-Spark Good Ventures](#). Accessed 19 September 2022.

189 [Gatsby Africa- Livestock](#). Accessed 19 September 2022.

190 ["Strengthening the aquaculture ecosystem in Kenya."](#) Farm Africa. 13 March 2020.

191 [Equity Bank: Micro Agribusiness Loan](#). Accessed 12 December 2022.

192 Beja, P. 14 September 2015. ["Mombasa county signs Sh60 million with KCB to support fishing."](#) The Standard.

193 [iProcure - Crunchbase Profile](#). Accessed 12 December 2022.



- Impact investors, VCs and PE investors** that are active in this key area include AHL Venture Partners, Village Capital, Beyond Capital Fund, Gray Matters Capital, Novastar Ventures, and Investisseurs & Partenaires, among others. In 2018, [Tulaa](#), an SGB that offers a digital end-to-end solution for farmers, raised US \$627,000 from AHL Venture Partners¹⁹⁴ and an undisclosed amount of funding from Village Capital and the Beyond Capital Fund. [Farmshine](#), an SGB that connects farmers with suppliers and service providers, raised US \$250,000 from Grey Matters Capital in 2019,¹⁹⁵ and [M-Farm](#), an SGB that offers market price information and a platform for farmers to sell their agri-produce and connect with other farmers and agribusinesses, raised US \$235,000 from Novastar Ventures in 2013.¹⁹⁶
- Foundations** include the Mastercard Foundation, Elea Foundation, and the Indigo Trust. In 2018, [Tulaa](#) raised US \$30,000 in the form of grants from the Mastercard Foundation and the Massachusetts Institute of Technology.¹⁹⁷ [iCow](#), an SGB that offers an integrated ecosystem of services to smallholder dairy farmers, raised US \$16,337 in grants from the Indigo Trust in 2011, another US \$17,070 in 2012,¹⁹⁸ and an undisclosed amount of funding from Elea Foundation in 2013.¹⁹⁹
- Commercial banks** include Equity Bank and KCB Group. The Micro Agribusiness Loan program managed by Equity Bank provides financing to the entire agricultural value chain.²⁰⁰ The KCB MobiGro program also provides credit to enterprises across the entire value chain of crops and livestock.²⁰¹

► ESTIMATED MARKET OPPORTUNITY (2022–2030)

The SDG target-based methodology was used to calculate the market size for sustainable agriculture and aquaculture because there is no comprehensive national target for sustainable agriculture and aquaculture and the existing national targets are not quantifiable, despite agriculture being the backbone of the Kenyan economy. This report provides an estimate of the sustainable agriculture and aquaculture market size as a whole, covering all the key areas identified. The calculated **market potential for sustainable agriculture and aquaculture between 2022–2030 is US \$32.61 billion**, which translates into an average of US \$3.58 billion annually.²⁰² The calculated market size is based on achieving SDG 2 (ending hunger, achieving food security, improving nutrition, and promoting sustainable agriculture), specifically Targets 2.4 and 2.5 that focus on sustainable agriculture and aquaculture,²⁰³ taking the average cost per capita to achieve the goal and the population growth in Kenya into account.

194 [Tulaa - Crunchbase Profile](#). Accessed 12 December 2022.

195 [Farmshine - Crunchbase Profile](#). Accessed 12 December 2022.

196 [M-Farm - Crunchbase Profile](#). Accessed 12 December 2022.

197 [Tulaa - Crunchbase Profile](#). Accessed 12 December 2022.

198 [The Indigo Trust - Grant Award to iCow](#). Conversion of £14,536 and £15,000 to USD using Oanda on 26 October 2022.

199 [Elea Foundation Investments - iCow Kenya](#). Accessed 12 December 2022.

200 [Equity Bank: Micro Agribusiness Loan](#). Accessed 12 December 2022.

201 ["KCB Group and Mastercard Foundation Announce Agricultural Finance Program to Benefit Two Million Farmers."](#)

202 This figure is higher than the estimates from the [Ministry of Agriculture, Livestock and Fisheries \(2017\)](#) and the [Ministry of Agriculture, Livestock, Fisheries, and Irrigation \(2019\)](#), which calculated an annual investment requirement of US \$0.5 billion and US \$0.72 billion, respectively. The latter only accounts for further investment given available funding in the ecosystem, while the former estimates the investment needed regardless of the funding currently available.

203 Target 2.4 regards to ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, help maintain ecosystems, strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters, and progressively improve land and soil quality), and Target 2.5 is to maintain the genetic diversity of seeds, cultivated plants, and farmed and domesticated animals and their related wild species, including through soundly managed and diversified seed and plant banks at the national, regional, and international levels, and promote access to and fair and equitable sharing of benefits arising from the utilization of genetic resources and associated traditional knowledge, as internationally agreed (source: [United Nations SDG Indicators](#))



Sustainable Forestry

► BACKGROUND AND BUSINESS SEGMENTS

Background: The FAO defines sustainable forestry as a “dynamic and evolving concept, which aims to maintain and enhance the economic, social, and environmental values of all types of forests, for the benefit of present and future generations.”²⁰⁴ The FAO describes the important principles of sustainable forestry as:

- **Environmental protection:** any forest practice needs to ensure that the ecological makeup of that forest is not tampered with at all costs.
- **Social well-being:** sustainable forestry must ensure that the interests of the local communities are met either directly or indirectly.
- **Economic prosperity:** any sustainable forest practice should add economic value to the people as it conserves the environment.
- **Legal, policy, and institutional framework:** the legal, policy, and institutional set-ups are necessary to support the aforementioned principles, focusing on participatory decision-making at all levels.

Sustainably managed forests improve the use of land, help reduce vulnerability to climate change and advance both mitigation and adaptation objectives. As forests remove carbon from the atmosphere and store it, activities such as afforestation, reforestation, and avoided deforestation contribute to climate change mitigation.²⁰⁵ Forests provide key ecosystem services, such as the reduction of soil erosion and maintaining productivity by creating micro-climatic conditions, critical to climate change adaptation. Beyond environmental benefits, the sustainable management of forests offers socioeconomic benefits through revenue diversification, product supplies, and more.

Kenya Context: Kenya is making some progress toward sustainable management of forests. Kenya Vision 2030 lays out the plan to achieve a 10% forest cover target by 2030.²⁰⁶ As of 2021, the forest cover was estimated at 8.83% of the total land area in Kenya.²⁰⁷ To achieve the national forest cover target of 10%, there is a need for major efforts involving reforestation, afforestation, and forest landscape restoration.

The following sections are arranged by three key areas – *agroforestry*, *non-timber forest products*, and *forest conservation* – identified under the sustainable forestry sector.

204 FAO. 2020. [Sustainable Forest Management](#). Accessed 19 October 2022.

205 “Forests and mitigation.” [Climate Change and Forests in the Congo Basin](#). Accessed 19 October 2022.

206 [Kenya Vision 2030](#). Accessed 19 October 2022.

207 Kenya Forest Service. 2021. [National Forest Resources Assessment Report 2021](#).



AGROFORESTRY

Agroforestry is a form of land-use system that involves growing timber trees alongside keeping animals, growing crops, or other trees for purposes other than timber production.²⁰⁸ Agroforestry is a primary pathway for increasing tree cover outside forests.²⁰⁹ According to the Agriculture Rules set in 2009, every farmer in Kenya is bound to establish and maintain farm forestry on at least 10% of their agricultural lands,²¹⁰ and Kenya achieved this goal in 2021 attaining 12.13% tree cover.²¹¹

The business segments under the agroforestry key area are *tree seedling production and provision of tree management services and the production and sale of bamboo seedlings and bamboo-based products*. While two business segments are recognized, the expansion potential of SGBs in the production of bamboo seedlings for agroforestry is limited, as bamboo is grown within only 5% of the agricultural land in Kenya.²¹² The tree seedling production and provision of tree management services business segment includes SGBs that are involved in the production and sale of tree seedlings. The tree seedlings produced are specifically for tree species that can be planted on farms. This segment also includes SGBs that provide tree management services, including the planting of trees, including SGBs such as [Akili Development](#) and [Kilifi Moringa](#).

NON-TIMBER FOREST PRODUCTS (NTFPS)

Non-timber forest products (NTFPs) are products or ecosystem services (e.g., honey, vegetables, medicinal and aromatic plants, gum and resins, essential oils, fruits and nuts, barks, and fibers) other than timber that are produced in forests.²¹³ NTFPs support forest-dependent communities through food creation and sustainable livelihoods and have a high potential for export. This business segment includes SGBs (e.g., [African Agency for Arid Resources \(AGAR\) Ltd](#)) that produce and sell NTFPs such as honey, fruits, resins, medicinal plants, and essential oils.

FOREST CONSERVATION

Forest conservation is concerned with the restoration of forest lands and entails afforestation, reforestation, and forest landscape restoration. The enterprises in this key area are involved in the *tree seedlings production and tree management services business segment, the production and sale of bamboo seedlings and bamboo-based products business segment, and the production and sale of sustainable wood forest products business segment*. The tree seedlings production and tree management services segment includes SGBs like [Miti Alliance](#) and [Africa Wood Grow](#), which produce tree seedlings specifically for forest conservation and provide tree management services, including planting trees. SGBs in the production and sale of bamboo seedlings and bamboo-based products segment (e.g., [Green Pot Enterprises](#)) produce bamboo-based products. An SGB in the production and sale of sustainable wood forest products segment is [Eco-charcoal Limited](#). Examples of sustainable alternatives to wood-based forest products include eco-charcoal, round wood logs, poles, timber logs, etc.

208 Ibid.

209 Ministry of Agriculture, Livestock, Fisheries and Cooperatives. 2021. [Kenya National Agroforest Strategy 2021 – 2030](#).

210 Ministry of Agriculture. 2009. [Agriculture \(Farm Forestry\) Rules 2009](#).

211 Kenya Forest Service. 2021. [National Forest Resources Assessment Report 2021](#).

212 Ministry of Environment and Forestry. 2019. [National Bamboo Policy 2019](#).

213 Center for International Forestry Research. [Forests and non-timber forest products](#). Accessed 19 October 2022.



► POLICY LANDSCAPE

The government has developed policies promoting agroforestry, the production of NTFPs, and forest conservation. The honey industry in the NTFP key area and the bamboo industry in the forest conservation area receive particularly significant government support. However, businesses in the NTFP area that are outside of the honey industry still struggle due to inadequate funding, scarcity of NTFP raw materials, the unpredictability of the NTFP market, and a lack of technology for NTFP production.²¹⁴

The following policies promote **agroforestry**.

Table 13: Key policies and strategies for Kenyan agroforestry

POLICY/STRATEGY NAME	AIM (drawn directly from policy/strategy document)	SUPPORT AND GAPS FOR SGB ACTIVITY
The Agriculture (Farm Forestry) Rules 2009	Require every farmer to establish and maintain farm forestry on at least 10% of their agricultural lands by planting tree species that do not have adverse effects on water sources, crops, livestock, and soil fertility, and are not of invasive nature.	The rules mandate District Agricultural Committees to manage annual seedling production plans to ensure there are adequate tree seedlings and work with the private sector players involved in tree seedling production. Thus, SGBs that produce agroforestry tree seedlings and provide tree management services are the direct beneficiaries of this policy.
The Kenya National Agroforestry Strategy 2021-2030	Notes that Kenya aims to absorb up to 4.1 MtCO ₂ e by 2030 by increasing the land area under agroforestry by 281,000 hectares between 2015 and 2030. The strategy proposes to incentivize investment in agroforestry by strengthening agroforestry-based value chains and enhancing the appreciation of multiple agroforestry services.	Achieving this target requires active private sector participation, particularly in the production of tree seedlings and provision of tree management services, which will create opportunities for SGBs that work in the agroforestry value chain. The strategy also proposes the creation of an enabling environment for the enhanced participation of women, youth, and marginalized groups in agroforestry value chains.

The following policies support the **Non-timber Forest Products (NTFPs) industry**. Despite the government's efforts to promote private sector participation in NTFP production, there are very few SGBs that are active in this space. The key challenges affecting the participation of SGBs in NTFP production include inadequate funding and lack of technology. The scarcity of NTFP raw materials and the unpredictability of the NTFP market discourage investors' interest in the sector.

214 Status and growth determinants of non-timber forest products firms in Kenya


Table 25: Key policies and strategies for Kenyan NTFPs

POLICY/STRATEGY	AIM (drawn directly from policy/strategy document)	SUPPORT AND GAPS FOR SGB ACTIVITY
The National Bee-Keeping Policy 2009	Aims to increase the contribution of the bee-keeping industry to the sustainable development of the country, conservation, and the management of natural resources. Through this policy, the government aims to address the marketing and value-addition challenges in the honey value chain, facilitate the development of market infrastructure, address the cost of beekeeping equipment, promote hive product processing, and enhance safety regulation mechanisms for high-quality hive products.	This policy provides incentives for SGBs (e.g., Bee Happy Enterprises) to participate in the production of honey.
The National Forest Policy 2020	Promotes the commercial production of NTFPs, such as gum and resins, essential oils, silk, edible oils, fruits, and honey in dryland forests as they have a high potential for export. To promote the participation of private sector enterprises, the policy proposes interventions including 1) embedding the production of NTFPs in sustainable business plans; and 2) developing and adopting a climate-smart, market-oriented value chain approach to NTFPs, among other incentives.	It mandates District Agricultural Committees to manage annual seedling production plans to ensure there are adequate tree seedlings and work with the private sector players involved in tree seedling production. Thus, SGBs that produce agroforestry tree seedlings and provide tree management services are the direct beneficiaries of this policy.

The following policies support to promote **forest conservation**.

Table 14: Key policies and strategies for Kenyan forest conservation

POLICY/STRATEGY	AIM (drawn directly from policy/strategy document)	SUPPORT AND GAPS FOR SGB ACTIVITY
<ul style="list-style-type: none"> ▶ The Forest Conservation and Management Act 2016 ▶ Forest Policy 2014 ▶ The Constitution of Kenya 2010 ▶ The National Forest Policy 2020 and Kenya Vision 2030. 	These all propose an increase of tree cover to at least 10% of the land area of Kenya. The government is encouraging private sector participation in forest conservation through public-private partnerships. Private sector enterprises are involved in the production of tree seedlings, planting of trees, and provision of tree management services.	Private sector investors, non-governmental organizations, and community-based organizations are mobilizing resources to support target activities in the production of tree seedlings, tree planting, tree management services, and awareness creation forums for tree planting. Achieving the 10% forest cover requires the production of at least 2 billion tree seedlings. ²¹⁵ Hence, this presents an opportunity for SGBs to participate in the production of tree seedlings and the provision of tree management services.

215 Gitonga, A. "Two billion tree seedlings needed to attain 10 percent Forest cover by 2025." The Standard.



POLICY/STRATEGY	AIM (drawn directly from policy/strategy document)	SUPPORT AND GAPS FOR SGB ACTIVITY
The National Bamboo Policy 2019	To promote large-scale bamboo planting, the policy indicates that the government will allocate at least 10% of the overall annual planting budget to promote bamboo plantation. The government will allocate suitable degraded forest lands to companies and private players (including SGBs) for the intensive product-targeted growing of bamboo through this policy.	This policy also provides immense support to the private sector in the bamboo value chains by 1) earmarking 2% of the budget of National Environment Trust Fund, Micro Enterprise Trust Fund, and Kenya Climate Innovation Centre fund for MSME support and development, and 2) supporting access to affordable finance and credit facilities for entrepreneurs, industries, and investors, among other incentives.

► FUNDING LANDSCAPE

There is a clear need to increase financing for the sustainable forestry sector due to its massive mitigation potential. The agroforestry and forest conservation key areas receive investments from all types of financiers (including DFIs, foundations, private investors, and commercial banks). The DFIs and foundations mainly finance sustainable forestry projects, while impact investors, VCs, and traditional finance providers give direct financing to enterprises (SGBs and high-growth enterprises) that have a sustainable business model and are profitable. However, little financing flows toward the key area of NTFPs.

- DFIs** like the AfDB, Finnfund, World Bank, GIZ, FCDO, and FMO, are active in the agroforestry and forest conservation key areas. The AfDB contributed US \$38.8 million to agroforestry and the reforestation of 14,300 hectares between 2007 and 2016.²¹⁶ The World Bank, BMZ, and SIDA funded the Africa Forest Landscape Restoration Initiative for Agroforestry and Forest Conservation,²¹⁷ and GIZ also supports agroforestry projects in Kenya.
- Impact investors** include Kenya Climate Ventures (KCV), Novastar Ventures, AXA Investment Managers, Mirova, and the Africa Enterprise Challenge Fund (AECF), among others. Out of all the mentioned investors, KCV shows unrivaled attention to agroforestry. Sustainable forestry accounts for about 10% of KCV's investments, and that figure is expected to increase in the coming years.²¹⁸ KCV provided seed funding of US \$500,000 to **Kilifi Moringa**²¹⁹ which also received funding of US \$400,000 from the AECF.²²⁰ In 2020, **Komaza**, a high-growth agroforestry enterprise, raised US \$28 million from AXA Investment Managers and FMO and US \$9.9 million from Novastar Ventures.²²¹
- Foundations** include the Gatsby Foundation, International Tree Foundation (ITF), Clinton Climate Initiative, and Green Africa Foundation. The Gatsby Foundation established the Kenya Commercial Forestry Programme (KCFP) in 2016 to support the growth of sustainable forestry in Kenya to increase investments in forest development and conservation of forests.²²²

216 African Development Bank. 10 December 2018. "Kenya forests: over 14,000 hectares reforested under 10 years."

217 Africa Forest Landscape Restoration Initiative – Financial Partners. Accessed 19 October 2022.

218 Primary research insight.

219 Irungu, S. 20 December 2017. "Investment In Moringa A Big Opportunity For Kilifi County." Kenya Climate Ventures.

220 Africa Enterprise Challenge Fund - Our Investees. Accessed 19 October 2022.

221 Komaza – Crunchbase Profile.

222 Gatsby Foundation. 2019. Kenya Commercial Forestry Programme.



- **Commercial banks** (e.g., Citibank, Absa Bank, Equity Bank, and Standard Chartered Bank Kenya) also support ventures in the key areas of sustainable forestry. Absa Bank aims to raise at least US \$50,293 (Ksh. 6 million) to support the growth of fruit trees in Kenyan schools, and Equity bank dedicated US \$293,3780 (Ksh. 350 million) in 2019 to plant 35 million trees across the country and empower SGBs and farmers to raise high-quality tree seedlings in nurseries.²²³ **Miti Alliance** received funding from Citibank for forest restoration and forged a partnership with Absa Bank in forest restoration projects.²²⁴

There is **little financing flowing toward NTFPs** even though there are a few DFIs and impact investors that provide financing in this key area. An example of a DFI that has provided financing is FCDO. Through the Energy 4Impact program, FCDO provided funding of US \$30,000 to **Eco-charcoal Limited**, an SGB producing sustainable eco-charcoal briquettes and prevent deforestation.²²⁵ An example of an active impact investor in this key area is KCV, which has invested in **Horn Afrik Gums Limited**, an SGB involved in the collection and aggregation of gums and resins.

