CHAMBERS FOR GREENTECH

ENVIRONMENTAL PROTECTION *made in Germany*

AHK Services Eastern Africa Ltd

Waste from Electrical and Electronic Equipment (WEEE) Value Chain in Kenya

A Baseline Study

Supported by:

Federal Ministry
for the Environment, Climate Action,
Nature Conservation and Nuclear Safety

based on a decision of
the German Bundestag

Publisher's Note

Publisher
AHK Services Eastern Africa Ltd.
The service company of the Delegation of German Industry and Commerce for Eastern Africa
West Park Suites, Ojijo Road, Parklands
P. O. Box 19016, 00100 Nairobi, Kenya
Email: office@kenya-ahk.co.ke
Website: www.kenia.ahk.de

Contact Points
Hanna Dittmeyer, Maureen Adongo

Authorship
This report was compiled and edited by Maureen Adongo and Hanna Dittmeyer.
Chapters 1-5, 6.1, 6.3, 6.4, and 8 were authored by Maureen Adongo and Hanna Dittmeyer.

Chapter 6.2 was prepared by the E-Waste Initiative Kenya (EWIK) team (Lawrence Thuo, Peter Njuguna, Stephen Mbugua, Keziah Wanjiku, and Jane Muthoni) as a subcontracted contribution.

Chapter 7 was written by ECOLOGICON GmbH (Dr.-Ing. André Rückert, Vaishnavi Reddy, Florian Werthmann and Laura Kruse), also under subcontract.

To ensure overall coherence, Chapters 6.2 and 7 were revised and partially shortened or rearranged by Maureen Adongo and Hanna Dittmeyer.

Chapter 6.4 includes a case study in collaboration with Minimise GmbH, from which Maureen Adongo and Hanna Dittmeyer obtained and analyzed the data, and developed the written chapter including the recommendations based on this analysis.

Publication Date
June 2025

Design and Production
Produced by AHK Services Eastern Africa Ltd. and Infuse Ventures Limited

Image Credits
Images: AHK Services Eastern Africa Ltd. and E-Waste Initiative Kenya (EWIK), used with permission.

This country study on the WEEE value chain in Kenya was conducted by AHK Services Eastern Africa Ltd. under the project "German GreenTech Innovation Programme: Disposal of Waste Electrical and Electronic Equipment (WEEE) in Nairobi" (01 July 2024 – 31 December 2025), implemented within the framework of the Export Initiative for Climate Protection (EXI) funded by the German Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety (BMUKN).

The purpose of the project is to provide stakeholders in and beyond Kenya with a comprehensive overview of the WEEE value chain, covering regulatory, institutional, and operational structures, as well as identifying practical business models and opportunities for sustainable e-waste management in Nairobi. The study collected information on current legal, policy and institutional frameworks relating to WEEE, including informal and formal sector activities, existing treatment paths, and innovative approaches to business model development within the local context.

The authors would like to thank and acknowledge the contributions of the following subcontractors: E-Waste Initiative Kenya (EWIK) for their extensive research and engagement within the informal sector, Ecologicon GmbH for the business modelling component, and Minimise GmbH for the case study of a WEEE collection scheme.

Special appreciation is extended to all informal and formal WEEE respondents and industry experts who generously shared their invaluable time, perspectives, and expertise in support of this study.

Disclaimer

Suggested Citation

Full Report:

Dittmeyer, H. & Adongo, M. et al. (2025). Waste from Electrical and Electronic Equipment (WEEE) Value Chain in Kenya – A Baseline Study. AHK Services Eastern Africa Ltd.

For individual chapter citations:

Lawrence Thuo, Peter Njuguna, Stephen Mbugua, Jane Muthoni, & Keziah Wanjiku (2025). Chapter 6.2.: Informal Sector Practices. In Dittmeyer, H. & Adongo, M. (Eds.). (2025). Waste from Electrical and Electronic Equipment (WEEE) Value Chain in Kenya – A Baseline Study. AHK Services Eastern Africa Ltd.

Rückert, André & Reddy, Vaishnavi (2025). Chapter 7: Business Case Development and Improvement. In Dittmeyer, H. & Adongo, M. (Eds.). (2025). Waste from Electrical and Electronic Equipment (WEEE) Value Chain in Kenya – A Baseline Study. AHK Services Eastern Africa Ltd.

Contents

Abbreviations

ABS	Acrylonitrile Butadiene Styrene
ADR	Accord relatif au transport international des marchandises Dangereuses par Route; Agreement concerning the International Carriage of Dangerous Goods by Road; a UN treaty regulating the international transport of hazardous goods by road.
B2B	Business to Business
CBD	Central Business District
CFC	Chlorofluorocarbon
CRT	Cathode-ray Tube
EEE	Electrical and Electronic Equipment
EPR	Extended Producer Responsibility
EPROK	Electrical and Electronic Waste Producer Responsibility Organization of Kenya
FGD	Focus Group Discussions
GEF	Global Environment Facility
HOC	Hand Over Center
ICT	Information and Communication Technology
NEMA	National Environment Management Authority
NiMH	Nickel-metal hydride, in the context of batteries
NIR	Near Infrared
PCB	Printed Circuit Boards
POE	Power over Ethernet (part of a list of networking equipment)
PRO	Producer Responsibility Organisation
SDG	Sustainable Development Goals
SGP	Small Grant Programme
TFT	Thin-Film Transistor (part of a screen)
WEEE	Waste from Electrical and Electronic Equipment
XRF	X-ray Fluorescence

List of Figures

List of Tables

Currency Exchange Rates

Currency exchange rate – Kenyan Shilling to Euro		Currency exchange rate – Kenyan Shilling to US Dollar	
1 KES in €	0.00678	1 KES in USD	0.00769
1 € in KES	145.536	1 USD in KES	128.485

Table 1: Currency Exchange Rates[1]

1 *Oanda. (2025). Currency converter. Retrieved 06.05.2025, from https://www.oanda.com/currency-converter/en/?from=USD&to=KES&amount=1*

Glossary of WEEE Management Terms

Appliance Recycling	The specific recycling processes for household appliances, often involving dismantling, material separation, and recovery of metals and plastics.
Back-end Processing	The stages of WEEE management that occur after collection and sorting, including dismantling, material recovery, and final disposal.
Battery Recycling	The specialized processes for recovering valuable metals (like lithium, cobalt, and nickel) from spent batteries, while also preventing environmental contamination.
Cable Stripper	A tool used to remove the insulation from electrical cables to recover the copper or other conductive metal within.
Circular Economy	An economic system aimed at minimizing waste and making the most of resources by keeping materials in circulation. In WEEE, this involves designing products for durability, reuse, and recycling.
Chamas	Table banking groups or informal savings and credit giving groups specially formed by peers in business, common in Kenya. Members contribute regularly to a shared pool, which is then disbursed to each member in turn. Built on social trust, chamas provide access to savings and credit outside the formal banking system, serving as a vital source of capital, especially for small businesses like those in the WEEE sector. Chama can also mean a self-help group.
County Market	A market designated area by the local county government for various types of trade, including the buying and selling of goods, often structured or semi-structured space. They are not specifically designed or regulated for WEEE activities but can serve as locations where informal WEEE handlers operate.
Collection Point	Designated locations where individuals or businesses can drop off their WEEE for collection and processing.
Component	A discrete part of an electronic device, such as a resistor, capacitor, integrated circuit (IC), or transistor.
Consumer Electronics	Electronic devices intended for personal use, such as televisions, stereos, computers, mobile phones, and gaming consoles.
Data Destruction	The secure and irreversible erasure of data from electronic storage devices to protect sensitive information.
Dismantling	Taking apart electronic devices to separate components and materials for reuse, recycling, or disposal.
Disposal	The final stage of waste management, where materials that cannot be reused or recycled are sent to landfills or incinerators. Proper disposal is crucial for preventing environmental contamination.
End-of-Life (EOL)	The point at which a product is no longer functional or useful for its intended purpose.
E-waste	Another term for WEEE (Waste Electrical and Electronic Equipment), commonly used in Kenya as it is more widely understood by the general public, industry players, and regulators than the formal term WEEE.
Focus group discussions	This is a data collection method where a small, diverse group of individuals are brought together and they discuss a particular topic of interest in the research to tell their views, opinions and perceptions and draw conclusions from there. It is usually guided by a trained facilitator.

Formal Sector (WEEE)	Businesses and organizations that are officially registered and operate within established regulations for WEEE handling.
Fractions (WEEE)	The different material components of WEEE, such as metals, plastics, glass, and printed circuit boards.
Fundi	A Swahili word for a skilled technician, often working in the informal sector. Fundis are individuals who informally repair and refurbish electronic devices, using some formal training and also training on the job, or specialized tools.
Hazardous Waste	Waste that poses a risk to human health or the environment. WEEE often contains hazardous substances.
Household Appliances	Electronic devices that are used in homes, like refrigerators, ovens, microwaves, and washing machines.
Informal Sector (WEEE)	Individuals or groups that collect, process, or trade WEEE outside of formal regulations and often using rudimentary methods.
Infrastructure (WEEE)	The physical facilities and systems needed for effective WEEE management, including collection points, processing facilities, and transportation networks.
Irreparable Items	Electronic devices or components that are beyond repair.
Jua Kali association	An association of self-employed artisans thriving in practical skills who work in small workshops and under harsh conditions.
Landfill	A site for the disposal of waste materials. Improper disposal of WEEE in landfills can lead to environmental pollution.
Material Recovery	The process of extracting valuable materials from WEEE for reuse or recycling.
Printed Circuit Board (PCB)	A board containing electronic components and circuitry. PCBs can contain valuable metals but also hazardous substances.
Recycling	Converting waste materials into new products or materials.
Refurbishment (WEEE)	Restoring used electronic devices to working condition for reuse.
Reuse	Using a product again for its original or another purpose.
Shared Equipment/ Space	Facilities or tools that are available for multiple users, often on a fee-for-service basis, to support WEEE handling and processing.
Soft loans	Loans that are offered with below-market interest rates or flexible repayment terms, often informally provided within communities or small business groups.
Sorting (WEEE)	The process of separating different types of WEEE or material fractions for appropriate processing.
Spare Parts	Components are used to repair or replace damaged parts in electronic devices.
Toxicity	The degree to which a substance is harmful to living organisms. Many components in WEEE are toxic.
Vibandas	Temporary, often makeshift, roofless structures used as informal business premises.