► ESTIMATED MARKET OPPORTUNITY (2022–2030)

Including all three areas (agroforestry, NTFP, and forest conservation) and using the government-set target approach, the **market opportunity for sustainable forestry is estimated at US \$1.38 billion between 2022–2030**, which consists of US \$934 million for forest conservation, US \$438 million for agroforestry, and US \$2.8 million for NTFP. The Kenyan government is committed to promoting forest restoration to reduce carbon emissions.²²⁶ However, the government only earmarked US \$83 million for forest restoration activities for the financial year 2022/2023, which signifies a significant investment gap to be filled.²²⁷

Ecotourism

► BACKGROUND AND BUSINESS SEGMENTS

Background: The International Ecotourism Society defines ecotourism as “responsible travel to natural areas that conserves the environment, sustains the well-being of local people, and involves interpretation and education”.²²⁸ Ecotourism includes elements of cultural and rural tourism, although the commercial definition of ecotourism is somewhat misleadingly interpreted as nature-based tourism.

Ecotourism contributes to both climate mitigation and adaptation. Ecotourism supports climate mitigation by reducing GHG emissions, by for example, encouraging sustainable transportation and accommodation facilities that promote the use of renewable energy.²²⁹ From an adaptation angle, ecotourism utilizes mechanisms that reduce impact on the environment and support biodiversity conservation.²³⁰

223 Equity Bank. 22 October 2019. “Equity Group Kickstarts a 35 million trees planting campaign.”

224 Primary research insight.

225 Energy 4 Impact. 22 November 2016. “Briquettes producer raising funds to boost production.”

226 Government of Kenya. 2021. *Kenya’s Updated Nationally Determined Contribution (NDC) and JCM Activities*.

227 *The National Treasury and Planning – Budget Statement FY 2022/23*. Conversion of Ksh. 10.2 billion to USD using Oanda 21 October 2022.

228 *What is Ecotourism?* The International Ecotourism Society. Accessed 19 October 2022.

229 *Transforming Tourism for Climate Action*. UNWTO. Accessed 19 October 2022.

230 Simpson, M.C., et al. 2008. *Climate Change Adaptation and Mitigation in the Tourism Sector: Frameworks, Tools and Practices*. UNEP, University of Oxford, UNWTO, WMO.



Kenya Context: More than 80% of tourism in Kenya is nature-based, and sustainability practices are widespread among tourism accommodation facilities and tour operators.²³¹ Sustainable tourism, of which ecotourism is a subset, is a critical part of Kenya's economy, accounting for over 10% of total employment, 9% of GDP, and 18% of foreign exchange earnings.²³² As of 2020, sustainable tourism contributed about 11% of government revenue in the form of taxes, duties, license fees, and park entry fees.²³³ However, the number of smaller businesses, such as SGBs and SMEs, in the sector is limited, and the SGBs in the sector are in their nascent stage.

Business Segments: The sector analysis for ecotourism identified four business segments instead of key areas. As the business segments are distinct from each other, no overarching key areas were observed. In total, the following five business segments were identified: *eco-lodging*, *eco-tours*, *agro-tourism*, and *auditing certification and training*. However, there are currently no SGBs involved in conducting audits and providing certification for sustainable tourism or running an internet platform that gathers information on eco-sites in Kenya.²³⁴ This business segment falls under the operation of large organizations, such as Ecotourism Kenya and Travelife.²³⁵

The SGBs in the **agro-tourism business segment** focus on agriculture in tandem with ecotourism services. [Kisima Safaris](#), for example, offers tours that feature farms, plantations, and ranches where customers can experience authentic agricultural environments and activities.²³⁶

The SGBs in the eco-lodging business segment are involved in operating eco-resorts or eco-lodges that consider waste management (solid waste and wastewater management), energy conservation, and water use efficiency. Examples of such SGBs include [Jatonet Kenya](#), [the Sanctuary at Ol Lentille](#), [Il Ngwesi Lodge](#), [Ol Gaboli Community Lodge](#), [Maji Moto Eco Camp](#), [Olarro Lodge](#), [Amboseli Serena Lodge](#), and [Mara Bush Houses](#). The selected eco-lodges and eco-resorts are certified by the National Environmental Management Authority (NEMA).

SGBs in the eco-tours business segment are involved in providing sustainable travel services (i.e., group safari tours). Eco-tours involve taking part in excursions to exotic or endangered areas to increase awareness of the region and support conservation. SGBs like [Ecotours Kenya](#), [Eco Adventures Limited](#), [Okoa Africa Tours](#), [Africa Wilderness Journeys](#), [Turnup. Travel](#), [Africa 360 Travel](#), and [Jatonet Kenya](#) provide such services in Kenya.

231 [Sustainable Tourism Report 2016](#). Kenya Tourism Board.

232 Ministry of Tourism. 2020. [Draft Revised National Tourism Policy, 2020 on Enhancing Sustainable Tourism in Kenya](#).

233 Ibid.

234 Cloud9xp used to be an SGB offering an online booking site but was acquired by HotelOnline in 2020.

235 Kusters, N. 2019. [Certification for Sustainable Tourism in Kenya and Wider Africa](#). Switch Africa Green and Green Tour Africa.

236 FAO Organic Research Center Alliance. [Agro-tourism](#). Accessed 19 October 2022.



► POLICY LANDSCAPE

Until recently, Kenya lacked a clear policy on ecotourism. The existing policies identify actions for promoting sustainable tourism but lack clear targets. In addition, Kenya is yet to implement most of the identified sustainable tourism actions due to inadequate funding.²³⁷ The government's allocations to the sector have been decreasing over time,²³⁸ which has led to a decline in the state of tourism facilities, affecting the quality of products and services. Without a source of sustainable financing from private and public capital, the country cannot implement its priority actions to promote sustainable tourism.

Table 15: Key policies and strategies for Kenyan ecotourism

POLICY/STRATEGY	AIM	SUPPORT AND GAPS FOR SGB ACTIVITY
Kenya Tourism Development Corporation Act (Cap. 382)	Makes provision for the establishment of the Kenya Tourism Development Corporation, which is responsible for formulating and carrying out projects for the development of the tourist industry of Kenya and promoting the establishment of enterprises that are active in the field of tourism activities.	Supports the establishment of enterprises that offer eco-tour services by founding the Kenya Tourist Development Corporation.
National Tourism Blueprint 2030	Outlines developing innovative schemes, incentives, and ethics to enable PPP for the development of sustainable tourism.	PPPs can present opportunities for sustainable tourism activities, which in turn benefits SGBs involved in the provision of services such as eco-tours and eco-lodging.
Revised National Tourism Policy, 2020 on Enhancing Sustainable Tourism in Kenya	Outlines various actions for promoting sustainable tourism in Kenya, for example promoting investment and the provision of incentives for investment in tourism products and services and improving roads that serve tourists.	The policy includes incentives for investment in alternative sources of energy within eco-lodges which will help promote the participation of SGBs in the provision of eco-lodging services. Launching an e-tourism portal will also help in marketing tourism products and services. However, as of 2022, most of the priority actions outlined in the policy have not been brought into action by the government due to inadequate funding. In the financial year 2021/2022, the Government reduced budget allocation to the tourism sector by over 25%. ²³⁹

► FUNDING LANDSCAPE

Ecotourism is in a nascent stage in Kenya, and the funding landscape mainly consists of DFIs, MDBs, and foundations rather than VC/impact investors and commercial banks. The lack of investment from impact investors and commercial banks is attributable to the fact that most ecotourism enterprises in Kenya are community-based and prioritize environmental conservation rather than profitability.

²³⁷ Ibid.

²³⁸ Olingo, A. 10 June 2021. "Kenya: Yatani's Cuts to Tourism Budget Rattles Sector Reeling From Covid-19 Effects." AllAfrica.

²³⁹ Olingo, A. 10 June 2021. "Kenya: Yatani's Cuts to Tourism Budget Rattles Sector Reeling From Covid-19 Effects." AllAfrica. The activities affected by the budget cut include tourism promotion and marketing, niche tourism product development and diversification, tourism infrastructure development, and training and capacity building in tourism.



- **DFIs** that support ecotourism businesses include the Tourism Finance Corporation (TFC), African Development Bank, World Bank, and the IFC. The TFC is a government-led DFI that specializes in financial and nonfinancial support for Kenya's tourism industry. It has invested in ecotourism enterprises such as [Chawia Forest Ecolodge](#).²⁴⁰ IFC invests in hotels and tourism development and approved US \$6 million for Kenya's tourism sector in 2022 to refurbish tourist facilities in Nairobi.²⁴¹ The UNDP has played a pivotal role in providing financial support to community-based tourism enterprises in Kenya,²⁴² and the World Bank is providing grant financing to ecotourism enterprises such as [Jatonet Kenya](#) through a US \$8,300 (Ksh. 1 million) grant.²⁴³ Moreover, the AfDB has shifted its focus into sustainable tourism through infrastructure projects.²⁴⁴
- **Foundations** active in the ecotourism sector include the Ford Foundation and the Acacia Conservation Fund, which provide grant funding to community-based tourism enterprises in Kenya.²⁴⁵ An example of a community-based tourism enterprise that has received funding from the Acacia Conservation Fund is [Maliasili](#).²⁴⁶

240 Mnyamwezi, R. 7 August 2018. "Samboja's Government Injects New Money to Revive Tourism."

241 "IFC Approves US\$ 6 million Loan for Kenya's Tourism Sector." IFC Pressroom.

242 Ecotourism Kenya. [Community Development Program](#). Accessed 19 October 2022.

243 Primary research insight.





244 African Development Bank. 27 September 2017. "AfDB joins international community in supporting sustainable tourism development in Africa."

245 [Ford Foundation - Natural Resources and Climate Change](#). Accessed 19 October 2022.

246 Maliasili. 2020. [Maliasili 2020 Annual Report](#).



Sector Group: Transportation

SUSTAINABLE TRANSPORTATION		
KEY AREAS	BUSINESS SEGMENTS	MARKET OPPORTUNITY (2022-2030)
 Electric vehicles and enabling infrastructure	<ul style="list-style-type: none"> ✓ EV providers ✓ EV equipment providers ✓ Charging service providers 	<p>US \$898 million</p> <p>covering the EV business segments (the other segments lack a national target and were therefore not included in the estimate).</p>
 Mobile services	<ul style="list-style-type: none"> ✓ Ride-hailing solutions ✓ Ride-sharing solutions ✓ Micro-mobility solutions 	
 Non-motorized transport (NMT)	<ul style="list-style-type: none"> ✓ Bicycle providers ✓ Bicycle equipment providers 	
 Technology and software	<ul style="list-style-type: none"> ✓ Traffic monitoring solutions 	



Sustainable Transportation

► BACKGROUND AND BUSINESS SEGMENTS

Background: Sustainable transportation refers to the provision of services and related infrastructure to enable the movement of people and goods from one location to another and, at the same time, ensure safety, resilience, efficiency, and protection of the environment through the reduction of fuel consumption and GHG emissions.²⁴⁷ The key elements of sustainable transportation include:²⁴⁸

- **Being green** – decreasing GHG emissions and noise pollution.
- **Universal access** – connecting all people, including women and marginalized communities.
- **Safety** – drastically reducing fatalities, injuries, and crashes.
- **Efficiency** – optimizing the predictability, reliability, and cost-effectiveness of mobility.

The transport sector has the highest reliance on fossil fuels of all sectors and is a major contributor to CO₂ emissions. The sector accounted for about 37% of CO₂ emissions globally in 2021, and its contribution is anticipated to grow even more as transport demand in developing economies increases.²⁴⁹ As of 2020, the global share of CO₂ emissions from each transport segment was as follows: road transport (78%), shipping (11%), aviation (8%), and rail (3%).²⁵⁰ As there are limited entrepreneurial activities in rail, aviation, and pipeline transport, this sector narrative focuses on road transport.

Globally, there is a push for the adoption of EVs, one form of sustainable transport, and the EV market recorded steady growth between 2010 and 2020.²⁵¹ For the purposes of this report, the term EV encompasses two-wheelers, three-wheelers, and any other mode of electric transport in Kenya. Global sales of electric vehicles reached a record high in 2021, with about 120,000 electric vehicles being sold weekly.²⁵² The supportive regulatory framework in countries around the world is one of the main factors contributing to increased adoption of EVs. By 2020, at least 20 countries banned the sale of conventional cars or mandated the sale of zero-emission vehicles.²⁵³

Sustainable transportation systems are beneficial for the environment as they promote the shift to alternative energy, fuel efficiency, and electrification.²⁵⁴ Alternative modes of mobility reduce demand for fossil-fuel transportation or replace it altogether, contributing to reduced fossil fuel consumption and hence climate change mitigation. Sustainable transportation has a direct impact on human health and well-being as well due to a reduction in air pollution, improved safety, reduced number of deaths or injuries from transport accidents, and job creation.²⁵⁵ Sustainable transportation increases the mobility of low-income populations and thereby contributes to their

247 United Nations. 2021. [Sustainable Transport, Sustainable Development: Interagency report for second Global Sustainable Transport Conference.](#)

248 Sustainable Mobility for All. 2017. [Global Mobility Report- Tracking Sector Performance.](#)

249 IEA. [Transport: Improving the sustainability of passenger and freight transport.](#) Accessed 6 October 2022.

250 Statista. [Distribution of carbon dioxide emissions produced by the transportation sector worldwide in 2020, by subsector.](#) Accessed 6 October 2022.

251 IEA. 2021. [Global EV Outlook 2021: Accelerating ambitions despite the pandemic.](#)

252 IEA. [Transport: Improving the sustainability of passenger and freight transport.](#) Accessed 6 October 2022.

253 IEA. 2021. [Global EV Outlook 2021: Accelerating ambitions despite the pandemic.](#)

254 Project Drawdown. [Sector Summary: Transportation.](#) Accessed 6 October 2022.

255 Holl, S. et al. 2021. [The Case for Impact Investment in Sustainable Mobility in Developing Countries.](#) Shell Foundation.



increased access to basic resources such as water, food, and healthcare.²⁵⁶ Other benefits include improved access to important services such as education, the integration of markets and economies, the enhancement of rural-urban linkages, and facilitation of international trade.²⁵⁷

Kenya Context: The transportation sector accounts for the majority of petroleum consumption, making it a leading contributor to GHG emissions.²⁵⁸ In 2020, the emissions from this sector were estimated at 12 MtCO₂e out of total emissions of 96 MtCO₂e in Kenya.²⁵⁹ Road transport accounts for 72% of the total emissions in the sector in Kenya, with the remaining 28% coming from shipping, aviation, and rail transport.²⁶⁰

Kenya is committed to lowering GHG emissions in the transport sector. The climate mitigation measures aimed at lowering GHG emissions include implementing low-carbon and efficient transportation systems,²⁶¹ including projects like a bus rapid transit system and the extension of the standard gauge railway.²⁶² Increased adoption of EVs will also significantly contribute toward achieving Kenya's transport sector goal of reducing emissions by 3.46 MtCO₂e by 2030.²⁶³ In this light, Kenya has introduced fiscal incentives such as a reduction of excise duty for all-electric vehicles from 20% to 10% so as to encourage the adoption of EVs.²⁶⁴

Sustainable transport lays emphasis on the use of EVs and non-motorized transport. Transitioning to sustainable transport also involves city planning, improved infrastructure, and the use of public transport services. However, these activities fall under the government's domain in Kenya. As the private sector is largely involved in the provision of vehicles and mobility services, this report focuses on the provision of EVs and non-motorized transport.

The three key characteristics of sustainable transport are vehicle and infrastructure-based solutions, mobility services that capture the service offered to the client, and technology and software solutions.²⁶⁵ The framework used in this report further divides vehicle and infrastructure-based solutions into EVs and enabling infrastructure and non-motorized transport, as non-motorized transport is one of the most common types of sustainable transportation in Kenya. The four key areas thus are: 1) electric vehicles and enabling infrastructure, 2) mobility services, 3) technology and software-based solutions, and 4) non-motorized transport (NMT).

ELECTRIC VEHICLES (EVs) AND ENABLING INFRASTRUCTURE

EVs are an important part of Kenya's strategy for decarbonizing the transport sector. Kenya has a target of increasing the share of EVs imported annually to 5% by 2025.²⁶⁶ Since EVs run on electricity, they need a supporting infrastructure. Charging stations and battery swapping services facilitate large-scale adoption of EVs and are referred to as enabling infrastructure.

256 Holl, S. et al. 2021. *The Case for Impact Investment in Sustainable Mobility in Developing Countries*. Shell Foundation.

257 United Nations. 2021. *Sustainable Transport, Sustainable Development: Interagency report for second Global Sustainable Transport Conference*.

258 GIZ. 2021. *Transport sector in Kenya's Nationally Determined Contribution*.

259 Strategic Business Advisors (Africa) Ltd. 2020. *Assessment of Green Investment Opportunities in the Transport Sector in Kenya*. Green Bonds Programme Kenya.

260 Ibid.

261 Government of Kenya. 2021. *Kenya's Updated Nationally Determined Contribution (NDC) and JCM Activities*.

262 GIZ. 2021. *Transport sector in Kenya's Nationally Determined Contribution*.

263 Energy and Petroleum Regulatory Authority (EPRA) – Electric Mobility. Accessed 21 February 2023.

264 Ibid.

265 Holl, S. et al. 2021. *The Case for Impact Investment in Sustainable Mobility in Developing Countries*. Shell Foundation.