1. Executive Summary

This study offers a comprehensive analysis of Waste Electrical and Electronic Equipment (WEEE) management in Kenya, with Nairobi as the focal area. Conducted by AHK Services Eastern Africa Ltd. in collaboration with local and international experts, the study was designed to improve the availability of data on WEEE flows, assess formal and informal sector capacities, and identify sustainable business models for sector development.

The study employed a mixed-methods approach, including desk research, stakeholder interviews, surveys, and focus group discussions in both formal and informal sectors. Surveys captured data from 174 informal WEEE handlers and multiple formal operators. Additionally, case studies, including a controlled WEEE collection pilot in partnership with Minimise, provided detailed insights into material flows and operational practices.

The research highlights Kenya's fragmented WEEE management landscape. The informal sector dominates collection, repair, dismantling, and resale activities, operating through networks of waste pickers, backyard recyclers, repair technicians, and scrap dealers. Often working without formal licenses, these actors process significant WEEE volumes using basic tools and hazardous methods. Despite operational constraints, the sector shows strong internal organization and business networks, particularly in areas like Githurai, Kibera, and Kangemi.

The formal sector remains limited in scale, facing challenges in sourcing sufficient volumes and integrating with informal collectors. Facilities such as Enviroserve and WEEE Centre demonstrate technical capability but are constrained by high operational costs, regulatory bottlenecks, and market fragmentation.

Material flow analyses revealed that while valuable fractions like copper and printed circuit boards are extracted and sold (sometimes for export), non-valuable fractions are often dumped or openly burned, posing environmental and health risks. Business modelling identified four viable opportunities across collection, sorting, dismantling, and processing services, with shared equipment hubs and better integration of Producer Responsibility Organisations (PROs) as strategic recommendations.

International case studies from India, Ghana, and Uganda illustrated successful models for informal sector formalisation, shared infrastructure, and safe dismantling practices.

The study recommends improving regulatory enforcement, enhancing sector financing, promoting PRO-led take-back schemes, and strengthening collaboration between formal and informal actors. Expanding shared infrastructure and refining licensing frameworks will be critical to improving both environmental and social outcomes in Kenya's growing WEEE sector.

2. Introduction to the Study

Waste Electrical and Electronic Equipment (WEEE) is a rapidly growing waste stream in Kenya, driven by population growth, urbanization, and increasing reliance on digital technologies. Kenya's WEEE management is characterized by a dominant informal sector that handles the majority of collection, repair, and dismantling activities, often without adherence to environmental, health, or safety standards. In contrast, the formal sector is limited in capacity and reach, constrained by high costs of operation and lower access to WEEE. Kenya has developed policy frameworks to address these issues, including the National E-Waste Management Strategy and the Extended Producer Responsibility (EPR) Regulations, aimed at improving the management of WEEE and improving circularity. However, enforcement remains a key challenge, and the gap between policy and practice continues to hinder the development of a sustainable e-waste management system.

2.1. Background Information on WEEE

Waste from electrical and electronic equipment (WEEE) includes a wide range of discarded devices that have reached the end of their useful life. It is broadly categorized by function, material composition, and disposal challenges. Major categories include large and small household appliances, IT and telecommunications equipment, consumer electronics, lighting devices, electrical tools, medical devices, and automatic dispensers.

Large household appliances like refrigerators, washing machines, and air conditioners make up a significant share of WEEE, due to their size and hazardous contents such as refrigerants and heavy metals. Small household appliances such as electric kettles, irons and hairdryers also contribute, though they are often overlooked in disposal regulations.

The IT and telecommunications sector generates large volumes of WEEE due to rapid obsolescence. Devices such as computers, laptops, mobile phones, and networking equipment contain valuable materials like rare earths, gold, and copper, making them priorities for recycling. Consumer electronics, including televisions, audio systems, and gaming consoles, pose disposal challenges due to lead-based solder, mercury backlights, and flame retardants. Specialized categories such as medical equipment, lab instruments, and industrial control systems also add to WEEE volumes, requiring strict handling and disposal protocols to prevent environmental and health risks.

2.2. Categories of WEEE

WEEE is a special waste stream due to its varied nature which includes a complex composition of materials and components and a wide range of product types. The rapid evolution of electronic products has also led to an increasing presence of miniaturized parts and embedded electronics within traditional equipment, such as clothing and toys, further complicating its composition and management. The categorization of WEEE is a fundamental aspect of regulatory and management frameworks aimed at addressing the growing WEEE challenge. Globally, WEEE classification follows standardized guidelines that facilitate proper handling, recycling, and disposal. Kenya's Draft WEEE Regulations 2013 align with these principles by defining specific categories of WEEE, ensuring a structured approach to its management. This classification is essential for implementing Extended Producer Responsibility (EPR), guiding policy interventions and promoting a circular economy within the WEEE value chain. It also enables the industry players including government agencies, recyclers, and producers to develop targeted strategies for resource recovery, hazardous waste mitigation, and sustainable electronic waste management.

The following table shows Kenya's WEEE categories:

Category	Examples
Large household appliances	Refrigerators, washing machines, air conditioners
Small household appliances	Microwave ovens, vacuum cleaners, blenders
IT and telecommunications equipment	Laptops, smartphones, routers
Consumer equipment	Televisions, radios, home theatre systems
Lighting equipment	LED bulbs, halogen lamps, tube lights
Electrical and electronic tools	Electric drills, soldering irons, electric saws
Toys, leisure, and sports equipment	Remote-controlled cars, gaming consoles, drones

Medical devices (excluding implanted and infected products)	Blood pressure monitors, glucose meters, digital thermometers
Monitoring and control instruments	Thermostats, security alarms, smoke detectors
Automatic dispensers	Vending machines, ATM machines, ticket dispensers
Batteries	Lithium-ion batteries, lead-acid batteries, nickel-metal hydride (NiMH) batteries
Security and military equipment	Surveillance cameras, biometric scanners, metal detectors
Fluorescent tubes	Compact fluorescent lamps (CFLs), linear fluorescent tubes, U-bend fluorescent tubes

Table 2: WEEE categories in Kenya[2]

2.3. Background Information on Kenya's Formal and Informal WEEE Sectors

The WEEE management value chain in Kenya comprises both formal and informal actors. These entities contribute to the collection, processing, and recycling of WEEE, each operating under distinct structures and regulatory frameworks. The formal sector consists of registered businesses and organizations that comply with government regulations, environmental policies, and labor laws. These entities hold the necessary licenses for waste management. Their operations are structured, ensuring standardized handling, transportation, and processing of WEEE to minimize environmental and health risks. While many formal businesses operate entirely within the regulated framework, some entities blend formal and informal elements. Meaning some businesses possess the required licenses but predominantly work with informal collectors, recyclers, and dismantlers to ease operations and reduce costs, This hybrid nature creates complexities in defining formal business relationships within the WEEE sector.

The informal sector comprises unregistered individuals and small enterprises engaged in WEEE collection, dismantling, and resale of valuable materials. Largely unregulated, this sector remains essential to waste recovery, with actors ranging from independent collectors to structured groups resembling formalized operations. The quality and security of informal business premises varies significantly across the various locations, reflecting the wide spectrum of informality within the WEEE sector. Informal operations are characterized by the ad hoc nature of business operations, operating with no formal regulatory framework. The other significant characteristic is the permanence of the premises; most of the informal sector operations are within semi-permanent structures.

Informal sector actors include:

- Waste pickers and scrap dealers who are mostly individuals sourcing discarded electronics from households, businesses, and dumpsites, selling recoverable components to recyclers.
- Backyard recyclers rent small workshops and manually dismantle electronics to extract valuable fractions.
- Repair shops in informal settlements whereby technicians salvage functional components for refurbishing or repurposing devices.

Informality in WEEE management is not just a structural categorization but also an identity. Some informal actors recognize and appreciate the flexibility, independence, and economic opportunities associated with operating outside regulatory frameworks. Others, despite their informal classification, exhibit characteristics of structured businesses, leading to a spectrum of informality, from small-scale, unregulated operations to large, well-organized networks. Understanding the interactions between formal and informal actors is crucial for developing integrated WEEE management strategies that leverage the strengths of both sectors.

2.4. Background on Kenya's WEEE Value Chain

The WEEE value chain consists of several interconnected stages that determine how discarded electronics are managed, ranging from initial collection to final disposal. A well-structured value chain ensures that valuable materials are recovered, hazardous components are safely handled, and environmental pollution is minimized. The primary stages include collection, repair, refurbishment, dismantling, recycling, and disposal, with additional activities such as sorting, logistics, and material recovery playing critical roles.