266 Ministry of Energy. 2020. *Kenya National Energy Efficiency and Conservation Strategy*.



Business Segments: The business segments under the EV and enabling infrastructure key area include *EV providers*, *EV equipment providers*, *charging service providers*, *battery-swapping service providers*, and *retrofitting service providers*. However, there are few SGBs providing battery swapping and retrofit services in Kenya. The primary business segments with SGB activities are EV providers, EV equipment providers, and charging service providers.

Table 16: Business segments and examples of SGBs in EVs and enabling infrastructure

BUSINESS SEGMENT	DESCRIPTION	EXAMPLES OF SGBS
EV providers	SGBs that provide electric vehicles, which encompasses manufacturers, assemblers, or importers of EVs.	<ul style="list-style-type: none"> ▶ Ebee Africa ▶ Kiri EV
EV equipment providers	Manufacturers or importers of EV equipment, such as electric traction motors, power inverters, charge ports, and onboard chargers.	<ul style="list-style-type: none"> ▶ Chaji Energy ▶ Kiri EV
Charging service providers	SGBs that provide charging infrastructure or facilities for EVs.	<ul style="list-style-type: none"> ▶ Drive Electric ▶ Ecotrify Limited

MOBILITY SERVICES

Mobility services include services such as ride-sharing, ride-hailing, mass transit, and micro-mobility.²⁶⁷ The enterprises under this key area provide mobility services using EVs or other types of vehicles. Mobility services minimize individual passenger trips and encourage the mass movement of people, contributing to reductions in traffic congestion and GHG emissions. Business segments in this key area include *ride-hailing solutions*, *ride-sharing solutions*, *micro-mobility solutions*, and *mass transit solutions*. However, few SGBs in Kenya provide mass transit solutions.

Table 17: Business segments and examples of SGBs in mobility services

BUSINESS SEGMENT	DESCRIPTION	EXAMPLES OF SGBS
Ride-hailing	Includes taxi-like solutions based on mobile applications.	<ul style="list-style-type: none"> ▶ Ecobodaa
Ride-sharing	A type of transportation where a group of passengers shares the same vehicle (car, motorcycle, bicycle, etc.).	<ul style="list-style-type: none"> ▶ Twende Mobility
Micro-mobility	Used for providing traveling services for short distances to one or two passengers at a time. It enables passengers to usually cover the first or last mile of a journey. Electric bicycles and electric scooters are among the most popular choices in micro-mobility as they are easy to use and act as an alternative to public transport.	<ul style="list-style-type: none"> ▶ Little ride

²⁶⁷ Holl, S. et al. 2021. *The Case for Impact Investment in Sustainable Mobility in Developing Countries*. Shell Foundation.



TECHNOLOGY AND SOFTWARE

Technology and software solutions are critical in sustainable transportation since they contribute to improved guidance of traffic and reduction of congestion. This key area includes enterprises that are leveraging technology and software to ensure efficiency in the transport sector. Business segments identified under the technology and software key area include *traffic monitoring solutions* and *parking solutions*. However, there are few, if any, SGBs providing parking solutions in Kenya as of 2022.

Table 18: Business segment and examples of SGBs in technology and software

BUSINESS SEGMENT	DESCRIPTION	EXAMPLES OF SGBS
Traffic monitoring solutions	Includes SGBs that use technology to provide traffic coordination solutions. Traffic monitoring reduces traffic congestion which, in turn, lowers fuel consumption by vehicles. Vehicles burn the most fuel while accelerating to get up to speed, and thus stop-and-go congested traffic leads to higher quantities of pollutants being released into the air. ²⁶⁸	▶ Ma3Route

NON-MOTORIZED TRANSPORT (NMT)

Non-motorized transport includes walking, cycling, and using other modes of transport, such as handcarts.²⁶⁹ To promote the development of non-motorized transportation, the government has set a mandatory requirement that all new and improved roads must have non-motorized transport components,²⁷⁰ but entrepreneurship in non-motorized transportation is still nascent in Kenya due to a lack of infrastructure such as cycling lanes, bike parking racks, street lighting, safe signals, and intersections.²⁷¹ The business segments under the NMT key area include bicycle sharing services, bicycle providers, and bicycle equipment providers, but SGBs are only found in the latter two segments.

Table 19: Business segment and examples of SGBs in NMT

BUSINESS SEGMENT	DESCRIPTION	EXAMPLES OF SGBS
Bicycle providers	This business segment includes SGBs involved in the supply of bicycles.	▶ Green Cycle Shop
Bicycle equipment providers	Produce bicycles and provide cycling equipment like tires, tubes, and helmets.	▶ Cycloville Kenya

▶ POLICY LANDSCAPE

The government has developed various policies to promote sustainable transportation. The policies benefit EV providers by charging higher levies for non-green vehicles and providing tax rebates for green vehicles, as well as bicycle providers by providing infrastructure for non-motorized vehicles.

²⁶⁸ Holl, S. et al. 2021. [The Case for Impact Investment in Sustainable Mobility in Developing Countries](#). Shell Foundation.

²⁶⁹ UNEP. 18 December 2018. ["Kenya prioritizes non-motorised transport to enhanced road safety."](#)

²⁷⁰ Ibid.

²⁷¹ Odhiambo, E. 2021. [Promoting Non-Motorized Transport in Nairobi: A study on users, safety, and infrastructure trends](#). Climate and Development Knowledge Network.


Table 20: Key policies and strategies for Kenyan sustainable transport

POLICY/STRATEGY	AIM (drawn directly from policy/strategy document)	SUPPORT AND GAPS FOR SGB ACTIVITY
The Finance Bill 2019	Proposes a reduction of the excise duty for all EVs from 20% to 10%, which is significantly lower than the excise duty for petrol and diesel vehicles (i.e., 20–35%). ²⁷² The fiscal incentive is intended to make EVs cheaper and thus contribute to the importation of more EVs.	In addition to reduced costs, this bill creates opportunities for SGBs that provide charging infrastructure, EV equipment, and mobility services using EVs. However, EVs are still expensive in Kenya. ²⁷³
Green Economy Strategy and Implementation Plan (GESIP) 2016 - 2030	This plan proposes 1) introducing bus rapid transit (BRT) systems in Nairobi, Mombasa, and Kisumu, 2) considering non-motorized transport during the design and construction of roads in all counties, and 3) developing legal and fiscal measures to reduce GHG emissions from the transport sector.	The BRT system will mainly be used by EVs offering mass transit services ²⁷⁴ and is expected to create opportunities for enterprises, including SGBs offering mobility services using EVs. However, one of the key challenges affecting the development of the BRT system is a lack of funding. ²⁷⁵ The development of non-motorized transport infrastructure, particularly bicycle lanes, is expected to encourage the use of bicycles, which will create opportunities for SGBs that provide bicycles and cycling equipment.
Kenya National Energy Efficiency and Conservation Strategy 2020	Outlines the following actions: 1) increasing the share of electric/hybrid vehicles in the total vehicles imported into Kenya by 5% annually until 2025 through lowering import duty vehicle road taxes, 2) enhancing public modes of transport and non-motorized transport infrastructure, and 3) improving urban vehicular management through the use of IT-based, smart transportation management to reduce reliance on police officers for traffic control and improve urban road transport.	These actions are expected to contribute to the creation of opportunities for SGBs that provide EVs, a mobility services using EVs, or IT-based or technology solutions to manage traffic in urban areas. The development of non-motorized transport infrastructure, including cycling paths, is expected to encourage the use of bicycles and create opportunities for SGBs that provide bicycles and cycling equipment.

272 Kenya Revenue Authority (KRA) – Learn About Importation. Accessed 31 August 2022.

273 The government imposes a 16% value-added tax (VAT), a 3.5% import declaration fee, a 2% railway development levy, and a 25% import duty on all imported vehicles, including EVs.

274 TechCrunch. 5 February 2022. “EVs to power Kenya’s bus rapid transit system.”

275 Strategic Business Advisors (Africa) Ltd. 2020. Assessment of Green Investment Opportunities in the Transport Sector in Kenya. Green Bonds Programme Kenya.



POLICY/STRATEGY	AIM (drawn directly from policy/strategy document)	SUPPORT AND GAPS FOR SGB ACTIVITY
National Climate Change Action Plan (NCCAP) 2018-2022	Outlines various actions for promoting sustainable transportation, including 1) developing an affordable, safe, and efficient public transport system through constructing a BRT system, piloting electric hybrid vehicles, extending the Standard Gauge Railway (SGR) and developing non-motorized transport, 2) reducing fuel consumption and fuel overhead costs through electrification of the SGR from Mombasa to Nairobi, shifting 30% of freight from Mombasa to Nairobi from road to rail, and improving heavy-duty and light-duty truck efficiency, 3) promoting enabling technology for the sector through encouraging electric modes of transport and researching the use of renewable energy to power different modes of transport, 4) promoting climate-proof transportation infrastructure, and 5) encouraging low-carbon technologies in the aviation and maritime sectors.	As the strategy proposes the introduction of EVs and the development of NMT, it is expected to create opportunities for enterprises, including SGBs, that provide EVs, charging infrastructure and EV equipment, or non-motorized transport solutions.
The Non-Motorised Transport (NMT) Policy for Nairobi	Proposes the need for road designs that adhere to complete street principles consisting of footpaths and dedicated cycle tracks, taking into consideration NMT users. The policy also proposes that street designs should be based on a user hierarchy that prioritizes NMT first and cars second.	The goal of the policy is to make non-motorized transportation a popular mode of transport in Nairobi. This is expected to encourage the use of bicycles, and in turn, create opportunities for SGBs that provide bicycles and cycling equipment.
Second and Third Medium Term Plan of the Kenya Vision 2030	Aim for a robust transportation network in Kenya by 2030 and plan to develop a feebate tax structure: a fee to be imposed on non-green vehicles and a rebate for green vehicles.	Once this tax structure is implemented, it is expected to promote the use of EVs which will create opportunities for SGBs that provide EVs, charging infrastructure, and EV equipment. However, the envisaged new tax structure is not in place as of 2022.

► FUNDING LANDSCAPE

The funding landscape for sustainable transportation in Kenya consists of impact investors, VCs, DFIs, foundations, and commercial banks. Impact investors, VCs, foundations, and commercial banks mainly provide financing to private sector enterprises, including SGBs, whereas DFIs provide funding to sustainable transport development projects.

The electric vehicles and enabling infrastructure key area is supported by all types of funders, with VCs/impact investors and commercial banks being the most heavily engaged in this area.

- **VCs and impact investors** active in this field include Novastar Ventures, Persistent Energy Capital, Moxie Ventures, Nimble Partners, Spring Ventures, Climate Capital, Oui Capital, EEP Africa, At One Ventures, Factor (e) Ventures, Ambo Ventures, and Third Derivative, among others. **BasiGo**, a high-growth EV enterprise, raised US \$1 million in pre-seeding funding from Climate Capital and Third Derivative to launch 25- and 36-seater electric



buses in 2021²⁷⁶ and seed funding of US \$4.3 million from Novastar Ventures, Moxxie Ventures, Nimble Partners, Spring Ventures, Climate Capital, and Third Derivative in 2022.²⁷⁷ [Roam \(formerly Opibus\)](#), a high-growth EV manufacturing enterprise, raised US \$5 million in a seed round from At One Ventures, Factor (e) Ventures, and Ambo Ventures²⁷⁸ and a grant of US \$2.5 million in 2021 to scale its operations.²⁷⁹

- **Commercial banks**, including Kenya Commercial Bank (KCB), NCBA Group, and Family Bank, also provide financial support to EV ventures. BasiGo partnered with KCB and Family Bank to allow bank customers to receive a loan (90% of the total price of an EV bus) for purchasing electric buses.²⁸⁰ Similarly, NCBA Group launched US \$16.42 million in electric car loan financing for customers in August 2022 as part of its green finance strategy, which allows customers to access asset financing of up to 80% of the total cost of an EV.²⁸¹
- **Development agencies** providing funding include GIZ, which is implementing the Transformative Urban Mobility Initiative (TUMI) Volt project,²⁸² a global project that aims to support governments at various levels in their efforts to implement e-mobility solutions.²⁸³
- **Foundations** like Shell Foundation are an example of a foundation supporting this area through a pilot research program that assesses the performance, commercial application, and scaling opportunity of electrified minibuses in Kenya.

The mobility services key area is supported by VC/impact investors and foundations, with limited support from DFIs and commercial banks.

- **Impact investors and VCs** in this key area include Oui Capital, EEP Africa, Persistent Energy Capital, InfraCo Africa, and DOB Equity, among others. In 2021, [Twende Mobility](#), a mobility service SGB, raised US \$150,000 in pre-seeding funding from Oui Capital to digitize and expand its operations.²⁸⁴ In 2021, [Nopea Ride](#), an SGB offering taxi-hailing services using electric cars, raised US \$198,171 from EEP Africa to develop a solar-powered charging station in Nairobi.²⁸⁵ In 2021, [Ecobodaa](#), an SGB providing electric two-wheeler ride-hailing services, raised funding from Persistent Energy Capital to expand its operations.²⁸⁶ In 2022, Kenyan mobility enterprise [Globology](#) raised a US \$3.8 million equity round to expand its offering across Kenya, Tanzania, and Uganda. The round was led by InfraCo Africa, an impact investor focused on development and construction, with participation from the Shell Foundation.²⁸⁷
- **Foundations** in this key area include Shell Foundation, NDF, and Siemens Stiftung. In 2022, Shell Foundation provided grant funding of US \$800,000 to [Waterbus](#) to support the enterprise to pilot retrofitting of a solar boost

276 Njanja, A. 2 November 2021. "EV Startup BasiGo debuts in Nairobi after \$1 million pre-seed funding." TechCrunch.

277 Njanja, A. 9 February 2022. "BasiGo secures \$4.3 million in seed funding to accelerate mass transit EV adoption in Kenya." TechCrunch.

278 [Opibus - Crunchbase Profile](#). Accessed 4 October 2022.

279 Roam Electric. 17 October 2022. "Breaking News COP26: Opibus secures Sub-Saharan Africa's largest ever fund raise in electric mobility (USD 7.5 million)."

280 Family Bank. 14 October 2022. "Family Bank and BasiGo Ink E-Bus Financing Deal."

281 Wakarima, L. 5 August 2022. "NCBA launches Ksh 2 billion electric car loan financing for customers." The Kenyan Wall Street. (Conversion of Kshs. 2 billion using Oanda on 4 October 2022).

282 [GIZ - Promoting electric mobility worldwide](#). Accessed 4 October 2022.

283 Ibid.

284 Koroya, K. 3 August 2021. "Meet the African female founders backed by Oui Capital." techcabal.

285 [Nopea Solar Hub - EEP Africa](#). (Conversion of EUR 200,000 to USD using Oanda on 5 October 2022).

286 VentureBurn. 26 April 2021. "Kenyan e-mobility startup Ecobodaa secures funding."

287 [Waterbus - Crunchbase Profile](#). Accessed 7 October 2022.



system to two of its vessels.²⁸⁸ The Shell Foundation is also supporting the African Mobility Initiative, which targets provides grant funding of US \$25,000 to enterprises providing sustainable mobility solutions in Kenya and Uganda.²⁸⁹ In 2021, Siemens Stiftung launched a competitive E-Mobility Innovation called Electric Mobility Made in Africa for Africa, which emphasizes innovative technical solutions and circular economy approaches.²⁹⁰ The financing provided to successful enterprises ranges from US \$9,858 to US \$49,291.²⁹¹

The technology and software key area is financed only by impact investors and VCs, including EchoVC Partners, Knuru Capital, Rackhouse Venture Capital, Better Tomorrow Ventures, Launch Africa, Flexport, Solyend, and Dynamo. In 2016, [Ma3Route](#), a technology-based SGB providing traffic coordination solutions, raised US \$25,000 in a seed round from [EchoVC Partners](#).²⁹² [Amitruck](#), a tech-enabled logistics enterprise, has raised a total of US \$5.2 million in funding over six rounds from investors including Knuru Capital, Rackhouse Venture Capital, Better Tomorrow Ventures, Launch Africa, and Dynamo.²⁹³

As the non-motorized transportation sector is still nascent in Kenya, financing in this key area is mainly provided by the government and DFIs and directed to the development of NMT infrastructure. The active DFIs in this key area include the World Bank and European Union. The World Bank has supported the implementation of the US \$92 million National Urban Transport Movement Project, which aims to improve urban public transport.²⁹⁴ Some of the activities in the project include constructing and rehabilitating NMT facilities and the provision of non-motorized traffic facilities in Nairobi and Kisumu.²⁹⁵ The World Bank also supported the implementation of the assessment of the NMT program to identify ways of improving mobility at a lower cost while meeting the needs of all residents within urban areas in Kenya.²⁹⁶ The European Union and the Government of Kenya have jointly funded The Nairobi Missing Link Roads and Non-Motorized Transport Facilities Project, which is being implemented by the Kenya Urban Roads Authority (KURA).²⁹⁷ The project aims to construct three NMT routes in Nairobi to ease traffic.

► ESTIMATED MARKET OPPORTUNITY (2022–2030)

This section investigated four key areas of SGB activity: 1) EVs and enabling infrastructure, 2) mobility services, 3) technology and software, and 4) non-motorized transport. However, government targets only exist for EVs and enabling infrastructure, not the remaining three key areas, nor are there any SDG targets specific to these key areas. Hence, the market opportunity for the sustainable transportation sector concentrates only on EVs and supporting infrastructure using the government target-based approach and calculates it to be **US \$898 million between 2022–2030**, which places the sector in a low rank relative to the estimated market opportunity of all other sectors (see Table 3). This estimate is not drastically different from the assessment conducted under the Green Bonds Programme.²⁹⁸

288 The Maritime Executive. 25 March 2022. "[Kenyan firm receives funding to expand safety critical ferry services.](#)"

289 Shell Foundation. 10 Mach 2020. "[Call for sustainable urban mobility start-ups in Kenya and Uganda.](#)"

290 Siemens Stiftung. [Sustainable mobility solutions in Sub-Saharan Africa](#). Accessed 7 October 2022.

291 Conversion of €10,000 and €50,000 to USD using Oanda on 7 October 2022.

292 Jackson, T. 9 March 2016. "[Ma3Route raises \\$25k in pre-seed-round.](#)" Disrupt Africa.

293 [Amitruck – Crunchbase Profile](#). Accessed 7 October 2022.