2 *The Republic of Kenya. (2013). Environmental Management and Co-Ordination (E-Waste Management) Regulations, 2013. Retrieved 26.2.25, from https://www.nema.go.ke/images/Docs/Regulations/Draft%20E-waste%20Regulations-1.pdf.*

1. **Collection and Aggregation**
   The first step in WEEE management is collection, where electronic waste is gathered from households, businesses, institutions, and industries. This process is facilitated by both the formal sector, through licensed collection points and take-back programs by manufacturers, and the informal sector, where waste pickers and middlemen play a dominant role.[3] Aggregation centers help consolidate WEEE for further processing, ensuring economies of scale for recycling facilities.

2. **Sorting and Pre-Processing**
   Once collected, WEEE undergoes sorting, where devices are categorized based on their composition and potential for reuse or recycling. Formal recyclers often separate hazardous components like batteries, capacitors, and cathode-ray tubes (CRTs) to prevent toxic exposure.[4] The informal sector primarily focuses on valuable materials, often discarding non-recoverable fractions in open dumpsites or water bodies.

3. **Repair and Refurbishment**
   Devices that are still functional or can be restored are sent for repair and refurbishment, which extends product lifespans and reduces waste generation. Informal repair workshops play a crucial role in repairing faulty electronics, making them accessible to lower-income consumers. In Kenya, at least 72% of consumers take their appliances to local repair shops for repair when they fail.[5] This is due to the cost-effectiveness of the informal repairers. This stage aligns with circular economy principles by promoting reuse before components are dismantled or recycled.

4. **Dismantling and Component Recovery**
   WEEE that cannot be repaired is dismantled to extract valuable components such as circuit boards, wiring, and metal casings.

   The formal sector often uses mechanized processes to separate hazardous and recyclable materials safely, but also relies on manual dismantling. On the other hand, the informal sector relies nearly exclusively on manual dismantling methods, often in unsafe working conditions.

   Certain high-value components, such as processors and RAM modules, may be resold or reused in secondary markets.

5. **Recycling and Material Recovery**
   At this stage, materials such as metals, plastics, and glass are recovered through various recycling techniques. Hydrometallurgical and pyrometallurgical methods are used for precious metal extraction, while plastics are shredded and repurposed. Formal recyclers have access to environmentally sound techniques, while informal recyclers often employ hazardous methods like acid leaching and open burning. The efficiency of recycling depends on investment in infrastructure and regulatory enforcement.

6. **Final Disposal**
   Non-recyclable and hazardous fractions of WEEE undergo final disposal through controlled landfilling or incineration. However, due to limited WEEE disposal facilities in Kenya and East Africa, a significant proportion of waste is dumped in open landfills or water bodies, contributing to environmental pollution.[6] Strengthening waste disposal policies and promoting Extended Producer Responsibility (EPR) programs are key to improving this stage of the value chain.

A well-managed WEEE value chain minimizes environmental damage, enhances material recovery, and creates economic opportunities in repair, refurbishment, and recycling industries. However, the dominance of the informal sector in many developing economies presents challenges in enforcing safe handling and disposal practices. Strengthening formal infrastructure, fostering collaboration between sectors, and implementing robust policies will be crucial for sustainable WEEE management in Kenya and the wider East African region.

3 Mureithi, M., & Waema, T. (2008). *E-waste Management in Kenya.* Kenya ICT Action Network (KICTANet). Retrieved 12.02.2025, *from* https://www.rds.org.co/apc-aa-files/ba03645a7c069b5ed406f13122a61c07/e_waste_kennia.pdf

4 Songa, J., & Lubanga, B. (2015). *The Health Risk of Electronic Waste in Kenya: Challenges and Policies.* Moi University. Retrieved 12.02.2025, from https://www.researchgate.net/publication/281633853_The_Health_Risk_of_Electronic_Waste_in_Kenya_Challenges_and_Policies

5 Ofuya, M., Mulinge, S., & Nalyanya, E. (2023). *MECS Study on the Repair and End of Life of Electrical Appliances in Kenya.* Modern Energy Cooking Services (MECS). Retrieved 15.04.2025, from https://mecs.org.uk/publications/mecs-study-on-the-repair-and-end-of-life-of-electrical-appliances-in-kenya/

6 Otieno, I., & Omwenga, E. (2016). *E-waste management in Kenya: Challenges and opportunities.* University of Nairobi. Retrieved 22.02.2025, from https://erepository.uonbi.ac.ke/bitstream/handle/11295/155124/Onyango%20I_E-waste%20Management%20in%20Kenya-%20Challenges%20and%20Opportunities.pdf?sequence=1

3. Methodology of the Study

The study employs a mixed-method approach to capture the dynamics of WEEE management in both the formal and informal sectors and to provide necessary overviews and background on the market, its regulatory environment and business conduct.

3.1. Literature Review and Desk Research

The policy, licensing, and market status chapters were based on a literature review and desk research. Relevant policies, reports, academic articles, and official documents were collected and analyzed. The policy review focused on identifying existing laws and strategies affecting the WEEE sector. To assess applicable licenses, their costs, and informal practices, additional consultations with key industry experts were conducted. This desk-based approach was complemented by insights from recent conferences and publicly available market data.

3.2. Geographical Scope

The study takes place in Nairobi County and its environs. As Kenya's capital and largest city, Nairobi is metropolitan in nature, with high population density, rapid urbanization, and growing technological consumption contributing to significant WEEE generation. Its role as an economic and industrial hub increases electronic device use, making WEEE management a priority. Nairobi also hosts various formal and informal recycling facilities, offering a useful setting to assess current practices, challenges, and opportunities for improvement.

Fieldwork was conducted at prominent dumpsites, informal electronic markets where repair, refurbishment, and reselling occur, formal recycling premises, and private companies handling e-waste.

Data triangulation highlights that, as the capital and economic center, Nairobi has a higher concentration of WEEE management facilities than other Kenyan regions. The city benefits from greater financial resources, technology, and skilled labor, enabling larger-scale operations. Its sizeable population and dense network of businesses and households generate substantial WEEE, creating an efficient waste collection network.

This environment allows WEEE management companies to collect and process large volumes more easily. Nairobi-based companies are also more likely to comply with regulations, improving WEEE quality. Furthermore, the city's steady market for refurbished products encourages businesses to expand operations. Better infrastructure supports these larger operations by minimizing logistical challenges.[7]

3.3. Survey: Formal WEEE Sector

Qualitative interviews with formal sector stakeholders have provided insights into regulatory compliance, operational models, and industry challenges. These interviews have been conducted with key organizations which specialize in WEEE take back schemes, large-scale collection, refurbishment, redistribution, recycling and disposal, as well as regulators and authorities. Furthermore actors of solid waste management without official specialization in WEEE have been interviewed due to missing segregation at source in Kenya, which leads to diverse waste stocks.

3.4. Survey: Informal WEEE Sector

To capture the complexities of the informal WEEE sector in Nairobi, a mixed-methods approach was applied between October 2024 and April 2025. Data collection was subcontracted to sector experts familiar with informal dynamics to ensure accurate representation of waste pickers, dismantlers, and repair technicians. Ethical standards were upheld, with informed consent, confidentiality, and data security throughout. While the questionnaire was in English, most interviews were held in Kiswahili with on-the-spot translation by the staff members of the subcontractor EWIK.

Two main methods were used:

- Structured surveys via Kobo Collect Tool targeting a random sample of 174 informal workplaces across Kibera, Dandora, Githurai, Kangemi, Ngara, Kasarani, Kawangware, and Korogocho. The questionnaire covered waste fractions, residue management, capacities, financial aspects, transport, and recommendations. Trained enumerators conducted the surveys, ensuring informed consent and data quality.

- Focus Group Discussions (FGDs) with informal sector actors from the same areas, using a semi-structured guide to discuss working conditions, income sources, challenges, and relations with the formal sector.

7 Kenya Roads Board. (2023). *Road network conditions map.* Kenya Roads Board. Retrieved 26.02.2025, *from* https://maps.krb.go.ke/kenya-roads-board12769/maps/110400/2-road-network-conditions-map/1000#

3.5. Case Study

To analyze material flows within the WEEE value chain, a pilot collection exercise was conducted at the AHK office from 13th November 2024 to 28th February 2025. The activity assessed the collection, categorization, dismantling, and disposal processes for typical office and household WEEE, while also reviewing internal procedures. The process was facilitated by Minimise, a German start-up offering documented, environmentally sound e-waste recycling with full traceability via an online portal. AHK was provided with access to the platform, enabling real-time monitoring of dismantling outcomes and material fractions. This case study complemented the overall study by providing practical data on material flows and disposal practices, as well as the need for awareness creation and understanding of the importance of WEEE.

3.6. Business Modelling

To identify and develop potential business cases, the ECOLOG-ICON team first evaluated the current state of WEEE (Waste from Electrical and Electronic Equipment) management in Kenya, using reports provided by AHK Kenya. The formal and informal sectors were assessed separately, while also analyzing possible interconnections and overlaps between them. Following this, the team conducted an internal workshop, tracing the downstream WEEE value chain and examining each link to pinpoint existing gaps and challenges. From this analysis, they generated business case ideas aimed at addressing these gaps. Additionally, the team evaluated different WEEE waste streams individually, exploring opportunities to enhance value creation and efficiency within the sector.