294 World Bank. 2019. [Kenya: National Urban Transport Improvement Project](#).

295 Ibid.




296 World Bank. 2022. [Assessment of the Non-Motorized Transport Program](#).



297 [NMT Strategy for Kenya – Air Quality and Mobility](#).

298 The Green Bonds Programme estimated green investment opportunities in the transport sector in Kenya and indicated that Kenya requires an investment of US \$610 million for 5 to 10 years (between 2020 and 2030). This investment is required to finance activities such as setting up of EV charging stations, development of the BRT system in Nairobi and Mombasa, provision of mobility services such as ride-sharing and ride-hailing, vehicle trailer modification, and setting up of city rail in Nairobi. ([source](#)).



Sector Group: Water and Waste Management

WATER MANAGEMENT		
KEY AREAS	BUSINESS SEGMENTS	MARKET OPPORTUNITY (2022-2030)
 Water conservation and restoration	<ul style="list-style-type: none"> ✓ Water harvesting ✓ Borehole/water well drilling services ✓ Efficient water usage 	<p>N/A</p> <p>no specific SDG targets or government targets related to water conservation and restoration</p>
 Purification and distribution	<ul style="list-style-type: none"> ✓ Water treatment and supply ✓ Water automatic teller machine (ATM) operators 	<p>US \$22.3 billion</p>
 Technology for water	<ul style="list-style-type: none"> ✓ Smart water management ✓ Air to water technologies 	<p>N/A</p> <p>no specific SDG targets or government targets related to technology for water</p>

WASTE MANAGEMENT AND CIRCULAR ECONOMY		
KEY AREA	BUSINESS SEGMENTS	MARKET OPPORTUNITY (2022-2030)
 Sustainable waste services	<ul style="list-style-type: none"> ✓ Plastic waste services ✓ E-waste services ✓ Biomedical waste services ✓ Hazardous waste services ✓ Wastewater treatment services ✓ Integrated solid waste management (ISWM) services ✓ Waste to value ✓ Textile waste services 	<p>US \$53.9 billion</p> <p>covering US \$52.9 billion for sanitation and US \$1.0 billion for solid waste management.</p>
 Support services	<ul style="list-style-type: none"> ✓ Technology for waste services ✓ Sustainable packaging providers ✓ Waste equipment providers ✓ Infrastructure providers 	



Water Management

► BACKGROUND AND BUSINESS SEGMENTS

Background: Water management refers to the utilization of water to meet current ecological, social, and economic needs without compromising the ability to meet future requirements.²⁹⁹ Water is a scarce natural resource owing to limited availability and over-exploitation. Nearly 40% of the world's population lives in water-scarce areas.³⁰⁰ Therefore, investment in water management is essential to address the problem of water scarcity.

Efficient water management contributes to both climate change mitigation and adaptation. Mitigation contributions come from the protection of ecosystems, such as peatlands which house at least twice as much carbon as all the Earth's forests combined.³⁰¹ Water management practices, such as rainwater capture, contribute to climate adaptation, building resilience and reserving water supplies. Water management can make further impacts through its contributions to renewable energy generation and sustainable food production.³⁰²

Kenya Context: Kenya is considered a water-scarce country.³⁰³ The average national water coverage is about 62%, which means that 38% of Kenyans have inadequate access to clean and safe water.³⁰⁴ Some factors contributing to water scarcity include low water storage capacity, poor water harvesting infrastructure, deforestation, the sharing of rivers, aquifers, and lakes with neighboring countries, and growing demand for water.³⁰⁵ Currently, the breakdown of water usage is 76% for agriculture, 20% for domestic use, and 4% for industrial use,³⁰⁶ and demand from all agricultural, domestic, and industrial sectors is increasing.³⁰⁷ To address the challenge of water scarcity, Kenya aims to increase annual per capita water availability to 1,000 cubic meters.³⁰⁸ To achieve this target, the key interventions proposed by the government include investing in the water storage infrastructure, rainwater harvesting, groundwater exploration, water treatment, and improving water use efficiency and flood control.³⁰⁹

The three key areas of business activity are *water conservation and restoration, purification and distribution, and technology for water.*

WATER CONSERVATION AND RESTORATION

Generally, water conservation and restoration entails "minimization of loss or waste, the preservation, care and protection of water resources as well as efficient and effective use of water."³¹⁰ The various methods of water conservation and restoration include rainwater harvesting and storage, water recycling and reuse, storing water in dams, and artificial recharge of aquifers.³¹¹ The businesses in this key area are involved in rainwater harvesting and storage and groundwater exploration, which leads to the following three business segments: water harvesting,

299 World Bank. 11 April 2014. [Water Resources Management: Sector Results Profile](#).

300 World Bank. [Water Resources Management](#). Accessed 26 August 2022.

301 Ibid.

302 Young, M. 2011. [Towards a Green Economy: Pathways to sustainable Development and Poverty Eradication](#).

303 [National Climate Change Action Plan \(Kenya\) 2018-2022](#). 2018. Government of Kenya.

304 Kenya Markets Trust. 2021. [A Global Water Benchmarking Study for Kenya](#).

305 [National Climate Change Action Plan \(Kenya\) 2018-2022](#). 2018. Government of Kenya.

306 Mogaka, H. et al. 2006. [Climate Variability and Water Resources Degradation in Kenya Improving Water Resources Development and Management](#). World Bank.

307 All aspects related to irrigation have been covered under the sustainable agriculture sector and are not covered in the water management sector, as irrigation is an integral part of sustainable agriculture.

308 [National Climate Change Action Plan \(Kenya\) 2018-2022](#). 2018. Government of Kenya.

309 Ibid.

310 Water Services Regulatory Board. 2009. [Water Conservation and Water Demand Management Guidelines](#).

311 Water Services Regulatory Board. 2009. [Water Conservation and Water Demand Management Guidelines](#).



borehole/water well drilling services, and efficient water usage. However, SGBs that provide efficient water usage services are not common in Kenya.

Business segments with SGB activities include *water harvesting* and *borehole/water well drilling services*.

Table 21: Business segment and examples of SGBs in water conservation and restoration

BUSINESS SEGMENT	DESCRIPTION	EXAMPLES OF SGBS
Water harvesting	Includes SGBs involved in rainwater harvesting and storage and that develop rainwater harvesting systems.	▶ Kerith Brook Drilling Ltd.
Borehole/water well drilling services	Includes SGBs involved in groundwater exploration, such as those that drill boreholes and protected dug wells.	▶ African Water Drilling Company ▶ Basil Drilling Company ▶ Kerith Brook Drilling Ltd ▶ Vajra Drill

PURIFICATION AND DISTRIBUTION

The Government of Kenya, through the Water Sector Trust Fund, provides financing to water supply projects in underserved and low-income rural and urban areas.³¹² The water supply projects are implemented through water service providers in the urban areas and community-based organizations and water utilities in the rural areas. Water purification is the process of removing contaminants (chemical contaminants, biological contaminants, solids, or gasses) from water.³¹³ The practice of selling or distributing water is often combined with purification, as seen in community water purification systems and water ATMs.

The two business segments with SGB activities in Kenya, therefore, are *water treatment and supply* and *water ATM operators*.

Table 22: Business segment and examples of SGBs in water purification and distribution

BUSINESS SEGMENT	DESCRIPTION	EXAMPLES OF SGBS
Water treatment and supply	Includes SGBs involved in the treatment and supply of water to communities, businesses, and institutions. They help in recycling water to address the water scarcity problem.	▶ Aljuli Engineering Ltd. ▶ Aqua Clara Kenya ▶ Impact Water ▶ Sonic Fresh Waters
Water ATM operators	Includes SGBs that set up low-cost water ATMs which supply purified water at low costs to communities and institutions.	▶ Amatsi Water Services Company (AWASCO) Ltd. ▶ FundiFix ▶ Water Kiosk Africa

TECHNOLOGY FOR WATER

The use of smart water management technologies such as Internet of Things (IoT), blockchain, and artificial

³¹² Water Sector Trust Fund. Accessed 26 August 2022.

³¹³ Popescu, R. et al. 2017. *Nanostructured membranes for the microbiological purification of drinking water*. Water Purification (pp.421-446).



intelligence (AI) helps to identify, analyze, and understand patterns of water use.³¹⁴ IoT-based technology is used in the agriculture sector to optimize the usage of water for irrigation (avoiding over/under irrigation) and detect any leakages.³¹⁵ Smart metering devices are used in the domestic and industrial sectors to monitor water consumption levels and detect any leakages in the distribution system.³¹⁶ As such, smart water management technologies lead to better water resource management by minimizing water wastage and ensuring efficiency in water use. Technologies are also used for water harvesting. For example, atmospheric water generator technology is used to convert air into water, which helps to increase water availability.

This key area includes businesses that leverage digital technologies to monitor the use of water and harvest water.

Table 23: Business segment and examples of SGBs in technology for water

BUSINESS SEGMENT	DESCRIPTION	EXAMPLES OF SGBS
Smart water management	Includes SGBs that provide digital technologies and tools, such as smart metering devices that help households, businesses, and industries to monitor water use.	<ul style="list-style-type: none"> ▶ HydroIQ ▶ Mobi-Water ▶ Rural Water Management Solutions (K) Limited ▶ SwissQuest Water Supplies Company Ltd
Air-to-water technologies	SGBs that use technology to harvest water by converting humidity in the air into water.	<ul style="list-style-type: none"> ▶ Majik Water

▶ **POLICY LANDSCAPE**

Water management in Kenya is led by the government. The institutions established by the government directly engage and contract private sector players to provide water management services, and government policies for efficient water usage present opportunities to businesses in the smart water management technology segment. Policies pertinent to the water conservation and restoration and purification and distribution key areas include those listed in the table below.

314 Gupta, A. et al. 2020. [Smart Water Technology for Efficient Water Resource Management: A Review](#). energies.
 315 Kamienski, C. et al. 2019. [Smart Water Management Platform: IoT-Based Precision Irrigation for Agriculture](#).
 316 Gupta, A. et al. 2020. [Smart Water Technology for Efficient Water Resource Management: A Review](#). energies.


Table 24: Key policies and strategies for Kenyan water management

POLICY/STRATEGY	AIM	SUPPORT AND GAPS FOR SGB ACTIVITY
The National Climate Change Action Plan (NCCAP) 2018–2022	Proposes an increase in annual per capita water availability from 647 cubic meters to 1,000 cubic meters, which relates to the water conservation and restoration key area. To meet this target, the plan proposes investment in climate-proof water harvesting and water storage infrastructure.	Investment in climate-proof water harvesting and water storage infrastructure creates opportunities for SGBs that provide water harvesting and storage services.
Sessional Paper Number 1 of 2021 on National Water Policy	Proposes a range of measures and actions that are relevant to the purification and distribution key area, which include 1) investment in storage infrastructure, 2) setting up standards for water service providers, and 3) investment in sewerage and non-sewer sanitation services in urban and rural areas.	The policy notes that there is a need to engage other stakeholders, including private sector enterprises, in order to achieve the objective of universal water access. As such, this policy is expected to create more opportunities for SGBs that are involved in water treatment and supply.
The Water Act 2016	Establishes various institutions for water management that elicit the participation of enterprises. The Water Sector Trust Fund (WSTF) is responsible for financing water supply projects in underserved and low-income rural and urban areas and mainly contracts water service providers in the urban areas and water utilities in the rural areas.	The National Water Harvesting and Storage Authority (NWHSA) has a mandate to develop and manage national water works infrastructure and contracts enterprises involved in the drilling of boreholes and construction of dams. Enterprises face high costs to acquire water management service permits, which dissuades SGBs from participating in groundwater exploration. ³¹⁷

The following strategy supports the key area of **technology for water**.

Table 27: Key policies and strategies for Kenyan technology for water

POLICY/STRATEGY	AIM	SUPPORT AND GAPS FOR SGBS
The National Water Services Strategy (NWSS) 2007–2015	To improve water use efficiency, this strategy proposes the use of 1) universal metering technology for monitoring water use, managing water sales, improving leak detection, and ensuring that only legal connections have access to the water supply and 2) water harvesting and water saving technologies.	The strategy creates opportunities for businesses, including SGBs, that provide smart water management technologies by including actions such as reducing non-revenue water and requiring an investment in smart water management technologies that help to monitor water use and minimize wastage and leakages along the distribution system.

317 Molle, F. and Closas, A. 2019. *Groundwater licensing and its challenges*. *Hydrogeology Journal*.



► FUNDING LANDSCAPE

The bulk of the financing in the water management sector is flowing toward water supply and infrastructure projects and originates from DFIs, foundations, and the government. Approximately 70% of the annual capital investment in this sector comes from the donor community (DFIs and foundations).³¹⁸

- **DFIs** are financing water supply and infrastructure projects as well as enterprises. The World Bank, for example, supported the implementation of a US \$300 million Kenya Water and Sanitation Development Project.³¹⁹ The World Bank is also supporting the implementation of the Kenya Water Security and Climate Resilience Program.³²⁰ The AfDB supported the implementation of a US \$391 million water supply and sanitation program in Kenya.³²¹ GIZ is supporting the implementation of the Integrated Water Resources Management project³²² and has also supported a smart water management enterprise, [Mobi-Water Solutions](#), through the Make-IT in Africa program.³²³
- **Foundations** provide financing to water supply projects as well as enterprises. For instance, the Green Africa Foundation is implementing a water supply project at the Kitui Centre of Excellence.³²⁴ The McGinnity Family Foundation has partnered with [Majik Water](#) to reduce the usage of firewood and charcoal in water boiling.
- Examples of **impact investors** that are active in this sector include Open Road Alliance, Wellers Impact, DOB Equity, and Kenya Climate Ventures.³²⁵ Kenya Climate Ventures, in partnership with KCIC and the Ministry of Foreign Affairs of Denmark (Danish MoFA), implemented the GreenBiz Program,³²⁶ with the participation of enterprises like [Mobi-Water Solutions](#) and [Majik Water](#).³²⁷
- **Commercial banks** that are active in this sector include Equity Bank, Standard Chartered Bank and Sidian Bank. Equity Bank provides financing for purchasing tanks, water pumps, and other equipment to access water and for the drilling of boreholes and water wells.³²⁸ Standard Chartered has partnered with Davis & Shirtliff to offer discounts and flexible payments on water treatment equipment.³²⁹ Sidian Bank has provided debt financing amounting to about US \$3.6 million to small water enterprises to enhance water supply in the fight against COVID-19 over the period from August 2020 to June 2021.³³⁰

► ESTIMATED MARKET OPPORTUNITY (2022-2030)

While the key areas with high potential for SGB contribution and growth are water conservation and restoration, purification and distribution, and technology for water, there are no specific SDG targets or government targets related to technology for water or water conservation and restoration. Hence, the market opportunity estimate

318 Water Sector Reforms Portal. [Financing water sector in Kenya](#). Accessed 26 August 2022.

319 The World Bank. [Kenya Water Security and Climate Resilience Project](#). Accessed 26 August 2022.

320 The World Bank. [Kenya Water Security and Climate Resilience Project](#). Accessed 26 August 2022.

321 African Development Bank. 9 November 2016. ["The AfDB Approves USD 391 million for Kenya's water and sanitation project."](#)

322 East African Community Lake Victoria Basin Commission. 8 July 2022. ["GIZ Funded Project for Institutional Strengthening Launched in Kisumu, Kenya."](#)

323 GIZ. [Make-IT in Africa Programme](#). Accessed 26 August 2022.

324 [Green Africa Foundation - Water Project](#). Accessed 26 August 2022.

325 Okutoyi, P. 2 August 2021. ["Kenya's Water Dilemma: Walking into a Silent Crisis."](#) Kenya Climate Ventures.

326 Kenya Climate Innovation Centre. [GreenBiz Programme](#). Accessed 12 December 2022.

327 Kenya Climate Innovation Center. 1 June 2020. ["Mobi Water Solutions Manufactures Digital Water Monitoring Systems."](#)

328 Equity Group Holdings. [Water Loan](#). Accessed 26 August 2022.

329 Standard Chartered. [Sustainable Living](#). Accessed 26 August 2022.

330 Business Daily. 17 June 2021. ["Sidian Bank gives Ksh. 430 million loans to small water firms."](#) (Conversion of Ksh 430 million to USD using Oanda on 26 August 2022).



pertains only to water distribution and purification. The estimated **market opportunity is US \$22.34 billion** to achieve universal access to water by 2030.³³¹

Waste Management and Circular Economy

► BACKGROUND AND BUSINESS SEGMENTS

Background: The amount of waste generated globally every year is estimated to be 2.01 billion tons of municipal solid waste, and at least one third of it is not managed appropriately in an environmentally safe fashion.³³² The indiscriminate disposal of waste creates serious health, safety, and environmental consequences and contributes to pollution and global climate change through methane generation.³³³

The adoption of sustainable waste management practices plays a critical role in the transition to a green economy. Waste management is the effective control of the generation, storage, treatment, recycling, reuse, transportation, recovery, and disposal of waste.³³⁴ Reducing waste mitigates climate change as waste is a major source of GHG emissions. Landfills are the third largest anthropogenic source of methane, “accounting for approximately 11% of estimated global methane emissions, equivalent to nearly 800 megatons of carbon dioxide equivalent per year.”³³⁵ Waste incineration is also detrimental for the climate, emitting 2.5 times more CO₂ to generate the same amount of electricity as a coal power plant.³³⁶ Conversely, recycling reduces energy consumption, as a product made from recycled materials requires less energy than a product from new materials.³³⁷

In addition, measures to reduce farm waste and redistribution of edible food can help address hunger and malnutrition. Wet waste (organic biodegradable waste) can be converted into compost, biogas, and clean, renewable, and affordable energy. Moreover, efficient waste management services can be a powerful catalyst for economic growth by creating new jobs.³³⁸

Kenya Background: Kenya generates more than 20,000 tons of waste per day and 8.8 million tons per year (about 40% of which is generated in urban areas).³³⁹ As Kenya’s fairly low urbanization rate (10%) is expected to grow, the amount of waste produced is also anticipated to increase.³⁴⁰ Hence, Kenya includes waste management as an important climate mitigation sector. Kenya is implementing a waste management hierarchy that prioritizes the reduction of waste generation and the reuse of materials to reduce emissions from the sector. Other key components of Kenya’s strategy include affordable waste solutions at the local level and ensuring diligent non-contamination measures are in place.