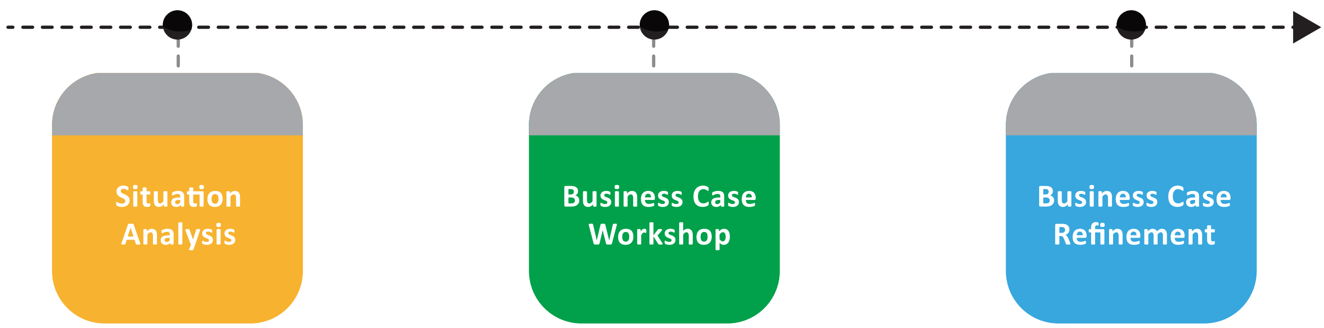


Figure 1: Business case development workflow (own illustration)

The resulting business cases and efficiency improvement strategies are not standalone solutions; they require support from policies and regulatory bodies in Kenya to establish a stable foundation for investors and entrepreneurs willing to invest in the WEEE management sector.

4. Regulatory Framework and Market Status of WEEE in Kenya

4.1. Overview of Policies and Governing Bodies

E-waste management in Kenya is governed by a combination of environmental laws, strategies, and draft regulations. The foundational legal framework is the Environmental Management and Coordination Act (EMCA), 1999, which provides the basis for environmental protection and waste management, although it does not specifically address e-waste. In response to growing electrical waste concerns, the National E-Waste Management Strategy 2019–2024 was developed by the Ministry of Environment, Climate Change and Forestry to guide the country toward sustainable e-waste practices, with the goal of achieving a sustainable E-waste management system in Kenya by 2030. The strategy outlines key pillars including policy reform, infrastructure development, and public-private collaboration. In addition, Kenya has proposed the Environmental Management Coordination (Electrical and Electronic Waste Management) Regulations, 2019, which are yet to be enacted into law but aim to provide a legal basis for managing e-waste across its lifecycle. The E-Waste Guidelines issued by NEMA in 2010 offer further direction but are not legally binding. More broadly, the Sustainable Waste Management Act, 2022, provides a framework for waste management in general and introduces provisions like Extended Producer Responsibility (EPR), which are relevant to e-waste and have been gazetted in 2024. Collectively, these instruments represent Kenya's policy intent, but their enforement is still evolving.

The following table shows relevant policies and regulations in place:

Regulations	Brief Description
Environmental Management and Coordination Act (EMCA), 1999 (Revised 2015)[8]	This Act is Kenya's primary framework for environmental management. It establishes the National Environment Management Authority (NEMA) and outlines the principles for sustainable environmental management, including the protection of natural resources, pollution control, and environmental impact assessments.
Guidelines for WEEE-Management in Kenya (2010)[9]	Published by NEMA, these guidelines offer a comprehensive approach to managing WEEE. They cover the entire lifecycle of electronic products, from production to disposal, and emphasize the importance of reducing, reusing, and recycling WEEE. The guidelines also provide strategies for public awareness and capacity building.
Draft Environmental Management and Co-ordination (E-waste Management) Regulations, 2013[10]	The Environmental Management and Co-ordination (E-waste Management) Regulations, 2013 provide a legal framework for the safe handling, collection, recycling, and disposal of electronic waste in Kenya. These draft regulations were developed to address the growing concerns of e-waste management. They serve simply as guidelines on e-waste management.
National E-waste Management Strategy 2019-2024[11]	The National E-waste Management Strategy is a five-year plan covering the period 2019 to 2024. The Strategy has five thematic areas: Resource mobilization for proper e-waste management, raising awareness, strengthening of Kenya's e-waste coordination structures at national and county levels, monitoring and evaluation mechanism for e-waste management, promotion of research and innovation in e-waste management and legal and regulatory framework for e-waste management in Kenya. Even though it is a 5-year plan, its vision and aspiration span a medium to long- term period of about 10 years.

8 National Environment Management Authority. (1999). *Environmental Management and Coordination Act (EMCA), 1999.* Retrieved 14.02.2025, from https://www.nema.go.ke/images/Docs/Guidelines/Environmental%20Act%20(EMCA1999)%20.pdf

9 National Environment Management Authority (2010). *Guidelines for E-waste Management in Kenya.* Retrieved 14.02.2025, from https://www.nema.go.ke/images/Docs/Guidelines/E-Waste%20Guidelines.pdf

10 National Environment Management Authority (NEMA). (2013). *Draft E-waste regulations.* Retrieved 14.02.2025, from https://www.nema.go.ke/images/Docs/Regulations/Draft%20E-waste%20Regulations-1.pdf

11 Ministry of Environment and Forestry. (2019, April). *National E-waste Management Strategy: Revised draft. Kenya Institute for Public Policy Research and Analysis (KIPPRA).* Retrieved 20.05.2025, from https://repository.kippra.or.ke/server/api/core/bitstreams/79d9dca9-172f-4bdc-9661-6037c8e57f84/content

Extended Producer Responsibility (EPR) Regulations, 2021[12]	EPR regulations require producers to take responsibility for the entire lifecycle of their products, including post-consumer waste management. The EPR framework aims to reduce waste generation, promote recycling, and ensure that producers contribute to the costs of managing waste associated with their products. Before Extended Producer Responsibility (EPR) Regulations were gazetted in November 2024, their development faced years of delays due to industry pushback, enforcement challenges, and infrastructure gaps. The discussions began particularly with the E-waste Management Regulations 2013. Between 2017 and 2019, stakeholder consultations were held, with KAM and KEPSA advocating for voluntary compliance rather than mandatory requirements. The biggest challenges included defining the role of Producer Responsibility Organizations (PROs) and the lack of sufficient recycling infrastructure. From 2020 to 2023, delays continued as industries lobbied for phased implementation, while environmental advocates pushed for urgent action due to rising plastic and e-waste pollution. Eventually the Kenyan government gazetted the EPR Regulations on 4th November 2024, making producer responsibility mandatory and requiring companies to fund waste collection and recycling through PROs.

Table 3: WEEE Policies and Regulations

There are three main relevant governing bodies:

National Environment Management Authority (NEMA)

NEMA is established under the Environmental Management and Coordination Act (EMCA) of 1999. It is the principal government agency responsible for overseeing and coordinating all environmental management activities in Kenya. NEMA's roles include issuing environmental licenses, conducting environmental impact assessments, and ensuring compliance with environmental regulations.

Communications Authority of Kenya (CA)

The CA is the regulatory authority for the ICT industry in Kenya. It oversees telecommunications, e-commerce, broadcasting, cyber security, and postal/courier services. The CA is responsible for managing the country's frequency spectrum, licensing communication services, and protecting consumer rights within the communications sector.

Ministry of Environment, Climate Change and Forestry

This ministry is tasked with conserving, protecting, and sustainably managing Kenya's environment and natural resources. Its goals include enhancing environmental governance, mitigating climate change impacts, and promoting agroforestry and commercial forestry. The ministry also works on expanding public awareness and capacity building in environmental conservation.

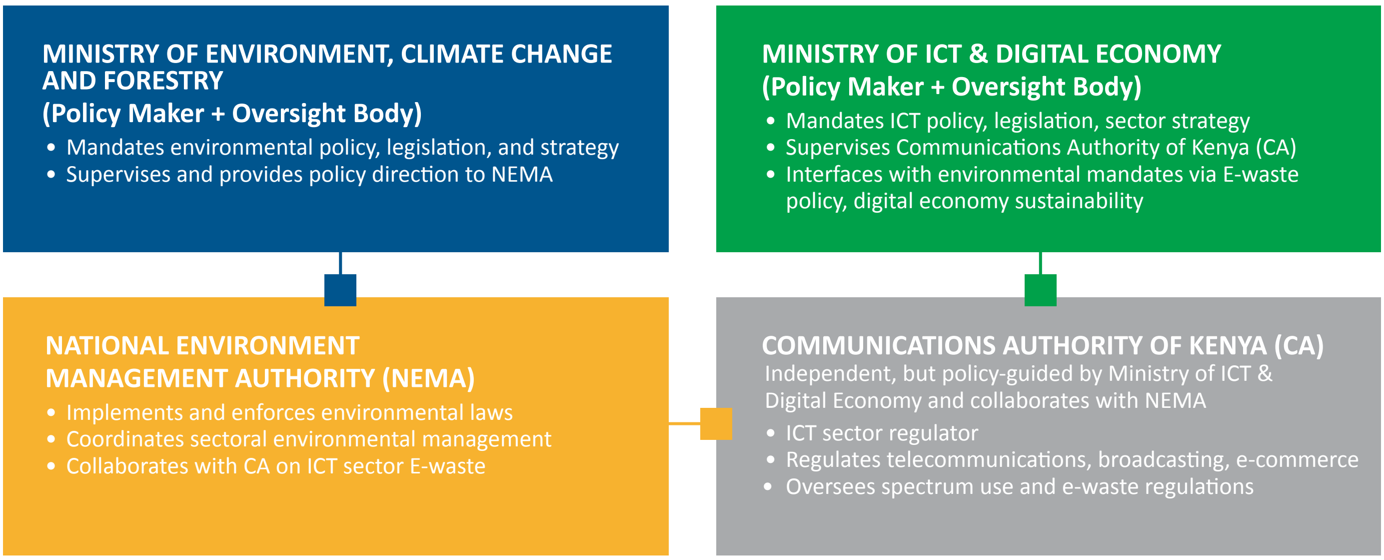


Figure 2: Relation and Mandates of Governing Bodies in the WEEE Sector in Kenya (own illustration)

12 National Environment Management Authority. (2024). *Extended Producer Responsibility (EPR) and Water Quality Regulations (L.N. 176-177).* Retrieved 14.02.2025, from *https://www.nema.go.ke/images/Docs/Regulations%202024%20Gazetted/%20EPR%20AND%20WATER%20QUALITY%20REGULATIONS-L.N.176-177.pdf*

4.2. Overview of Licenses

There are ten relevant licenses to know of within the sector and overarching structures:

License	Description	Issued by
Waste Management License	In Kenya, the Waste Management License issued by NEMA is the overarching license required for any entity involved in the handling, collection, transportation, treatment, or disposal of waste, including electronic waste (E-waste). It covers all waste categories under the Environmental Management and Coordination Act (EMCA) and Waste Management Regulations, 2006. Since e-waste often contains hazardous materials, it typically falls under the hazardous waste category, requiring this general license as a prerequisite. In some cases, additional endorsements may be needed, but the waste management license is the foundational approval for any legal waste operations in Kenya. It is a waste management license but applicants handling WEEE must meet additional requirements due to the hazardous nature of WEEE.	NEMA
The E-Waste Management License	This license is issued to businesses specializing and involved in the collection, transportation, recycling, treatment, or disposal of e-waste. To obtain this license, one must first secure an Environmental Impact Assessment (EIA) License and then apply for the E-waste Management License under The Waste Management Act. The fees for the E-waste Management License are KES 85,000 for a new application and KES 80,000 for renewal.	NEMA
WEEE Transporting License	Required for companies involved in transporting WEEE from collection points to recycling or disposal facilities.	NEMA
Hazardous Waste Handling License	For entities handling hazardous components of WEEE (e.g. lead, mercury, cadmium in batteries and circuit boards).	NEMA
Export Permit for WEEE	Required for companies exporting processed or raw WEEE to authorized international recyclers.	NEMA & KRA
Scrap Metal Dealer License	Required for individuals or businesses buying, selling, or processing scrap metals, including WEEE materials.	Scrap Metal Council, Ministry of Trade & Industry
Scrap Metal Export License	Allows companies to export processed scrap metals, including valuable metals recovered from WEEE (e.g. copper, aluminium, gold).	Scrap Metal Council & Kenya Revenue Authority (KRA)
County Business Operating Permits	Issued by county governments for businesses involved in WEEE recycling or collection.	County Offices
Environmental Impact Assessment (EIA) License	An Environmental Impact Assessment (EIA) license is a legal authorization issued by environmental regulatory authorities to ensure that projects comply with environmental sustainability standards before implementation. It evaluates potential environmental risks and mitigation measures, ensuring that activities such as waste management, infrastructure development, and industrial operations minimize negative environmental impacts.	NEMA
Extended Producer Responsibility (EPR) Compliance	Producers and importers of electronic goods must comply with EPR regulations, ensuring they take responsibility for the end-of-life management of their products.	NEMA & Ministry of Environment, Climate Change & Forestry

Table 4: WEEE Licences in Kenya[13]

13 *Interviews conducted by AHK with Kenyan WEEE sector actors, March 2025*

To operate an E-Waste Materials Recovery Facility (MRF) in Kenya, one must obtain an Environmental Impact Assessment (EIA) license from the National Environment Management Authority (NEMA). A NEMA-registered EIA expert conducts an assessment, identifying potential environmental risks and mitigation measures, and engaging stakeholders for public participation.[14] The expert submits an EIA report to NEMA for review, after which the applicant must pay license fees ranging between KES 45,000 to KES 120,000, depending on the project size. The renewal fees range between KES 20,000 and KES 80,000. NEMA then conducts a 60-day public notice period, allowing for objections or feedback, followed by a site inspection to ensure compliance. If all requirements are met, NEMA issues the EIA license, which is valid for one year and must be renewed annually. Compliance monitoring continues through periodic inspections, and failure to adhere to regulations may result in penalties or license revocation.[15]

To own or operate a waste transportation vehicle in Kenya, one must obtain a license from the National Environment Management Authority (NEMA). The application process includes submitting a completed form, proof of vehicle ownership, a valid business registration certificate, and other relevant documents. The fees associated with this process are as follows: Application Fee and license Fee: KES 15000, Renewal: KES 10000.[16] The license is valid for one year and must be renewed annually. Failure to comply with regulations may lead to penalties or revocation of the license.

The current regulatory framework sets clear standards for WEEE management, but remains costly, bureaucratic, and difficult to navigate, particularly for informal and small-scale operators. As a result, formal compliance is limited, constraining sector growth and the development of a functioning, inclusive WEEE management system in Kenya.

14 Kenya Law. (2022, December 31). *The Environmental (Impact Assessment and Audit) Regulations, 2003 (Legal Notice No. 101 of 2003).* Retrieved 19.05.2025, from https://new.kenyalaw.org/akn/ke/act/ln/2003/101/eng@2022-12-31

15 National Environment Management Authority (NEMA). (2022, June 1). *Reinstatement of Environmental Impact Assessment and Related Fees.* Retrieved 19.05.2025,from https://www.nema.go.ke/index.php?option=com_content&view=article&id=365:reinstatement-of-environmental-impact-assessment-and-related-fees&catid=10:news-and-events&Itemid=524

16 Kenya Law. (2024, December 6). *The Environmental Management and Co-ordination (Waste Management) Regulations, 2024 (Legal Notice No. 178 of 2024).* Retrieved 19.05.2025, from https://new.kenyalaw.org/akn/ke/act/ln/2024/178/eng@2024-12-06

5. Market Status

Electronic waste (WEEE) is a rapidly growing environmental and public health concern in Kenya and the wider East African region, driven by increased consumption of electrical and electronic equipment (EEE) and limited formal recycling infrastructure. In 2022, Kenya produced around 22,000 tons of waste daily, based on a per capita waste generation estimate of 0.5 kg for a population of 45 million, according to the Ministry of Environment.[17] Urban areas contributed approximately 40% of this total, and with an urbanization rate increasing by 10%, projections suggest urban populations will generate about 5.5 million tons of waste annually by 2030.[18]

When it comes to e-waste specifically, the ICT Authority Kenya estimates that Kenya generates approximately 51,300 tons of WEEE annually with Nairobi contributing a significant share due to its high population density and rapid technological uptake.[19] Other sources suggest higher figures, with per capita WEEE generation rising to 1.6 kg and total national volumes reaching an estimated 88,000 tons in 2024.[20]

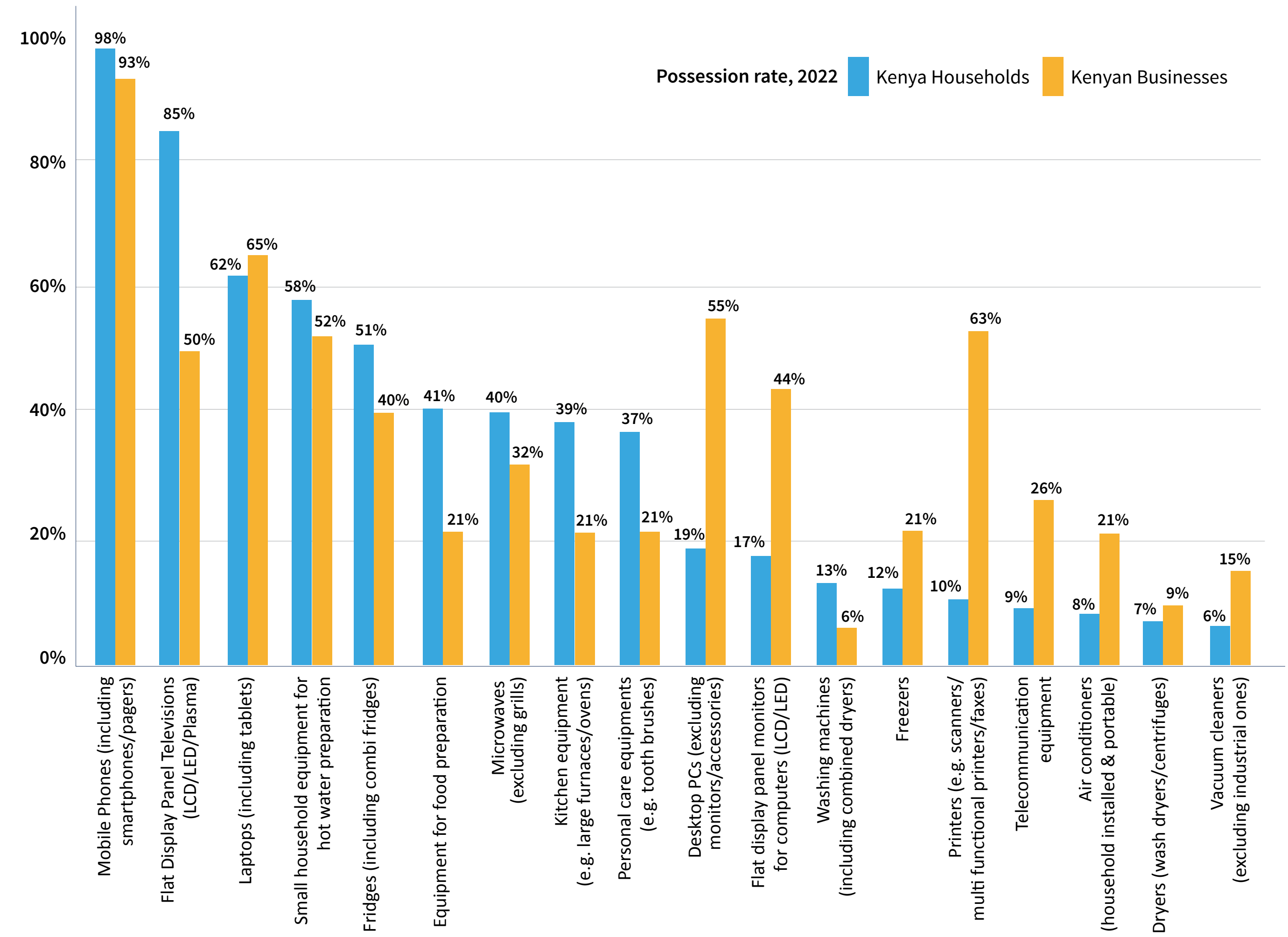


Figure 3: Percentage of Kenyan households and businesses in possession of at least one type of EEE by type[21]