331 This estimate is slightly higher than the government estimate. As of 2019, it was estimated that Kenya requires an overall investment of approximately USD 14.7 billion (Conversion of Ksh 1.764 trillion to USD using Oanda on 26 August 2022) to achieve universal access to water (SDG 6) by 2030 (source: Ministry of Water, Sanitation, and Irrigation).

332 World Bank. [What A Waste 2.0: A Global Snapshot of Solid Waste Management to 2050](#). Accessed 20 September 2022.

333 The World Bank. 11 February 2022. [Solid Waste Management](#).

334 UN Department of Economics and Social Affairs. [Chemicals and Waste](#). Accessed 20 September 2022.

335 Global Methane Initiative. 2011. [Landfill Methane: Reducing Emissions, Advancing Recovery and Use Opportunities](#).

336 Energy Justice Network. [Trash Incineration and Climate Change: Debunking EPA Misinformation](#). Accessed 20 September 2022.

337 U.S. Energy Information Administration. [Recycling and the environment explained](#). Accessed 20 September 2022.

338 The World Bank. 11 February 2022. [Solid Waste Management](#).

339 Ministry of Environment and Forestry. 2020. [National Sustainable Waste Management Policy](#).

340 Ibid.



This report identified two key areas within the waste management sector: *sustainable waste services* and *support services*. The sustainable waste services key area covers primary activities in the waste management value chain, and the support services embrace secondary activities necessary to support the primary activities.

SUSTAINABLE WASTE SERVICES

The sustainable waste services key area deals with various activities across the waste management value chain. In Kenya, types of waste streams include domestic, municipal, industrial, hazardous, biomedical, and e-waste.³⁴¹ As such, the list of business segments includes integrated solid waste services, wastewater services, plastic waste services, e-waste services, textile waste services, hazardous waste services, bio-medical waste services, waste-to-value waste services, and construction and demolition waste services. SGBs are identified in each business segment in Kenya, except for the construction and demolition waste business segment.

Table 25: Business segments and examples of SGBs in sustainable waste services

BUSINESS SEGMENT	DESCRIPTION	EXAMPLES OF SGBS
Biomedical waste services	SGBs involved in the collection, transportation, treatment, and disposal of biomedical waste. Biomedical waste includes waste generated in health facilities, research institutions, or during the immunization of human beings and animals. ³⁴²	▶ Tranbiz waste solutions
E-waste	SGBs involved in the collection, transportation, and disposal of e-waste. Through the rapid expansion of the ICT sector and tech verticals, the country has seen an influx of low-quality electrical and electronic equipment. ³⁴³	▶ Enviroserve Kenya ▶ Waste Electrical and Electronic Equipment Centre (WEEE Centre)
Plastic waste services	SGBs that collect, transport, and recycle plastic waste.	▶ Chemolex. Vintz Plastics Limited ▶ Mr. Green Africa Kenya Ltd ▶ Taka Taka Solutions
Hazardous waste services	SGBs that collect and dispose of hazardous waste. Hazardous waste is any waste or combination of wastes with the potential to damage human health, living organisms, or the environment that require special handling and disposal procedures. ³⁴⁴	▶ Waste Afrika Kenya Ltd
Integrated solid waste management (ISWM) service providers	SGBs that collect, transport, segregate, recycle, treat, and dispose of different types of waste streams, including municipal solid waste and other solid waste. ISWM service providers mainly focus on municipal solid waste.	▶ Taka Taka Solutions ▶ Zoa Taka Ltd

341 National Environment Management Authority. 2019. [The National Solid Waste Management Strategy 2019](#).

342 Ibid.

343 Ibid.

344 Piper, D. [Harmful substances and hazardous waste](#). United Nations Environment Programme.



BUSINESS SEGMENT	DESCRIPTION	EXAMPLES OF SGBS
Textile waste services	Cover all activities in the textile waste management value chain, including SGBs that specialize in collecting, transporting, sorting, recycling, treating, and disposing of textile waste.	▶ Africa Collect Textiles
Wastewater treatment services	SGBs that collect, treat, and dispose of wastewater that is either from domestic sewage or industrial waste from manufacturing sources. ³⁴⁵	▶ Excloosive Ltd ▶ Ideal Sanitation ▶ IkoToilet ▶ Karibu Loo ▶ Sanivation ▶ Sewertech Kenya Ltd. ▶ Unique Loo Limited
Waste-to-value	SGBs that convert waste into useful resources, such as new or improved products (e.g., energy, organic fertilizers, clothing, building materials).	▶ Ecodudu ▶ Gjenge Makers Ltd ▶ Klurdy

SUPPORT SERVICES

The business segments under this key area were identified by studying the various support services required to complement the primary activities in the waste value chain. The list of business segments under this key area includes *technology for waste, sustainable packaging providers, equipment providers, and infrastructure providers*.

Table 26: Business segments and examples of SGBs in support services

BUSINESS SEGMENT	DESCRIPTION	EXAMPLES OF SGBS
Technology for waste services	SGBs that leverage technology to increase efficiency in waste management processes (collection, transportation, etc.).	▶ Mr. Green Africa Ltd.
Waste equipment	Provide equipment that may be used at any stage of the waste management value chain.	▶ Biohazard Waste Solutions EA Ltd. ▶ Ecowaste Biohazard Solutions
Infrastructure providers	SGBs that setup, operate, and maintain effluent treatment plants (ETPs), sewage treatment plants (STPs), and material recovery facilities (MRFs), etc.	▶ Elikham Systems Limited ▶ Oloolaiser Water and Sewerage Company Limited (OWSC)

▶ POLICY LANDSCAPE

Waste management in Kenya is a devolved function where the 47 county governments have a lead role in delivering sustainable waste management services.³⁴⁶ The national government has a responsibility to provide an enabling policy and regulatory environment to facilitate the county governments to effectively deliver waste management services. To ensure efficiency in waste management, the county governments, guided by national policies, engage private sector players through PPPs.³⁴⁷ In order to encourage collaboration with the private sector, county

345 Ministry of Health. 2016. [Kenya Environmental Sanitation and Hygiene Strategic Framework \(KESSF\) 2016-2030](#).

346 Ministry of Environment and Forestry. 2020. [National Sustainable Waste Management Policy](#).

347 National Environment Management Authority. 2014. [The National Solid Waste Management Strategy 2014](#).



governments have reduced licensing fees, mobilized financial resources, provided financial incentives for waste equipment, and established clear guidelines on how private sector players can be engaged in waste management. Despite the measures put in place by county governments to encourage private sector participation, SGBs still face some challenges, including inadequate financing and the multiplicity of licenses and charges, particularly for waste recycling enterprises. Moreover, entrepreneurs in this sector face high competition from informal operators – who illegally dump waste to reduce their costs – as the market entry barriers are very low.³⁴⁸

Table 27: Key policies and strategies for Kenyan technology for water

POLICY/STRATEGY	AIM	SUPPORT AND GAPS FOR SGB ACTIVITY
The Environmental Management and Co-ordination (Extended Producer Responsibility) Regulations in 2021 *still in draft form	Provide for extended producer responsibility regarding products and packaging at all phases of their life cycle so as to enhance environmental sustainability.	To encourage private sector participation in waste management, the EPR Regulations propose collaboration between Producer Responsibility Organizations. ³⁴⁹
Green Economy Strategy and Implementation Plan (GESIP) 2016 - 2030	Provides guidelines and key actions to improve waste management processes, including waste collection, recycling, treatment, and recovery of various types of waste, including emerging waste streams such as plastic waste and e-waste. The strategy notes that about 8% of recyclable waste and 5% of compostable waste in Kenya are recovered but aims to achieve over 50% waste recovery (17% recycling and 32% compositing) by 2030.	These targets will be achieved by establishing markets for secondary raw materials and recycled products, building infrastructure and technical capacity, and providing financial incentives. These actions should provide a market and ecosystem friendly to private enterprises and SGBs in the waste management sector.
The Kenya Environmental Sanitation and Hygiene Policy 2016-2030	Encourages private sector participation in waste sanitation services, noting that the government shall empower and support private sector initiatives with required legal instruments, including exemptions, and create an enabling environment by setting clear standards and guidelines and establishing transparent tendering processes for the promotion of the different technology options provided by private enterprises. The policy also notes that the national and county governments shall continue to expand existing sanitation technology programs that aim to support the improvement and development of pro-poor sanitation products and service delivery at the small-scale independent providers/entrepreneurs level.	Through sanitation marketing, the government encourages landlords and households to purchase improved sanitation products and services from local enterprises. However, as of 2022, the government is yet to provide any incentives for private sector enterprises, and such enterprises still experience challenges in acquiring licenses. ³⁵⁰

348 Siemens Stiftung. "TakaTaka Solutions: Leveraging the Value of Waste for a Circular Economy (Kenya)."

349 A membership organization that comprises various enterprises in waste management and county governments through PPPs for the purposes of establishing and operationalizing collection, take-back, disposal, and setting up material recovery and sustainable waste management facilities.

350 Primary research insight.



POLICY/STRATEGY	AIM	SUPPORT AND GAPS FOR SGB ACTIVITY
The National Solid Waste Management Strategy 2014	Proposes key actions to be undertaken by county governments to promote the collection, transportation, processing (recycling and treatment), and safe disposal of different types of waste streams. While county governments are responsible for collecting waste in zoned areas within the central business district, enterprises are contracted through PPP arrangements to collect waste in residential estates. This strategy recommends the use of technologies, including material recovery technologies (recycling and composting) and waste-to-energy or waste-to-value technologies (waste incineration, gasification, and biological treatment of waste).	The challenges affecting the adoption of waste management technologies include inadequate financial resources for purchasing equipment, a lack of incentives (including tax waivers), a lack of awareness, and resistance to change. Therefore, the strategy proposes the increased involvement of the private sector, particularly in the development of sustainable waste management technologies. The strategy also calls for the promotion of PPPs to encourage investment in waste management technologies and modern equipment for waste management.
The National Sustainable Waste Management Policy	Provides a framework for the sustainable management of different types of waste, including hazardous waste, electronic waste, industrial waste, agricultural chemicals, and medical waste. The policy notes that waste management is a devolved function where the 47 county governments have the lead role in delivering sustainable waste management services. The policy indicates that county governments will engage waste management enterprises at county level, including those run by vulnerable and marginalized groups.	The county governments issue contracts to private waste management enterprises that collect, transport, and dispose of waste, among other related services. In each county, private sector firms are assigned to deliver waste management services within the designated zones where they are in charge of both fee and waste collection. However, this approach has not been efficient as the enterprises compete for contracts in the wealthier areas but decline to service poorer areas.

► FUNDING LANDSCAPE

Funding in the waste management sector in Kenya is heavily donor dependent. DFIs and foundations account for more than 60% of the funding in waste management.³⁵¹

- **DFIs** finance enterprises through programs. For instance, FCDO has provided US \$95,000³⁵² grant funding to [Taka Taka Solutions](#) to scale up its operations³⁵³ and US \$116,886 to the [Waste Electrical and Electronic Equipment Centre \(WEEE Centre\)](#) under the Kenya Catalytic Jobs Fund (KCJF) project.³⁵⁴ Through the Sustainable Energy Fund For Africa (SEFA) program, the AfDB has provided a US \$995,000 grant to Asticom Kenya Ltd.³⁵⁵ In 2021, the UN-Habitat issued a call for the application of innovative enterprises that can manage and deliver an innovative approach to community-based waste management and establish a public-private-people partnership (PPPP) in low-income urban areas in informal settlements in the city of Kisumu.³⁵⁶

351 Government of Kenya. 2021. [Programme Based Budget of the National Government of Kenya for the year ending 30th June, 2022](#).

352 [Taka Taka Solutions – Crunchbase Profile](#). Accessed 31 August 2022.

353 Annual Review: Kenya Catalytic Jobs Fund (KCJF). Available [here](#).

354 WEEE Centre. [“WEEE Centre Receives £100,000 Funding, Targets 2000 Jobs.”](#) (Conversion of GBP 100,000 to USD using Oanda on 31 August 2022).

355 Africa Development Bank Group. 21 December 2017. [“Sustainable Energy Fund for Africa Improves Waste-to-energy electricity in Kenya with USD 1 million Grant.”](#)

356 UN-Habitat: [Turning Waste into Jobs – Kenya](#). Accessed 31 August 2022.



- **Foundations** also provide financial support to enterprises in waste management. The Bestseller Foundation launched an upgrading program in 2020 to support six waste management enterprises in four East African countries, including Kenya, with selected enterprises receiving convertible debt of US \$100,000.³⁵⁷ The same foundation also financed Taka Taka Textile Recycling, a subsidiary of [Taka Taka Solution](#), in 2021.³⁵⁸ The Safaricom Foundation provided an interest-free loan for US \$50,852 to the [Waste Electrical and Electronic Equipment Centre \(WEEE Centre\)](#) to enable it to scale up and increase its processing capacity to 25 tonnes per month.³⁵⁹
- Funding from **impact investors, VCs, and commercial banks** is available, although limited. Active impact investors and VCs include Open Road Alliance, Kenya Climate Ventures, DOB Equity, and Wellers Impact. Funding has been provided from Open Road Alliance to [Taka Taka Solutions](#) in 2016 (a US \$130,000 recoverable grant),³⁶⁰ from DOB equity and Global Innovation Fund to [Mr. Green Africa Kenya Limited](#) in 2019,³⁶¹ and from Wellers Impact to [Sanivation](#) in 2021.³⁶² Commercial banks that provide funding in this sector are limited, although Kenya Commercial Bank did provide a loan of US \$34 million to finance enterprises in this sector.³⁶³ While some enterprises in this sector have successful records, most find acquiring capital from non-donor institutions challenging due to the early-stage nature of their businesses and the lack of adequate deal flow information.³⁶⁴

► ESTIMATED MARKET OPPORTUNITY (2022–2030)

Since there are two main categories of waste (solid and liquid waste), the market opportunity takes into consideration the market size for solid waste and sanitation services separately. **The market potentials for sanitation and solid waste management are projected to be US \$52.85 billion and US \$1.02 billion, respectively, totaling of US \$53.87 billion.** This means that the waste management sector has the second-largest potential market size out of all eleven identified green sectors in Kenya (see Table 3).

357 TechinAfrica. "6 East Africa waste management startups get support from the Bestseller Foundation."

358 Denim Focus. 7 October 2021. "International Potential for New Textile Recycling Project."

359 Safaricom Foundation. "Provision of grant to Waste Electric and Electronic Equipment Centre in Nairobi County." (Conversion of Kshs 6 140 000 to USD using Oanda on 31 August 2022.)

360 Open Road Alliance. 2017. [TakaTaka Solutions](#).

361 [DOB Equity: Mr. Green Kenya](#). Accessed 31 August 2022.

362 Wellers Impact. 16 March 2021. "Water Unite Announces Sanivation as the first investee of the Water Unite Impact Investment Vehicle."

363 Odhengo, P. et al. 2021. [The Landscape of Climate Finance in Kenya](#). Republic of Kenya: The National Treasury and Planning. (Conversion of Kshs 4,147,000,000 to USD using Oanda on 2 September 2022.)

364 Makena, A. and Mangeni, M. [Waste-to-Value Startup Ecosystem](#). Intellecap.





Sector Group: Built Environment

GREEN BUILDINGS

KEY AREA	BUSINESS SEGMENT	MARKET OPPORTUNITY (2022-2030)
 <p>Green construction</p>	<ul style="list-style-type: none"> ✓ Green construction materials providers ✓ Green building construction ✓ Green building consultancy 	<p>US \$7.3 billion</p>

DISASTER MANAGEMENT

KEY AREA	BUSINESS SEGMENT	MARKET OPPORTUNITY (2022-2030)
 <p>Disaster preparedness</p>	<ul style="list-style-type: none"> ✓ Predictive analytics and artificial intelligence (AI) 	<p>No estimate due to the lack of SGB activities in this sector.</p>
 <p>Disaster response</p>	<ul style="list-style-type: none"> ✓ Drone technology ✓ Satellite-based technology 	



Green Buildings

► BACKGROUND AND BUSINESS SEGMENTS

Background: A “green” building is a building that, in its design, construction, or operation, reduces or eliminates negative impacts and can create positive impacts on our climate and natural environment.³⁶⁵ Features of green buildings include “the efficient usage of energy, water, and other resources, the use of renewable energy, measures to reduce pollution and waste and to enable recycling, good indoor environmental air quality, the use of non-toxic, ethical, and sustainable materials, the consideration of the environment and the quality of life of occupants in design, construction and operation, and the design enabling adaptation to a changing environment.”³⁶⁶

In 2021, buildings accounted for 40% of global energy consumption and 33% of GHG emissions.³⁶⁷ To meet the Paris Agreement goals, the global buildings and construction sector must almost completely decarbonize by 2050.³⁶⁸ Green buildings help in climate mitigation by reducing emissions and by improving resource efficiency, but they also play an important role in climate adaptation. Green buildings increase the resilience of buildings and reduce their vulnerability to extreme weather events.³⁶⁹ Measures such as bio-climatic design, dry proofing, drainage, green roofs, and efficient heating and cooling systems help buildings adapt to climate change.³⁷⁰ Green buildings also offer several other benefits, such as reduced operating costs, “lower construction costs and higher property value for building developers, increased occupancy rates or operating costs for building owners, and job creation.”³⁷¹ Moreover, people who work in green offices or live in green homes experience improved health and well-being.³⁷²

Kenya Context: The concept of green buildings is still nascent in Kenya, but the uptake of green buildings is increasing. The number of certified green buildings in Kenya increased by 92% between 2021 and 2022,³⁷³ and the IFC estimates an increase in the number of green buildings in the coming years driven by an enabling policy environment and availability of funding.³⁷⁴ Residential buildings are especially expected to significantly contribute to that growth in coming years, while the number of green buildings for commercial purposes, such as hotels, restaurants, tourism facilities, office and retail, are also expected to grow.³⁷⁵

To promote the growth of the green building stock, the government has set various targets, mostly focusing on the implementation of renewable energy solutions in new and retrofitted buildings and providing affordable green housing options to promote inclusivity. To actively engage with the private sector to achieve these goals, the government launched the Kenya Green Bonds Program which provides financial support for green building construction.³⁷⁶

There are two areas of operational activities within the green buildings sector: *green construction and retrofitted building* (e.g., energy efficiency, water efficiency, waste management, etc.). While SGB activities are observed

365 World Green Building Council. [What is a Sustainable Built Environment?](#) Accessed 21 February 2023.

366 Ibid.

367 Tricoire, J. 22 February 2021. [“Why buildings are the foundation of an energy-efficient future.”](#) World Economic Forum.

368 United Nations Environment Programme. 2021. [2021 Global Status Report For Buildings And Construction.](#)

369 Thacker, S. et al. 2021. [Infrastructure for climate action.](#) UNOPS.

370 Ibid.

371 World Green Building Council. [What is a Sustainable Built Environment?](#) Accessed 21 February 2023.

372 Ibid.

373 Business Daily. 14 June 2022. [“Developers shift to green buildings in design, sales pitch.”](#)

374 IFC. 2018. [Green Buildings Market Intelligence: Kenya Country Profile.](#)

375 Ibid.

376 Green Finance Platform. [The Kenya Green Bond Programme.](#) Accessed 28 September 2022.



in the retrofitted building business segment, this is covered under the respective sector narratives (i.e., energy efficiency and storage, water management, and waste management). Hence the focus of this section will be on green construction.

GREEN CONSTRUCTION

Green construction enables the creation and usage of the built environment to be as environment-friendly as possible. It involves the use of sustainable and eco-friendly materials, efficient building design, and sustainable construction processes. The green construction key area includes SGBs that provide products and services that reduce the carbon footprint and improve the resource efficiency of the building sector.

Business Segments: The business segments identified under the green construction area are *green construction materials providers*, *green building construction*, *green building consultancy*, and *support service providers*. However, SGBs do not typically provide support services.

Table 28: Business segments and examples of SGBs in green construction

BUSINESS SEGMENT	DESCRIPTION	EXAMPLES OF SGBS
Green construction materials providers	Supply sustainable materials such as earthen materials, bamboo, insulated concrete forms, slate, polystyrene, stone, natural clay, natural fiber floors, non-volatile organic compounds (VOC) paints, and fiber cement, among others. ³⁷⁷	<ul style="list-style-type: none"> ▶ Kenda Interlocking Bricks ▶ Mycotile
Green building construction	Provide structures that are designed, built, renovated, operated, or reused in a resource-efficient manner.	<ul style="list-style-type: none"> ▶ Gjenge Makers ▶ Kwangu Kwako Limited, Vlage ▶ Questworks Ltd
Green building consultancy	Delivers consultancy services for the design and construction of green buildings with regard to energy efficiency, exposure to natural light, and building ventilation systems, to name but a few.	<ul style="list-style-type: none"> ▶ Greenkey Environmental Solutions ▶ Urban Green Consultants Ltd

▶ POLICY LANDSCAPE

The Kenyan government has developed various policies and strategies that aim to promote green building construction. The private sector is expected to participate in the green building market by building green buildings and supplying green construction materials. The government supports that role and also provides tax reductions and rebates for green building businesses. As of 2022, the majority of SGBs in this sector are concentrated in the supply of green construction materials.³⁷⁸ However, the government is yet to develop a policy on the procurement of green construction materials, which slows down the further development of the green materials industry.

³⁷⁷ Nduire, J. 2 July 2021. [Green Building Materials in Kenya](#). Construction Kenya.

³⁷⁸ Primary research insight.


Table 29: Key policies and strategies for Kenyan green building

POLICY/STRATEGY	AIM	SUPPORT AND GAPS FOR SGB ACTIVITY
The Big Four Agenda	Notes that the government will provide incentives to private developers in the form of reduced taxes to facilitate the construction of more than 100,000 houses every year.	This is expected to create opportunities for SGBs, particularly those involved in green construction and the supply of green construction materials. In 2020, the government issued a decree that all affordable housing development projects under the Big Four Agenda must meet the Excellence in Design for Greater Efficiencies (EDGE) green buildings standard.
Green Economy Strategy and Implementation Plan (GESIP) 2016-2030	Outlines the action plan for promoting sustainable design, construction, and maintenance of buildings in Kenya. Kenya has a target of ensuring that 75% of new and renovated public (national and county) and large-scale private buildings are green by 2030. Achieving the target of 75% implies constructing at least 187,500 (75% of 250,000) green residential buildings annually, which cannot be met solely by the government or the public sector since the state department constructed only about 3,480 housing units as of December 2021. ³⁷⁹	Filling this gap will require the active participation of private sector players, including SGBs involved in the supply of green construction materials and the construction of green buildings. The government is engaging the private sector through PPPs. However, it is yet to develop a policy on the procurement of green construction materials, ³⁸⁰ which has contributed to the slow uptake of green construction materials by the building industry since conventional building materials tend to be cheaper. ³⁸¹
The Green Mark Standard for Green Buildings	Developed by the Government of Kenya in collaboration with the Green Africa Foundation and other stakeholders, this standard provides a localized benchmark and guidelines for assessing the extent to which the development of new and existing buildings addresses climate change and environmental degradation.	The intention of the standard is to promote the construction of green buildings that meet the highest standards. Therefore, it creates more opportunities for private sector enterprises, particularly those involved in the supply of green construction materials and green building construction.
Kenya Vision 2030 – Medium Term Plan III (MTP III)	Notes that the government aims to provide 500,000 affordable houses to low-income households across the country, which is aligned with the affordable housing program (AHP) under the Big Four Agenda of the Kenyan government. ³⁸² To achieve this target, the government intends to partner with financial institutions, private developers, cooperatives, and manufacturers of building materials. Further, MTP III indicates that a National Housing Development Fund will be established and other financing strategies created to finance low-cost housing and the associated social and physical infrastructure.	The construction of 500,000 affordable houses under MTP III of the Kenya Vision 2030 is expected to create opportunities for SGBs involved in the supply of green construction materials as well as those involved in construction and the provision of consultancy services. However, the government is yet to provide any incentive to facilitate the participation of private sector enterprises in green building construction as of 2022.

379 In Kenya, about 50,000 new housing units are constructed annually against an annual demand of 250,000 housing units (source).

380 Primary research insight.

381 Ibid.

382 Government of Kenya. 2020. *The Big Four Agenda Report*.



POLICY/STRATEGY	AIM	SUPPORT AND GAPS FOR SGB ACTIVITY
The Sessional Paper No. 3 of 2016 on the National Housing Policy	Outlines key actions and strategies that will promote the construction of green buildings in Kenya. The policy notes that the government will introduce tax rebates (fiscal incentives) on building materials and technologies and other incentives pegged on materials used in green building construction.	This is intended to promote the participation of private enterprises in the construction of green buildings and the production of green construction materials.
The Sessional Paper No.10 of 2014 on the National Environment Policy	Highlights key government commitments and calls for consideration of environmental factors in the construction of buildings.	Promoting technologies for efficient and safe water use, especially with respect to wastewater use and recycling, is expected to promote the participation of enterprises, including SGBs, involved in the supply of technologies and materials used in the construction of green buildings. Additionally, the undertaking of an Environmental Health Impact Analysis (EHIA) and Environmental Impact Assessment (EIA) for housing development projects will require the participation of SGBs that provide green building consultancy services.

► FUNDING LANDSCAPE

The funding in the green building sector in Kenya is limited but growing. The funding landscape mainly consists of DFIs and commercial banks with few active impact investors and foundations.

- **DFIs** active in this area include IFC, the Foreign, Commonwealth and Development Office (FCDO), FSD Africa Investments, the World Bank, and FMO. In 2013, the IFC provided US \$20 million in financing to the Housing Finance Company of Kenya.³⁸³ In 2016, the IFC provided US \$105 million to the Co-operative Bank to support lending to SMEs, women entrepreneurs, and the housing sector.³⁸⁴ In 2021, FSD Africa Investments committed US \$5.4 million, while FCDO committed US \$32.3 million,³⁸⁵ to support the implementation of the green affordable housing program. The FCDO has also raised US \$13.99 million to support affordable housing research and is committed to raising an additional US \$84 million to support the construction of green and affordable housing units.³⁸⁶ Various investors, including FMO, FCDO, and FSD Africa Investments, issued the first green bond (US \$41 million) in Kenya in 2019 to support green building construction through the Kenya Green Bonds Program.³⁸⁷
- **Commercial banks** are also active in providing financial support. In 2020, Equity Bank, KCB Group, NCBA, Stanbic Bank, Housing Finance, and Absa Bank committed to raising US \$2.7 billion to support the implementation of the affordable housing program.³⁸⁸ Stanbic Bank and Cooperative Bank are providing

383 IFC. 5 February 2013. "IFC Provides Funding to Housing Finance Company of Kenya to Spur Green Housing Market."

384 IFC. 11 January 2016. "IFC Invests in Co-op Bank to Support Entrepreneurs and Housing Finance in Kenya."

385 FSD Africa. 2021. *FSD Affordable Housing Strategy: Rationale for Affordable Housing Working Group in Kenya*. Conversion of GBP 5 million and GBP 30 million to USD using Oanda on 28 September 2022.

386 Cleanbuild.africa. 1 August 2021. "Climate Action Africa: Kenya to receive \$184m for its green transition." Conversion of GBP 13 million to USD using Oanda on 28 September 2022.

387 Green Finance Platform. 2019. *The Kenya Green Bond Programme*.

388 Theurl, P. 12 June 2020. "Banks to pump over Kshs 300 billion into housing." *The Standard*. (Conversion of Kshs. 27.7 billion to USD using



US \$33 million in green credit lines for energy and resource efficiency projects, including green building construction projects.³⁸⁹

- **Few impact investors are active** as the green buildings sector is highly capital-intensive and has a limited number of private enterprises.³⁹⁰ The most active impact investor in the green construction key area is Hooge Raedt Social Venture (HRSV).
- **Foundations** active in the green construction key area include the Draper Richards Kaplan (DRK) Foundation and Green Africa Foundation. The DRK Foundation funds early-stage, high-impact social enterprises. In 2016, [Kwangu Kwako Ltd](#), a green construction SGB, raised US \$130,394 convertible debt from HRSV to construct new affordable houses in informal settlement areas in Nairobi³⁹¹ and raised an undisclosed amount of debt from the DRK Foundation to expand its activities in affordable housing construction.³⁹² Since the green building space is still nascent in Kenya, impact investors are skeptical about the sustainability of the enterprises.³⁹³

► ESTIMATED MARKET OPPORTUNITY (2022–2030)

This market opportunity analysis for the green building sector is based on a government-set target approach. The Kenyan government aims to construct 500,000 housing units under the affordable housing program.³⁹⁴ Although not all housing units under the program will be built green, the government plans to utilize local green construction materials and incorporate innovative green building features like green roofs and green walls for 75% of the newly constructed buildings.³⁹⁵ The estimated market opportunity of the green building sector is US \$7.32 billion. This estimate is greater than FDS Africa’s estimate (US \$5,000 per unit) but lower than the IFC’s estimate (US \$36,666 per unit).³⁹⁶

Disaster Management

► BACKGROUND AND BUSINESS SEGMENTS

Background: The United Nations Office for Disaster Risk Reduction (UNDRR) defines a disaster as a “serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability, and capacity, leading to one or more of the following: human, material, economic and environmental losses, and impacts.”³⁹⁷ Global warming and changing weather patterns result in climate catastrophes across the world. According to the latest data, losses from natural catastrophes in 2020 rose to US \$210 billion globally from US \$166 billion in 2019.³⁹⁸ Mainstreaming disaster management into development planning can reverse the current trend of rising disaster impact.³⁹⁹ Thus, planning and preparing for disaster, especially considering climate risks, is becoming increasingly important for climate adaptation and resilience.

Oanda on 29 September 2022).

389 IFC. 2018. [Kenya Green Building Market Intelligence report](#).

390 Primary research insight.

391 [HRSV – Kwangu Kwako Ltd](#). Accessed 15 September 2022.

392 [DRK Foundation – Kwangu Kwako Ltd](#). Accessed 15 September 2022.

393 Primary research insight.

394 The National Treasury. 2022. [Mwananchi Guide – Financial Year 2022/23 Budget](#).

395 Ministry of Environment and Natural Resources. 2016. [Green Economy Strategy and Implementation Plan 2016 – 2030](#).

396 The IFC estimates US \$1.1 billion of investment opportunity that covers 30,000 housing units built from 2019 to 2030 in Nairobi ([source](#)). FSD Africa estimates that US \$45–90 billion is needed over the next 20 years to construct 9 million housing units ([source](#)).

397 UNDRR. [Global Assessment Report on Disaster Risk Reduction](#). Accessed 15 September 2022.

398 [World Bank – Disaster Risk Management Overview](#). Accessed 15 September 2022.

399 Ibid.



Kenya Context: Kenya is exposed to various disasters, including floods, drought, epidemics, landslides, earthquakes, and storms, with droughts having affected the highest number of people in Kenya in terms of loss of livelihoods and massive displacement of populations.⁴⁰⁰ Between 1964 and 2019, floods resulted in high mortality and damage to assets worth US \$508 million.⁴⁰¹

This section is organized into the following five major areas of operational activities in the disaster management sector:⁴⁰²

- **Prevention and mitigation:** avoiding, lessening, or limiting the adverse impacts of hazards and related disasters.⁴⁰³
- **Preparedness:** developing knowledge and capacities to anticipate, respond to, and recover from the impacts of likely, imminent, or current hazard events or conditions.
- **Response:** providing emergency services during or immediately after a disaster.
- **Recovery:** encompasses the three overlapping phases of emergency relief, rehabilitation, and reconstruction.
- **Rehabilitation:** providing temporary public utilities and housing.

Entrepreneurial activity in the disaster management sector in Kenya is still nascent. There are very few SGBs in this sector, as disaster management falls under the responsibility of government at the national and county levels. The government engages private sector enterprises through PPPs.⁴⁰⁴ However, working with the government has challenges, including cumbersome contracting procedures and delayed payments. Also, there is a lack of funding and limited technical expertise, particularly among SGBs that use drone technology in disaster management.⁴⁰⁵ The following section focuses only on disaster preparedness and disaster response, as SGB activities were not identified in disaster prevention and mitigation, disaster recovery, or disaster rehabilitation.

DISASTER PREPAREDNESS

Preparedness action is carried out within the context of disaster management and aims to build the capacities needed to efficiently manage all types of emergencies and achieve orderly transitions from response through to sustained recovery. The SGBs in the disaster preparedness key area provide services such as early warning systems, emergency planning, assessment, and remedial actions in readiness for a potential disaster. The business segments with SGB activities in Kenya are *predictive analytics and artificial intelligence (AI)*. Predictive analytics refers to the use of environmental and climate data to predict future disasters, while AI generates insights about disaster phenomena using software algorithms and computation models. SGBs in this business segment, such as **Techno Brain**, use both predictive analytics and AI to detect early signs of droughts or floods.

400 UNDRR. 2020. [Kenya: Risk-sensitive Budget Review](#).

401 ASAL Humanitarian Network. 2022. [Drought situation in the Kenya ASAL areas now at crisis level](#).

402 The broad framework of areas of operational activities are borrowed from the [Indian National Institute for Disaster Management](#). However, the categorization used in this report combines prevention and mitigation, which are two separate categories in the source. UNISDR Terminology on Disaster Risk Reduction takes a similar approach.

403 UNISDR. 2009. [UNISDR Terminology on Disaster Risk Reduction](#).

404 Government of Kenya. 2021. [The Disaster Risk Management Bill 2021](#).

405 Primary research insight.



DISASTER RESPONSE

Disaster response predominantly focuses on immediate and short-term needs. The SGBs in the disaster response key area provide services such as communication, evacuation, assessment of damage, and logistical support during a disaster. In Kenya, the business segments with SGB activities are *drone technology* and *satellite-based technology*.

Table 30: Business segments and examples of SGBs in disaster response

BUSINESS SEGMENT	DESCRIPTION	EXAMPLES OF SGBS
Drone technology	SGBs that use drones to transmit real-time videos to first responders and thereby providing real-time knowledge of the disaster situation. This helps understand the extent of damage inflicted on infrastructure, the state of transportation and logistics, and ultimately, how to respond to a disaster.	<ul style="list-style-type: none"> ▶ Astral Aerial ▶ Swift Lab Ltd
Satellite-based technology	Connect stranded people with rescue teams by using satellite-based mobile applications and providing real-time updates about a disaster using mobile-based communication services.	<ul style="list-style-type: none"> ▶ Alatpres ▶ Flare ▶ Usalama Technology

▶ POLICY LANDSCAPE

The Kenyan national government has developed various policies for disaster management, although most of them are generic in nature. Moreover, there is no comprehensive disaster management framework that provides guidelines on how private enterprises can engage in disaster management. As such, there are few private sector enterprises, including SGBs, active in the sector.

The following are the policies that cover both the disaster preparedness and disaster response key areas.

Table 31: Key policies and strategies for Kenyan disaster management

POLICY/STRATEGY	AIM	SUPPORT AND GAPS FOR SGB ACTIVITY
The Civil Aviation (Unmanned Aircraft Systems) Regulations, 2020	Pertains to the disaster response key area and provides guidelines for operating drones in Kenya. The guidelines provide details for registering and obtaining a license or permit for using drones in various activities, including disaster management. The regulations allow private sector players to own and use drones for different activities.	The introduction of the Civil Aviation Regulations has led to the emergence of enterprises, including SGBs, that use drone technology for disaster response activities. However, drone technology is still nascent in Kenya, and the skillset required is expensive and mostly provided by foreign experts. ⁴⁰⁶ Moreover, as of 2022, there is no insurance for drones, ⁴⁰⁷ which makes it expensive to manage and operate them.