17 Kenya Plastics Pact (KPP). (2022). Roadmap to 2030: *Kenya Plastics Pact releases its national strategy (KPP).* Retrieved 19.05.2025, from https://kpp.or.ke/2022/08/29/roadmap-to-2030-kenya-plastics-pact-releases-its-national-strategy/

18 Garbage Dot Com Ltd. (2023, June 10). *Addressing the growing waste crisis in Kenya's urban areas.* Retrieved 19.05.2025, from https://garbage.co.ke/2023/06/10/addressing-the-growing-waste-crisis-in-kenyas-urban-areas/

19 Kenya News Agency. (2024, June 14). *Kenya produces 51,300 metric tonnes of e-waste annually.* Retrieved 19.05.2025, from https://www.kenyanews.go.ke/kenya-produces-51300-metric-tonnes-of-e-waste-annually/

20 *Baldé, C. P., Kuehr, R., Yamamoto, T., McDonald, R., D'Angelo, E., Althaf, S. et al. (2024). The Global E-Waste Monitor 2024 (International Telecommunication Union (ITU) & United Nations Institute for Training and Research (UNITAR), Hrsg.). Page 66.*

21 *Baldé, C. P., Kuehr, R., Yamamoto, T., McDonald, R., D'Angelo, E., Althaf, S. et al. (2024). The Global E-Waste Monitor 2024 (International Telecommunication Union (ITU) & United Nations Institute for Training and Research (UNITAR), Hrsg.). Page 66.*

However, discrepancies persist, attributed to gaps in data collection, widespread informal waste handling, and the fast-expanding electronics market.[22]

A substantial portion of Kenya's WEEE comes from end-of-life household appliances, ICT devices, and electrical equipment — particularly mobile phones, computers, televisions, and kitchen appliances. Rising incomes, urbanization, and increased digitization have driven the uptake of EEE. Yet despite the growing volumes, formal collection and recycling rates remain low, with much of the waste either handled informally or dumped in open landfills. The informal sector remains central to WEEE recovery, with household waste collectors and aggregators selling electronics to recyclers like the WEEE Centre. However, a large share is dismantled under unsafe conditions, exposing workers and communities to hazardous substances such as lead, mercury, and brominated flame retardants.[23]

Across East Africa, countries like Uganda and Tanzania face comparable challenges. Tanzania generates approximately 36,000 tons of WEEE annually, with most stored in households or discarded in informal dumpsites. In Uganda, initiatives have emerged to integrate informal collectors into formal structures through Extended Producer Responsibility (EPR) programs, though enforcement remains weak.[24] Throughout the region, rising EEE consumption fueled by economic growth has not matched by updated regulatory frameworks, leaving most countries to rely on outdated waste management policies.

In Kenya, the gazetted Sustainable Waste Management Act and Extended Producer Responsibility regulations aim to introduce a more structured WEEE management system, though implementation is still in its early stages.

A major factor behind rising WEEE volumes is the importation of second-hand electronics. According to trade data from Volza, between March 2023 and February 2024, Kenya's imports of used electronics mainly originated from:[25]

- China: 46% of imports (1,060 shipments)
- India: 20% (469 shipments)
- United States: 7% (171 shipments)

These affordable, often short-lifespan devices exacerbate the country's WEEE problem. A large proportion of imported electronics are near end-of-life, compounding disposal challenges.[26] Additionally, consumer awareness on safe disposal methods and existing collection points remains low, leading to e-waste stockpiles in households.

Some companies and organizations have responded: Safaricom has launched device take-back programs, while Computer for Schools Kenya (CFSK) refurbishes and redistributes electronics to extend their use.[27] However, bridging the WEEE management gap will require stronger policy incentives for both consumers and businesses, investment in formal recycling infrastructure, and capacity-building initiatives for informal sector workers.

22 *Basiye, S. (2020). WEEE management in Kenya: Current status and future challenges.* United Nations Environment Programme (UNEP), Nairobi.

23 *Okalebo, A., & Wabuge, G. (2021). Electronic waste management in East Africa: A comparative analysis of Uganda, Kenya, and Tanzania.* East African Journal of Environmental Studies.

24 Okalebo, A., & Wabuge, G. (2021). *Electronic waste management in East Africa: A comparative analysis of Uganda, Kenya, and Tanzania.* East African Journal of Environmental Studies.

25 Volza. (2025). *Used Electronic, Kenya Imports in Kenya – Market Size & Demand based on Import Trade Data.* Retrieved 17.04.2025, from https://www.volza.com/p/used-electronic-or-kenya/import/import-in-kenya/

26 Kenya Institute for Public Policy Research and Analysis. (2023). *Rejuvenating local manufacturing in the context of the secondhand economy. KIPPRA.* Retrieved 17.04.2025, from https://kippra.or.ke/rejuvenating-local-manufacturing-in-the-context-of-secondhand-economy/

27 Safaricom PLC. (2011, February 17). *Safaricom unveils novel phone recycling plan.* Retrieved 19.05.2025, from https://www.safaricom.co.ke/media-center-landing/press-releases/safaricom-unveils-novel-phone-re-cycling-plan

6. Results and Discussion

Chapter 6 presents the key findings of the study on WEEE management in Kenya, based on data collected from both the formal and informal sectors. It analyses material flows, operational practices, business models, and sector-specific challenges, offering insights into current realities and opportunities for improvement.

6.1. Material flow analysis

Chapter 6.1 provides a detailed material flow analysis, mapping the movement of electrical and electronic equipment from import and local manufacturing to waste generation and handling within Kenya's WEEE value chain.

6.1.1. Local manufacturing

Kenya manufactures only a small fraction of the electrical and electronic equipment (EEE) it consumes, with most products imported either as fully assembled units or as parts for local assembly. Locally produced EEE is limited to items such as car batteries, lower-end mobile phones, and select electronic components. The modest scale of domestic manufacturing is driven by factors including high production costs, limited technical capacity, and reliance on imported raw materials.[28] Despite these constraints, Kenya hosts a growing market for electronics assembly, particularly in sectors such as renewable energy, e-mobility, and telecommunications.

The prevailing market dynamic revolves around the import of electronic components for local assembly. This is particularly evident in the e-mobility industry, where firms like Roam, BasiGo, and EVChaja import critical components such as batteries, electric drivetrains, and control systems while assembling final products locally. The preference for assembly over full-scale manufacturing is influenced by factors including tax incentives, lower labor costs, and reduced shipping expenses. For example, Kenya's tax regime offers exemptions on certain imported electronic parts, making it more cost-effective to assemble products locally than to manufacture them from scratch.[29]

In addition to tax incentives, Kenya's labor market provides a competitive advantage. Labor costs remain comparatively low, making local assembly operations viable for companies seeking to manage production expenses. The emphasis on assembly extends beyond e-mobility. In the renewable energy sector, firms such as M-KOPA and D-Light import photovoltaic cells and battery components, assembling them into solar home systems for distribution.

Similarly, while manufacturing in the telecommunications industry is minimal, local assembly and software integration play an important role, particularly in producing feature phones and mobile payment devices.

Kenya's potential to scale up its electronics manufacturing sector depends on investment in industrial infrastructure, technical training, and supportive government policies that move beyond assembly to full production.

However, the country's manufacturing sector has faced persistent challenges over the past decade. High operational costs, stringent tax regulations, regulatory unpredictability, and currency depreciation have driven several multinational companies to exit the market.

At least three multinational firms have scaled down or ceased operations, citing rising energy prices, fluctuating tax policies, and falling consumer demand.[30] Despite these setbacks, the manufacturing sector remains essential, contributing 7.6% to GDP. The Kenya Association of Manufacturers (KAM) continues to advocate for reforms through its *Resetting Manufacturing to achieve Agenda 20BY30 initiative,* which aims to increase the sector's contribution to 20% of GDP by 2030.[31] Key measures include reducing production costs, improving policy consistency, strengthening supply chains, expanding access to financing, and fostering partnerships between local firms and international technology companies.

Only a limited range of products is produced locally, with the majority of EEE imported into Kenya. One of the notable exceptions is Associated Battery Manufacturers EA (ABM Group), whose portfolio includes Chloride Exide Ltd. According to company information, they produce around 900,000 batteries annually and operate a regional network of over 20 branches and more than 2,000 dealers. A related firm, Regional Recycling East Africa Ltd., specializes in battery recycling and operates from Athi River, close to Nairobi.[32] This proximity to the capital's WEEE sector supports their operations. Both formal and informal interviews confirm that battery waste flows are largely directed to this recycling facility. The system is incentivized financially; for example, collectors can earn between 50 and 100 KES per kilogram for lead-acid batteries.

---

28 Kenya Association of Manufacturers. (2022). *Manufacturing Priority Agenda 2022: Manufacturing sector recovery and sustained growth for Kenya's shared prosperity, Nairobi. Kenya Association of Manufacturers.* Retrieved 17.04.2025, from *https://kam.co.ke/wp-content/uploads/2022/02/MANUFACTURING-PRIORITY-AGENDA-2022-Final-Copy.pdf*

29 Kenya Revenue Authority (2023). *Import Duty Exemptions and VAT Policies on Electronic Components.* Government of Kenya.

30 Business Daily Africa. (2024, August 15). *34 plant shutdowns reveal Kenya manufacturing woes.* Retrieved 19.05.2025, from *https://www.businessdailyafrica.com/bd/corporate/companies/34-plant-shutdowns-reveal-kenya-manufacturing-woes--4397890*

31 Kenya Association of Manufacturers. (2025). *Manufacturing priority agenda (MPA) 2025.* Retrieved 18.03.2025, from *https://kam.co.ke/wp-content/uploads/2025/03/MANUFACTURING-PRIORITY-AGENDA-MPA-2025-Print-5.pdf*

32 Associated Battery Manufacturers EA (ABM Groups). *LinkedIn Profile.* Retrieved 26.2.2025, from *https://www.linkedin.com/company/associated-battery-manufacturers-abm-group/?originalSubdomain=ke.*

Plastics constitute a significant share of both EEE and resulting WEEE. Yet, Kenya lacks industrial-scale capacity for virgin plastic production. The country's only crude oil refinery in Mombasa, which could have produced raw materials for plastics, has remained non-operational for several years. Domestic crude oil production is also limited and cannot sustain downstream plastic manufacturing. Available crude must be exported for processing, as no infrastructure exists to refine it into petrochemical derivatives needed for plastic resins. Consequently, all virgin plastics used in EEE production are imported, adding to manufacturing costs and Kenya's dependence on external supply chains.[33] That said, several plastics recyclers operate in Kenya, focusing mostly on PET (for export), HDPE, and PP. Some of these recyclers pelletize HDPE for reuse, including in the production of irrigation water tanks.

More recently, a telecommunications company has begun assembling mobile phones in Kenya, targeting lower-income market segments. While this represents a valuable opportunity for local value addition and improved device accessibility, it also underscores the need for sustainable end-of-life management systems for these domestically assembled devices.

6.1.2. Imports

In Kenya, Electrical and Electronic Equipment (EEE) enters the market both as new and second-hand products, with imports arriving from countries such as China, Germany, Japan, UAE, USA, UK, Canada, South Africa, and Australia. These goods are brought in through major entry points including the Port of Mombasa, Eldoret, Jomo Kenyatta International Airport (JKIA), and border crossings within the East African region. The value chain typically involves importers supplying distributors, who then sell to wholesalers, retailers, and ultimately end-users.

EEE imports have increased steadily in recent years, with the total value reaching USD 906,179 in 2021, USD 1,079,661 in 2022, and USD 1,192,765 in 2023, reflecting rising demand in the country.[34]

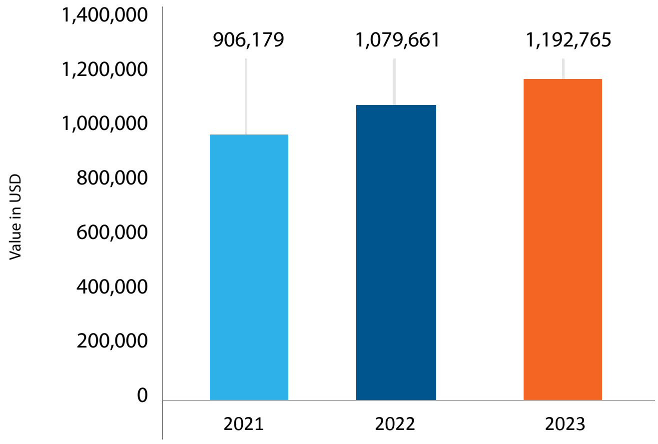


Figure 4: Imported value to Kenya of electrical machinery and equipment (2021-2023) (own illustration)

Alongside formal imports, Kenya faces persistent challenges with illegal imports of both new and second-hand EEE, as well as waste electrical and electronic equipment (WEEE). Illegal imports of new EEE often involve substandard or counterfeit goods that bypass official quality and safety checks, creating environmental and consumer risks.[35] While the legal import of second-hand EEE can contribute to a circular economy by extending product life cycles, illegal imports of near end-of-life devices falsely labeled as functional lead to early disposal and increased environmental hazards.[36]

More serious is the illegal import of WEEE, which contravenes the Basel Convention (1992) by transferring hazardous waste to countries lacking adequate recycling infrastructure. In response, Kenya banned the importation of second-hand electronic devices in January 2020 to curb the risk of becoming a WEEE dumping ground.[37] The ban aligns with Kenya's Basel Convention obligations, aimed at regulating hazardous waste movements.[38]

To address these issues, stronger enforcement, improved tracking systems, and international collaboration are needed. The East African Community (EAC) has also introduced measures to curb WEEE dumping and promote recycling in the region.[39]

33 Thilo Vogeler, George Warutere, Judy Chebet, Jana Brinkmann, Valerie Leisten, Stephan Löhle, Karin Ruf and Bronwyne Andabwa (the consortium of cyclos GmbH and AHK Services Eastern Africa Ltd.). (2021). *Study in Plastic Value Chain in Kenya.* A Project of the United Nations Industria Development Organization (UNIDO), Retrieved 26.02.2025, from https://www.unido.org/sites/default/files/unido-publications/2022-12/Plastic-value-chain-in-Kenya.pdf

34 International Trade Centre. (2024). *Trade statistics for electrical machinery and equipment (HS Code 85).* Retrieved 26.02.25, from https://www.trademap.org

35 The Elephant. (2021). *Dumped WEEE Threatens Kenyan Lives, Contributes to Global Warming.* Retrieved 26.03.2025, from https://www.theelephant.info/analysis/2021/11/06/dumped-WEEE-threatens-kenyan-lives-contributes-to-global-warming

36 Basiye, J. (2022). *The WEEE Challenge in Kenya: Policy Gaps and Future Solutions.* Journal of Environmental Policy, 14(2), 87-104.

37 The East African. (12.12.2020). *EAC bans dumping of electronic waste, calls for recycling.* The East African. Retrieved 26.02.2025, from https://www.theeastafrican.co.ke/tea/news/east-africa/eac-bans-dumping-of-electronic-waste-calls-for-recycling-3633632

38 Basel Convention. (n.d.). *Overview of the Basel Convention.* Retrieved 18.03.2025, from https://www.basel.int/TheConvention/Overview/tabid/1271/Default.aspx

39 East African Communications Organization (EACO). (2022). *EACO regional WEEE management strategy 2022–2027.* Retrieved 18.03.2025, from https://eaco.int/admin/docs/publications/EACO%20Regional%20WEEE%20Management%20Strategy%202022-2027.pdf

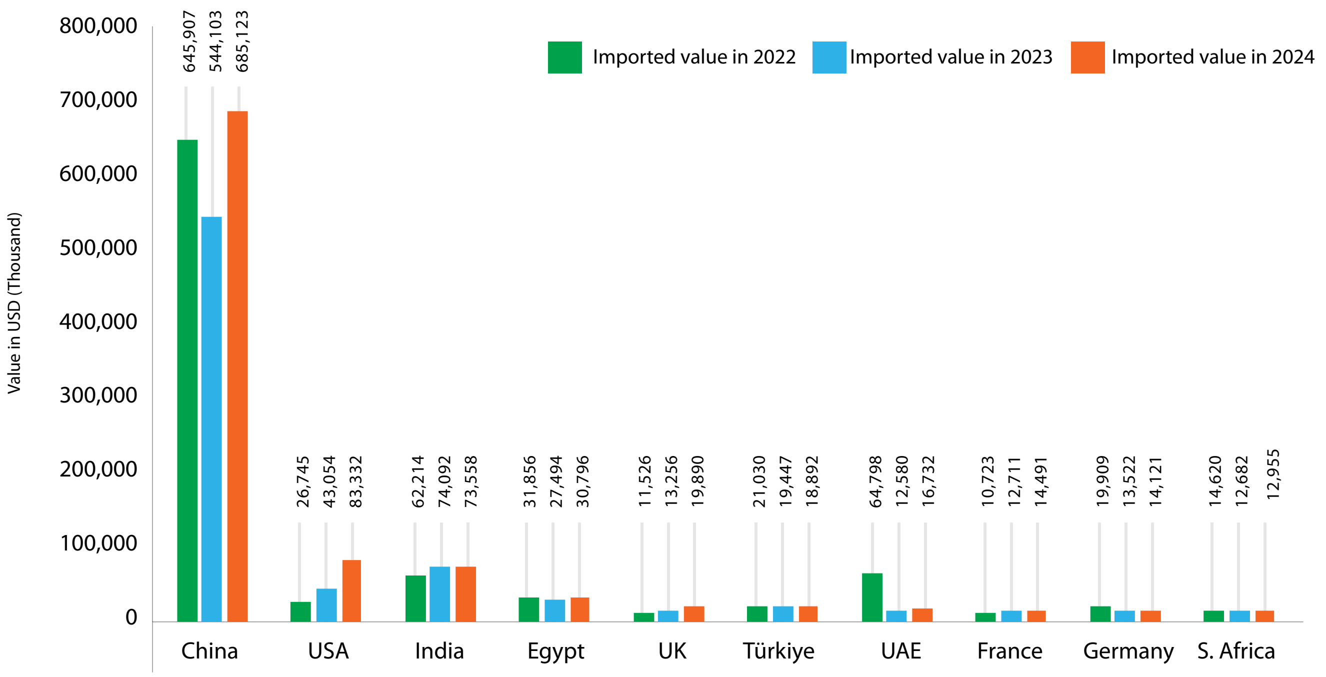


Figure 5: Import markets for WEEE and its value (2021-2023)[40]