406 Primary research insight.

407 Ibid.



POLICY/STRATEGY	AIM	SUPPORT AND GAPS FOR SGB ACTIVITY
The Disaster Risk Management Bill 2021	Proposes the development of a National Disaster Risk Management Authority that is expected to spearhead and coordinate private sector activities in disaster management. The Authority's responsibilities include 1) serving as the central national agency in the implementation of disaster management activities, 2) mobilizing public-private partnerships in disaster management, 3) developing a database containing private sector organizations with specialized equipment, skills, or knowledge relevant to disaster risk management, among other responsibilities.	The National Disaster Risk Management Authority is yet to be established as of 2022, delaying active participation of the private sector in disaster preparedness and response.
National Disaster Management Policy of Kenya 2010	States that the ministry responsible for disaster management should work closely with the private sector in risk reduction programs, contingency planning, and relief and recovery operations.	The policy specifically mentions raising public awareness about disasters as the role the private sector should play. However, the policy does not provide guidelines or incentives to encourage the participation of the private sector.
National Policy for Disaster Management in Kenya, 2009	Recognizes the important role that private sector stakeholders, including companies, the media, individuals, and professional bodies, play in disaster management. It notes that private sector players provide resources (financial, human, technical know-how, and equipment), advocacy, public education, sensitization, and awareness when a disaster strikes.	To promote private sector participation, the policy proposes the establishment of a National Agency for Disaster Management (NADIMA) to work closely with private sector enterprises. However, NADIMA is yet to be established as of 2022.

► FUNDING LANDSCAPE

In Kenya, the disaster management funding landscape is mainly dominated by DFIs alongside some support from foundations. Few impact investors, private equity investors, VCs, and traditional finance providers are active in this subsector. Entrepreneurship in disaster management is still nascent, with very few emerging enterprises. Enterprises mainly raise revenues through participating in government-led projects. The DFIs provide technical and financial assistance to the government.

The funding available for the disaster preparedness key area mainly flows from DFIs and foundations.

- **DFIs** active in disaster preparedness include the Global Facility for Disaster Reduction and Recovery (GFDRR), the European Union (EU), the World Bank, the United Nations Development Programme (UNDP), and the United Nations Educational, Scientific, and Cultural Organization (UNESCO). GFDRR provided a US \$469,827 grant to Kenya in 2019 to support the implementation of the Fortifying Institutional, Planning and Policy Frameworks to



Manage Climate and Disaster Risk project.⁴⁰⁸ In 2020, UNESCO, in collaboration with the Government of Japan, launched the Strengthening Disaster Prevention Approaches in Eastern Africa project in Nairobi.⁴⁰⁹ The UNDP works in the sector through many projects implemented by the National Drought Management Authority (NDMA).⁴¹⁰

- **Foundations** active in disaster preparedness include the Safaricom Foundation and the Kenya Community Development Foundation (KCDF). They have supported communities in ASAL counties to adopt native and more effective farming, storage, and water conservation mechanisms through the Ustawi program.⁴¹¹

DFIs and foundations also provide the major share of funding for the disaster response key area.

- **DFIs** that provide such funding are the African Development Bank (AfDB), the World Bank, the Foreign, Commonwealth and Development Office (FCDO), and the EU, among others. In 2017, AfDB approved a US \$1 million emergency relief grant to drought victims in Kenya.⁴¹² FCDO is implementing the Hunger Safety Net Program, which provides cash transfers to 100,000 of the poorest households in arid and semi-arid lands and an additional 250,000 households during drought emergencies.⁴¹³ Since 2007, the EU has been engaged in drought management projects in Kenya and currently sponsors a disaster response project called the Support to Drought Risk Management.⁴¹⁴
- **Foundations** active in disaster response include the Safaricom Foundation and KCDF. In 2013, the Safaricom Foundation donated US \$81,968 to support rescue efforts for flood victims in Kenya⁴¹⁵ and donated US \$81,968 to the Kenya Red Cross Society (KRCS) to support its activities in addressing the drought situation.⁴¹⁶ The Ustawi program supported by the Safaricom Foundation and KCDF enables communities in ASAL areas to respond to disasters such as drought and famine.⁴¹⁷

408 [GFDRR: TA Kenya - Fortifying Institutional, Planning and Policy Frameworks to Manage Climate and Disaster Risk](#). Accessed 17 October 2022.

409 UNESCO. 28 October 2020. "Strengthening Disaster Prevention Approaches in Eastern Africa".

410 [National Drought Management Authority - Partner-supported Projects](#). Accessed 17 October 2022.

411 Safaricom Foundation. "The launch of Ustawi programme in partnership with Kenya Community Development Foundation (KCDF) in Wajir County."

412 AfDB, 7 July 2017. "AfDB approves US\$1 million emergency relief grant to drought victims in Kenya."

413 FCDO Development Tracker. Available [here](#)

414 [National Drought Management Authority - Partner-supported Projects](#). Accessed 17 October 2022.

415 Safaricom. 3 May 2013. "Safaricom donates Kshs 10 million to help those affected by floods." (Conversion of Kshs. 10 million to USD using Oanda on 17 October 2022).

416 "Safaricom Limited Donates Ksh 10 million to Kenya Red Cross Society towards drought response in Kenya." (Conversion of Kshs. 10 million to USD using Oanda on 17 October 2022).

417 Safaricom Foundation. "The launch of Ustawi programme in partnership with Kenya Community Development Foundation (KCDF) in Wajir County."



APPENDIX A: INTERVIEWEES

Investors	DOB Equity Goodwell Investments Kenya Climate Ventures (KCV) Oikocredit
DFIs	GIZ Kenya IMF World Bank
Accelerators/incubators	BESIC Group E4Impact Accelerator GrowthAfrica WAKE-UP Kenya
Enterprises	Acacia Innovations Ltd. BasiGo Burn Manufacturing Deevabits Green Energy Enviroserve Kenya Farmbetter Inno Neat Ltd. Jambo Africa Tourism Organisation Network (JATONET) Kenya Kiri EV Kwangu Kwako Ltd. Magiro Hydro Electricity Ltd. Miti Alliance Ltd. Safi Organics Ltd. Sanivation Kenya Swift lab Ltd. Usafi Green Energy
Associations	Clean Cooking Association of Kenya (CCAK) Kenya Association of Manufacturers (KAM)- Center for Green Growth Kenya Bankers Association (KBA)
Government	Energy and Petroleum Regulatory (EPRA)
Others	The IKEA Foundation World Wildlife Fund



APPENDIX B: DETAILED METHODOLOGY OF MARKET OPPORTUNITY ESTIMATES

► SOLAR ENERGY

To estimate the investment gap between the current state and the universal access to electricity, the population without access to electricity between 2022 and 2030 was calculated. In 2022, 34.30% of the rural population⁴¹⁸ and 4.96% of the urban population⁴¹⁹ in Kenya did not have access to electricity either on-grid or off-grid. That translates to 13,655,833 people in rural areas and 806,383 people in urban areas.⁴²⁰ The percentage shares of the rural population with access to off-grid and on-grid electricity are 35% and 18%, respectively. The equivalent figures for the urban population are 7% (off-grid) and 81% (on-grid).⁴²¹

These figures show that 9,018,003 people in rural areas were being served with off-grid electricity in 2022, compared to 64,144 people in urban areas (adding up to a total of 9,082,147 people depending on off-grid electricity). That total equates to an estimated 2,328,756 households being served with off-grid electricity (assuming that households have 3.9 people on average).⁴²²

Using a similar approach, the year-to-year number of households that will be served with off-grid electricity in the years leading up to 2030 was estimated based on the World Bank projection of how many households would not have access to electricity in those years. The share of households served with off-grid electricity from various sources SHS (15%), mini-grids (0.3%), solar lanterns/solar lighting systems (36%), tier 0 off-grid solutions (45%), and rechargeable battery (4%)⁴²³ was then used to calculate the number of households to be connected with these off-grid solutions from 2022 to 2030 (see the table below). The average costs are US \$234.4 for a SHS,⁴²⁴ US \$15.16 for a solar lantern,⁴²⁵ is US \$5,⁴²⁶ US \$97.22 for tier 0 off-grid solution,⁴²⁷ US \$5,600/kW or US \$5.6/W for a mini-grid.^{428 429} Lastly, by multiplying the number of households to be served with each off-grid energy source with the unit cost and summing it all up, the analysis derives the market size of US \$873.24 million.

418 World Bank. [Access to electricity, rural \(% of rural population\)](#).

419 World Bank. [Access to electricity, urban \(% of urban population\)](#).

420 Population data was obtained from United Nations World Population Prospects 2022. Available [here](#).

421 The assumption is that power supply make-up from off-grid and on-grid remains constant till 2030; The percentage share of off-grid and on-grid electrification is obtained from IRENA (2019). [Tracking SDG7: The Energy Progress Report](#).

422 According to the 2019 Kenya Population and Housing Census Report, the average of people per household in Kenya is 3.9.

423 The share of SHS and mini grids were obtained from the IRENA (2019). [Tracking SDG7: The Energy Progress Report](#) and the World Bank (2017) [Mini Grids in Kenya: A Case Study of a Market at a Turning Point](#).

424 The cost includes the cost of purchasing and installation of SHS ([source](#)). The average size of a SHS purchased by a household is 60W ([source](#)).

425 IFC. 2022. [Energy Sector Baseline Study in the Kakuma-Kalobeyei Refugee-Hosting Area in Kenya](#).

426 The World Bank. 2018. [Kenya: Off-grid Solar Access Project for Underserved Counties](#).

427 The World Bank. 2020. [Economic Analysis of Battery Energy Storage Systems](#).

428 The World Bank. 2018. [Kenya: Off-grid Solar Access Project for Underserved Counties](#).

429 On average, the size of mini grid connected to a household is 200 W. Source: World Bank. 2017. [Mini grids in Kenya: A Case Study of a Market at a Turning Point](#).


Table A: Estimates of Households Served with Solar Energy

	MINI-GRIDS	SHS	SOLAR LANTERNS	TIER 0 OFF-GRID	RECHARGEABLE BATTERY	TOTAL
2022	7,452	349,313	838,352	1,047,940	93,150	2,328,756
2023	7,255	340,095	816,227	1,020,284	90,692	2,267,297
2024	7,060	330,958	794,300	992,875	88,256	2,206,390
2025	6,868	321,916	772,599	965,749	85,844	2,146,110
2026	6,677	312,974	751,138	938,923	83,460	2,086,496
2027	6,488	304,135	729,924	912,405	81,103	2,027,566
2028	6,302	295,401	708,963	886,204	78,774	1,969,342
2029	6,118	286,776	688,263	860,329	76,474	1,911,842
2030	5,936	278,263	667,831	834,789	74,203	1,855,086

According to KNES 2018, Kenya requires an investment of US \$2.7 billion to achieve universal access to electricity by 2022.⁴³⁰ About US \$0.5 billion of the investment will be required to provide off-grid solutions (SHS and mini grids) to more than 2 million households in 14 underserved counties.⁴³¹ As noted in section 2 above, solar energy is the key area with high potential for SGB contribution and growth.

► BIOFUELS

The government-set targets on four business sectors – bioethanol, biodiesel, biogas, and briquettes and pellets – within the biofuel key area were first identified. For biodiesel, the government has a target of 2% biodiesel blend (B2), which translates to the fuel composition of 2% biodiesel and 98% petroleum. For bioethanol, the government also has a target of a 10% bioethanol blend (E10), which means that the fuel mix will consist of 10% ethanol and 90% petroleum fuel. Another national goal for bioethanol is to increase the percentage of households in Kenya using bioethanol for cooking to reach 4.5% at a minimum by 2030. Similarly, the government also aims to have 0.8% of Kenyan households use biogas for cooking by 2030 and intends to construct 6,500 biogas digesters annually. There are no specific government targets for briquettes and pellets. The market size was assessed based on the projected population growth and the assumption that 1% of Kenyan households – as it is in 2019⁴³² – will continuously need briquettes and pellets for cooking in the future.

430 Ministry of Energy. 2018. [The Kenya National Electrification Strategy 2018](#).

431 Ibid.

432 Ministry of Energy & Clean Cooking Association of Kenya. 2019. [Kenya Household Cooking Sector Study: Assessment of the supply and demand of cooking solutions at the household level](#).



	TARGET	TARGET (2030)	CURRENT	CAGR
Biodiesel	B2	50 mil liters ⁴³³	32 mil liters (2013) ⁴³⁴	2.7%
Bioethanol	E10 (52 million liters/yr)	-	-	-
	4.5% of households	4.5%	1%	16.2%
Biogas	0.8% of households	0.8%	0.3%	10.3%
	6,500 biogas digesters/yr	-	-	-
Briquettes and pellets	1% of households	1%	1%	-

The next step was to estimate the gap between the current production levels and the target. The current consumption of gasoline in Kenya (i.e., 520 million liters) and the E10 target set 52 million liters of bioethanol as an annual target. There was no need to try to calculate the current and target number for biogas digesters since the goal is to produce a set number of digesters each year. For the rest, the CAGR gives us the projected % of households using bioethanol/biogas/briquettes and pellets year-to-year from 2022 and 2030. The projected percentage of households using each fuel alongside the total number of projected households in Kenya allows us to derive the number of households using the corresponding fuel for each year. The next step taken is to estimate the demand for bioethanol/biogas/briquettes and pellets by multiplying the number of households that need the energy source and the annual average household consumption of the fuel (185 million tons for bioethanol, 441.65 kg for biogas, 260 kg for briquettes and pellets).

The annual market opportunity (from 2022 to 2030) was deduced by multiplying the annual production targets or the number of households in demand of each fuel source by the cost of associated fuel production. The cost of production is approximately US \$0.70 per liter for biodiesel,⁴³⁵ US \$0.56 per liter for bioethanol,⁴³⁶ US \$677.19 per unit for designing and installing a biogas digester, and US \$0.11 per kilogram for briquettes and pellets.⁴³⁷ The overall market size was reached by summing up the annual market size for biodiesel, bioethanol, biogas (and biogas digesters), and briquettes and pellets.

433 Ministry of Energy. 2008. [A Roadmap for Biofuels in Kenya: Opportunities and Obstacles](#).

434 Ibid.

435 This cost includes both the capital cost and the operational cost of producing biodiesel in 2012 USD/liter diesel equivalent terms. Source: IRENA. 2013. [Road Transport: The Cost of Renewable Solutions](#).

436 This cost includes the cost of feedstock production, processing, and distribution of bioethanol. The main feedstocks used in bioethanol production include molasses, sugarcane juice and cassava. Source: Ministry of Energy. 2008. [A Roadmap for Biofuels in Kenya: Opportunities and Obstacles](#).

437 Cost of designing and installing a biogas digester. SimGas Ltd. Available [here](#).



► SUSTAINABLE AGRICULTURE AND AQUACULTURE

The cost of sustainable agriculture and aquaculture was obtained from [Brookings Institution Building the SDG Economy 2019 report](#). The cost estimate also relates to Targets 2.4 and 2.5. The cost estimate per capita to achieve SDG2 for Kenya is US \$59.07.⁴³⁸ The components used in the calculation of the cost per capita include 1) improving primary agriculture and natural resources (e.g., soil, fish stock, forest resources), 2) improving agro-processing operations, 3) improving institutional framework, and 4) improving research, development, and extension.⁴³⁹

Finally, the cost estimate per capita coupled with annual population projections (up to 2030) in Kenya⁴⁴⁰ allowed for the calculation of annual investments in sustainable agriculture and aquaculture. Kenya's population was projected to be 54.78 million in 2021 and 66.96 million in 2030.⁴⁴¹ These population projections multiplied by the unit cost calculated above give a total estimated spending on agriculture of US \$3.24 billion in 2021 and US \$3.96 billion in 2030. With these two figures, this analysis derives CAGR, the annual investment needed, and the overall market between 2022 and 2030 by summing up the annual investments leading to US \$32.61 billion.

► SUSTAINABLE FORESTRY

The first step to estimate the market opportunity was to identify the government target for sustainable forestry and the identified key areas. The national target for forest conservation is twofold: 1) achieving 10% forest cover by 2030⁴⁴² and allocating at least 10% of the overall annual planting budget towards bamboo planting.^{443, 444} With regards to agroforestry, Kenya aims to increase the land area under agroforestry by 281,000 hectares between 2015 and 2030.⁴⁴⁵ Unlike the two mentioned key areas, there are no specific government targets for NTFPs. The key area itself is still at a nascent stage while many SGBs operate in the honey industry and policy support exists for this industry, the main type of NTFP in Kenya. The market size assessment for the NTFP, thus, focuses on honey and assumes that honey products will be extracted from 1% of the annual increment in forest cover.⁴⁴⁶

As a next step, the growth rate (CAGR) was identified. For forest Conservation, the target forest cover is 10% by 2030, while the figure in 2021 is estimated to be 8.83% of the total land mass in Kenya. These two figures give us a CAGR of 1.39%. The CAGR of 1.39% was used to calculate incremental forest cover in percentages from 2022 to 2030, which were then converted into hectares by multiplying with the total land area in Kenya (i.e., 59.20 million hectares). The forest target would be covered 10% by bamboo and 90% by indigenous trees, as the government intends to allocate 10% of the national tree planting budget towards the bamboo plantation, which puts the area to be covered by indigenous trees and bamboo in 2022 to be 65492.34 and 7276.93 hectares, respectively. With regards to agroforestry, the goal is to increase the total area under agroforestry at the farm level to reach 281,000 hectares by 2030, while the current agroforestry land area in Kenya stands at 80,000 hectares.⁴⁴⁷ These two figures provide a

438 [Brookings Institution: Building the SDG Economy report full dataset \(including country level data\)](#).

439 Brookings Institution 2019. [Building the SDG economy: Needs, spending, and financing for universal achievement of the Sustainable Development Goals](#).

440 Population projections obtained from [United Nations World Population Prospects 2022](#)

441 [United Nations World Population Prospects - Rural population](#) and [United Nations World Population Prospects - Urban population](#).

442 [Kenya Vision 2030](#).

443 The calculation of market size for forest conservation assumes that 10% of the additional annual forest cover from 2022 to 2030 will be covered by bamboo plantation. The remaining 90% will be covered by indigenous trees.

444 Ministry of Environment and Forestry. 2019. [National Bamboo Policy 2019](#).

445 Ministry of Agriculture, Livestock, Fisheries and Cooperatives. 2021. [The National Agroforestry Strategy 2021-2030](#).

446 Target is informed by the low volume of production of NTFPs and limited participation of SGBs in NTFPs production.

447 Since there is no publicly available current data on the total area under agroforestry in Kenya, this analysis assumes the target in 2018 (80,000 in hectares and 200,000 in acres) is met. Source: [The National Climate Change Action Plan \(NCCAP\) 2018 - 2022](#).



CAGR of 14.98%. The CAGR is then used to calculate the area to be covered with agroforestry trees from 2022 (i.e., 91,984.37 hectares) to 2030 (i.e., 281,000 hectares). Lastly, for NTFPs, as honey products will be extracted from 1% of the annual increment in forest cover, honey products will be extracted from 727.69 hectares of forest land in 2022 and 812.30 hectares of forest land in 2030.

Lastly, the average costs per hectare are identified from various sources and multiply the unit cost of the annual land that needs to be conserved, land under agroforestry, and land for NTFP. For forest conservation, the average cost of indigenous tree cultivation is US \$1331.27 per hectare. For bamboo, the cost of bamboo cultivation is US \$1,502.53 per hectare, which leads to the average cost being US \$2,180.92 per hectare for agroforestry trees.⁴⁴⁸ The average cost of production of honey - in the NTFP key area - per hectare is US \$401. This cost includes the cost of purchasing Langstroth box, honeybee colony, wax foundation, honey extractor, protective cloth, and smoker piece. It also includes the cost of management, operation and guarding the hive.⁴⁴⁹

► SUSTAINABLE TRANSPORT

The growth rate (CAGR) is 67.91% using the current and projected number of registered vehicles from 2022 and 2030 and the current and the target number of EVs by 2030. The numbers of registered vehicles from 2022 to 2030 are retrieved from the Kenya Association of Manufacturers.⁴⁵⁰ While the new EVs in 2022 only remain at a meager 650 and take up only 0.16% of the newly registered vehicles in 2022, the target estimate indicates that 410,66 new EVs in 2030 needs to be registered so that they constitute the 5% of the newly registered vehicles in 2030 leading us to the CAGR of 67.91%.

Using various reports, primary interviews, and secondary research, our team identified the average price of an EV and use this to derive the market size. The average prices of an electric car (electric four-wheelers), electric motorcycles (electric two-wheeler), and electric buses in Kenya are US \$9,844⁴⁵¹, US \$1,800,⁴⁵² and US \$40,902,⁴⁵³ respectively, as of 2022. The cost analysis excludes three-wheelers since their contribution to the Kenyan eVs market is negligible.⁴⁵⁴ The next information needed to estimate the cost in the market, in general, is the share of each type of electric vehicle. There are no readily available statistics regarding the share of electric cars/motorcycles/buses, but primary interviews with Kiri EV (an SGB that supplies electric two-wheelers) in June 2022 and the secondary research revealed that electric cars, motorcycles, and buses constitute 40%, 50%, and 10% of the market share, respectively. These findings are validated by Shell Foundation's research on EV adoption in five Sub-Saharan countries (including Kenya), which reveals that the sales of electric-two wheelers are expected to reach an all-time high in 2030.⁴⁵⁵ By multiplying the estimated cost of each type of EV with the number of newly registered eVs from 2022 to 2030 and summing them all up, the estimated market size till 2030 reaches US \$897.86 million.

448 Ministry of Environment Forestry. 2018. [Economic Analysis of Forest Landscape Restoration Options in Kenya.](#)

449 [Economic evaluation of the honey yield from four forest tree species and the future prospect of the forest beekeeping in Sudan.](#)

450 [Kenya Association of Manufacturers.](#)

451 Source: [Kenya.co.ke- Hidden Costs in Owning, Maintaining Electric Car.](#) (Converted Kshs. 1.2 million to USD using Oanda on 7 October 2022).

452 Shell Foundation. 2022. [Financing the transition to electric vehicles in Sub-Saharan Africa.](#)

453 Source: [CleanTechnica - Kenya's Basigo Celebrates 6 Months Of Passenger Journeys For Its BYD K6 Electric Buses.](#) (Converted Kshs. 5 million to USD using Oanda on 28 October 2022).

454 According to research conducted by Shell Foundation, the use of three-wheelers is often banned in major urban centres in Africa (including Kenya). This restricts the use of three-wheelers to secondary towns and therefore leads to low adoption of electric three-wheelers. Source: Shell Foundation. 2022. [Financing the transition to electric vehicles in Sub-Saharan Africa.](#)

455 The electric motorcycle is expected to grow rapidly, electric cars and buses rather slowly adopted in Kenya due to their high upfront cost for purchasing the EV and limited charging infrastructure. Source: Shell Foundation. 2022. [Financing the transition to electric vehicles in Sub-Saharan Africa.](#)



The government target for EVs is to ensure at least 5% of all vehicles imported annually are EVs by 2025.^{456, 457} Given the slow adoption of EVs in Kenya, the 5% target is presumed to be achieved by 2030 instead of 2025 for this market size assessment. There were about 350 EVs in Kenya in the year 2021⁴⁵⁸ and 1,000 EVs as of October 2022,⁴⁵⁹ which leaves the EV share of the market to be less than 1% (approximately 0.00021%) of the total number of vehicles in Kenya.

► WATER MANAGEMENT

First of all, the identified target for water management is universal access to water by 2030, which is a government-set target but SDG 6 at the same time. The indicator of the performance for the target is the percentage of the population using at least basic drinking water services (indicator 6.1.1 SDG 6).⁴⁶⁰ As of 2021, 62% of people in Kenya had access to at least basic drinking water services.

The last steps were to identify the unit costs of providing basic and improved water services in Kenya, estimate the annual spending using the unit cost and the number of the population, and aggregate all up to derive the market size from 2022 to 2030. The data used for [this World Bank report](#) estimates the annual costs per capita to be US \$34.68 for the rural population and US \$81.13 for the urban population.^{461,462} Then, the unit cost was multiplied by the number of rural and urban populations in Kenya for the years 2021 (baseline) and 2030 (endline) to calculate the investment needed in the respective years (US \$1.62 billion in 2021 and US \$3.36 billion in 2030).⁴⁶³ The baseline and endline investment levels provide us with a CAGR of 8.5%. Then, the annual market size from 2022 to 2030 was calculated using the CAGR and the sum of the overall market size for the nine years is US \$22.34 billion.

► WASTE MANAGEMENT

While the Kenyan government allocated about US \$305 million towards sanitation and sewerage infrastructure development⁴⁶⁴ and about US \$24 million⁴⁶⁵ towards solid waste management services⁴⁶⁶ In the financial year 2021/2022, there is no comprehensive nationwide target for this sector. Thus, the SDG target-based methodology was used for the market size assessment.

First, targets, current levels, and unit costs were identified. The SDG targets relevant to the greening of the waste management sector are indicator 6.2.1 under SDG 6 (the percentage of the population using safely managed sanitation services)⁴⁶⁷ for the sanitation key area and indicator 12.5.1 under SDG 12 (national recycling rate in terms of

456 Ministry of Energy. 2020. [Kenya National Energy Efficiency and Conservation Strategy](#).

457 The assumption is that most registered vehicles in Kenya are imported.

458 EPRA – [Electric-mobility](#). There being no single source that provide clear statistics on the number of EVs in Kenya. Hence, the numbers shared by EPRA, a government entity, were used as an accurate estimate of the number of EVs in 2021.

459 Abuya, K. 3 October 2022. “[State of Electric Vehicles in Kenya in 2022](#).” TechWeez.

460 World Health Organization. Population using at least basic drinking water services (%)(SDG 6.1.1).

461 The annual costs per capita for Kenya’s rural and urban population are obtained from the World Bank’s report which estimates the costs of meeting the 2030 SDG targets on drinking water, sanitation, and hygiene. The annual costs per capita includes the costs for capital investment, program delivery, operations, and major capital maintenance to sustain the life span of the infrastructure created.

462 World Bank. 2016. [The Costs of Meeting the 2030 Sustainable Development Goal Targets on Drinking Water, Sanitation, and Hygiene](#).

463 The population data is obtained from [United Nations World Population Prospects 2022](#).

464 Government of Kenya. 2021. [Programme Based Budget of the National Government of Kenya for the year ending 30th June, 2022](#). Conversion of Kshs 49,254,007,079 to USD using Oanda on 31 August 2022.

465 Conversion of Kshs 2,939,165,074 to USD using Oanda on 31 September 2022.

466 Government of Kenya. 2021. [Programme Based Budget of the National Government of Kenya for the year ending 30th June, 2022](#).

467 World Health Organization. [Percentage of population using safely managed sanitation services including a hand-washing facility with soap and water \(SDG 6.2.1\)](#).



tons of material recycled).⁴⁶⁸ Kenya's SDG targets for the analysis are 47.3% of the population having access to safely managed sanitation services for the sanitation key area and 28% recycling rate for the solid waste key area. These targets are set based on the performance level of selected countries (i.e., Lesotho for the sanitation key area and South Africa for the solid waste key area) that have a similar level of GDP to Kenya but have a higher achievement rate in the relevant SDG. The next step was to identify the current state of Kenya; in 2022, 29.5% of the Kenyan population is assumed to have access to safely managed sanitation services,⁴⁶⁹ and 8% of the waste generated is recycled in Kenya.⁴⁷⁰ Then, the associated unit costs are obtained from the World Bank's data. In Kenya, the annual cost of providing service to each individual in rural areas is US \$224.20 and in urban areas is US \$114.45.⁴⁷¹ The total average cost of waste collection, transfer, and recycling per ton in Kenya is US \$79.46, which consists of waste collection and transfer and recycling cost.⁴⁷² This cost also takes the projected recycling rate.

With the input numbers, the next step was to calculate the total spending in 2021 (the baseline, assuming 29.5% coverage for sanitation and 8% recycling rate for solid waste) and 2030 (the endline, assuming 47.3% coverage for sanitation and 28% of recycling rate for solid waste), calculate the CAGR, derive annual market size based on the CAGR, and sum it for both sanitation and solid waste key areas. The total spending is obtained by multiplying the population number from United National Population Database⁴⁷³ and the unit costs identified above. Using the 2021 and 2030 total spending, the analysis calculated the CAGR for the sanitation and solid waste key area and annual market size using the CAGR. The sum of the annual market size from 2021 to 2030 is US \$52.85 billion for safely managed sanitation services and US \$1.02 billion for a national recycling rate of 28%.

► GREEN BUILDINGS

The market opportunity estimate identified the government target, identified the current level of building stock (i.e., the total number of buildings in a country or a region), used a secondary resource for CAGR, and ultimately derived annual green building stocks from 2022 to 2030. The Kenyan government targets to ensure that 75% of newly built or renovated public (national and county) and large-scale private buildings are accredited green by 2030.⁴⁷⁴ Kenya's overall building stock in 2018 was 37 million square meters (m²) which are comprised of 30 million m² of residential space, 1.5 million m² of office and retail space, and 5.5 million m² of commercial buildings.⁴⁷⁵ The CAGR is estimated to be 3.5% which is driven by the IFC report.⁴⁷⁶ According to the building stock number in 2018 and the CAGR, the building stock is assumed to be 41.02 m² in 2021 and 55.91 m² in 2030. The next step was to derive the annual new building stock by calculating the differences in building stocks each year and multiplying it by 75% to derive the number of

- 468 United Nations Statistics Division (UNSD) / United Nations Environment Programme (UNEP): SDG Indicator Metadata. Available [here](#).
- 469 This figure is based on the rural population's access to improved sanitation, but the assumption is made as there is no publicly available national performance data. This assumption may inflate the lack of nationwide coverage because the urban population generally has better access to sanitation services than the rural population. Source: [WHO/UNICEF Joint Monitoring Programme \(JMP\) for Water Supply, Sanitation and Hygiene](#).
- 470 The annual costs per capita entail the costs for capital investment, program delivery, operations, and major capital maintenance to sustain the life span of the infrastructure created. Source: World Bank. 2018. [What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050](#).
- 471 Ibid.
- 472 The total recycling cost varies depending on the recycling rate and we assume that on average Kenya's recycling rate from 2021 and 2030 would be 58.5% based on the current state and the target to be 100% by 2030). The waste management costs entail the costs of collection, transfer, and recycling of waste.
- 473 Kenya's urban and rural population are obtained from the [United Nations World Population database](#).
- 474 Ministry of Environment and Natural Resources. 2016. [Green Economy Strategy and Implementation Plan 2016 - 2030](#). The policy itself does not indicate the issuer of a green building certificate or a standard for green buildings, but The GreenMark Standard for Green Buildings report shows a collaborative effort to develop a standard certification scheme amongst stakeholders.
- 475 Ministry of Energy. 2020. [Kenya National Energy Efficiency and Conservation Strategy](#).
- 476 IFC. 2018. [Kenya Green Building Market Intelligence report](#).



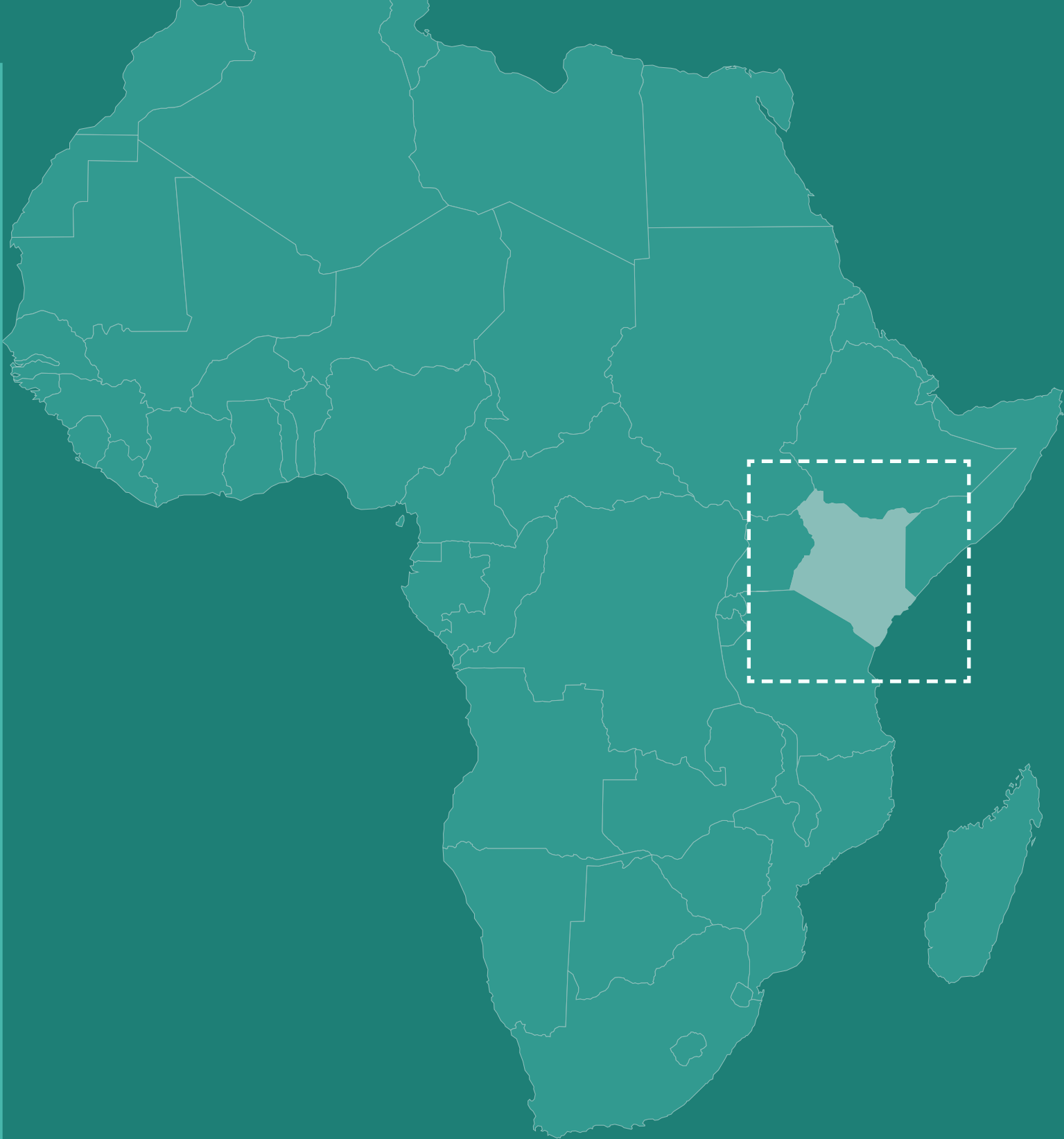
annual new green building stock as indicated in the government target. This gives us an annual green building stock range from 1.08 million m² (2022) to 1.42 million m² (2030).

Separately, the unit cost of construction of a green building was estimated to be US \$655.87 per square meter. First, the cost of a conventional building is calculated. While the information on the cost of green buildings in Kenya is not readily available, the cost of conventional buildings in Kenya is available, and the cost of green buildings relative to the cost of conventional buildings is available in other countries. For many certified green buildings globally, the costs of construction are between 0% and 4% higher than that of conventional buildings.⁴⁷⁷ The weighted average cost of a conventional building in Kenya is US \$630.64 per square meter, which is driven by the cost of four different types of buildings (i.e., hotels, residential, office and retail, and commercial buildings) and its share.⁴⁷⁸ The costs of each building type are obtained from the Turner and Townsend International Construction Market Survey 2021 Report.⁴⁷⁹ The unit cost of construction takes into consideration labor, materials, and plant costs. Lastly, the annual green building stock multiplied by the unit cost provides the annual market size, and aggregating the estimates from 2022 and 2030 gives a total estimate of US \$7.32 billion.

477 M. Hu and M. Skibniewski. 2021. [Green Building Construction Cost Surcharge: An Overview](#). *Journal of Architectural Engineering*, Vol. 27, Iss.4

478 Ministry of Energy. [Kenya National Energy Efficiency and Conservation Strategy](#).

479 Turner and Townsend. 2021. [International Construction Market Survey Report](#).



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