EEE reaches Kenyan consumers via both formal and informal channels, though this section focuses on formal imports. Authorized resellers and manufacturers handle formal imports, with brands like LG, Samsung, Caterina, Ramtons, Skyworth, Ariston, Beko, Tefal, Philips, Armco, Bruhm, Tecno, and Oppo active in the market. Some, such as LG, work through official local partners like Opalnet Ltd., which holds exclusive rights for brand distribution.

Nonetheless, "grey imports" remain common — legitimate products that enter the market outside official channels, often undetectable by enforcement agencies since the products themselves are genuine. Additionally, cases occur where products are falsely labelled in shipping containers to bypass specific distributor agreements or tax obligations. Fully illegal imports involve goods smuggled past authorities without declaration or tax payment.

6.1.3. Generation of WEEE in Kenya

Recent studies indicate that Kenya generates approximately 88,000 tons of WEEE annually, with a per capita generation of 1.6 kg per person per year.[41] However, other assessments, including qualitative interviews with key stakeholders, suggest that the actual figure may be lower, around 55,000 tons per year. This discrepancy results from differing data collection methodologies, with most studies deriving figures from estimates in a single region. Differences also exist in how the formal and informal WEEE sectors handle records. Formal sector players maintain structured digital records for compliance and accountability, while informal actors rely on minimal, often non-standardized methods such as handwritten notes or memory-based tracking. Despite the Global E-waste Monitor 2022 listing 88,000 tons, most stakeholders continue to reference the lower estimate of 55,000 tons.

40 International Trade Centre.(2024). *Trade statistics for electrical machinery and equipment (HS Code 85).* Retrieved 26.02.25, from https://www.trademap.org

41 Global E-waste Statistics Partnership (GESP). (2022). *Kenya E-waste statistics 2022.* Retrieved 18.03.2025, from https://globalewaste.org/statistics/country/kenya/2022/

Population
53,499,879

E-WASTE GENERATED	E-WASTE FORMALLY COLLECTED	EEE PUT ON MARKET
88 kt	0 kt	156 kt
E-WASTE GENERATED	**E-WASTE IMPORTED & EXPORTED**	**EEE PUT ON MARKET**
1.6 kg /capita	N/A	2.9 kg /capita

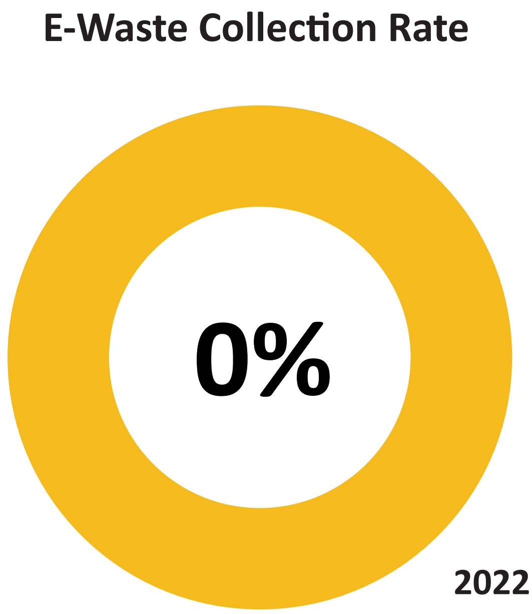


Figure 6: EEE data for Kenya, excerpt from the Global E-Waste Statistics Partnership (2022)[42]

Nairobi, as Kenya's economic hub, accounts for the largest share of WEEE generation due to its high population density, widespread digitalization, and concentration of businesses. Common categories of WEEE include mobile phones, computers, televisions, printers, refrigerators, and washing machines. According to the Kenya National Bureau of Statistics (KNBS), 'small equipment' alone accounted for 20,000 tons in 2024.[43]

WEEE in Kenya is categorized and generated as follows:

Temperature exchange equipment (e.g. refrigerators, air conditioners)	20,000 tons
Screens and monitors (e.g. televisions, computer screens	7,000 tons
Lamps (e.g. fluorescent bulbs)	4,000 tons
Large equipment (e.g. washing machines, electric stoves)	4,000 tons
Small equipment (e.g. kettles, toasters, irons)	31,000 tons
Small IT and telecommunication equipment (e.g. mobile phones, routers)	6,000 tons

Table 5: WEEE categorization & generation in Kenya[44]

A significant share of WEEE remains uncollected or improperly disposed of. Many consumers store obsolete devices at home or dispose of them alongside general waste. A substantial fraction enters informal waste streams, where it is discarded in open dumpsites or processed through rudimentary methods like burning, releasing hazardous substances into the environment.[45]

While the import of EEE, both new and second-hand, supports technological advancement and digital inclusion, it simultaneously drives WEEE generation as products reach end-of-life. The absence of effective enforcement mechanisms for Extended Producer Responsibility (EPR) further exacerbates the challenge. Efforts by government institutions such as KEBS and NEMA, alongside private-sector initiatives, aim to enhance regulatory frameworks and public awareness on sustainable WEEE management.

As discussed in the literature review in Chapter 2, WEEE generation is highly diverse. Many key informants noted that households and public institutions are "hoarders", stockpiling obsolete electronics. While the reasons for household-level hoarding are well documented, the motivations within public institutions are less visible and largely considered tacit industry knowledge.

42 Global E-waste Statistics Partnership (GESP). (2022). *Kenya E-waste statistics 2022.* Retrieved 18.03.2025, from https://globalewaste.org/statistics/country/kenya/2022/

43 Linah Ngumba, Kenya National Bureau of Statistics (26.03.2025). *E-Waste and Put on Market (POM) Data Analysis.* Presentation for 7th EACO E-Waste Conference, Nairobi, Kenya.

44 ibid.

45 Otieno, I., & Omwenga, E. (2016). E-Waste management in Kenya: *Challenges and opportunities.* International Journal of Scientific and Research Publications.

The principal reason cited is the Public Procurement and Asset Disposal Act 2015, revised in 2022. The Act outlines disposal procedures for public entities, including the establishment of disposal committees and allowable disposal methods under Paragraph 165:

> *Methods of disposal (1) Subject to prescribed provisions, an accounting officer of a procuring entity may dispose assets by a method which may include any of the following;*
> *a. transfer to another public entity or part of a public entity, with or without financial adjustment*
> *b. sale by public tender*
> *c. sale by public auction*
> *d. trade-in*
> *e. waste disposal management*
> *f. as may be prescribed.*[46]

While this provision lists sale and trade-in options, which emphasize generating revenue, it remains unclear whether '(e) waste disposal management' allows for incurring costs. Most public entities, including those interviewed, hold the position that they must sell WEEE to generate income rather than pay for its disposal.

In contrast, private companies enjoy more flexibility. Several businesses interviewed noted a willingness to pay for WEEE disposal as part of Corporate Social Responsibility (CSR) or general corporate responsibility. Similar to how they handle other waste streams (e.g. paper, kitchen waste), some companies responsibly manage their e-waste, particularly problematic items like printer cartridges. Additionally, some companies are influenced by Environmental, Social, and Governance (ESG) reporting requirements, either for compliance or investor relations.

For retailers of household appliances, customer-facing take-back schemes are common. These enable customers to return obsolete devices to service centers or have them collected upon delivery of a new item. Aggregated items are refurbished or sent for recycling, for example, to Enviroserve. In many cases, these schemes make both economic and environmental sense, especially where refurbished devices can be sold at a discount. However, Enviroserve has confirmed that often the items received from customer take back schemes are less-valuable or non-valuable fractions, meaning that Enviroserve incurs a loss if they are not compensated with a disposal fee.

46 The Republic of Kenya. (2022). *The Public Procurement and Asset Disposal Act (Revised Edition 2022), paragraph 165.* Retrieved 26.2.25, from https://ppra.go.ke/ppda/#.

6.2. Informal Sector Practices

This chapter examines the practices, challenges, and opportunities within Kenya's informal WEEE sector, drawing on survey data from key actors. It highlights the WEEE value chain, documenting the roles of repairers, informal collectors, dismantlers, recyclers, refurbishers, scrap metal dealers, transporters, and dumpsite operators, with a focus on second-hand devices and imported electronics from developed countries.

6.2.1. Background on Respondents' locations and Demographics

6.2.1.1. Handler Locations

The survey covered eight key locations in and around Nairobi: Kibera, Dandora, Githurai, Kangemi, Ngara, Kasarani, Kawangware, and Korogocho. These areas were selected based on population size, levels of WEEE generation and availability of handlers.

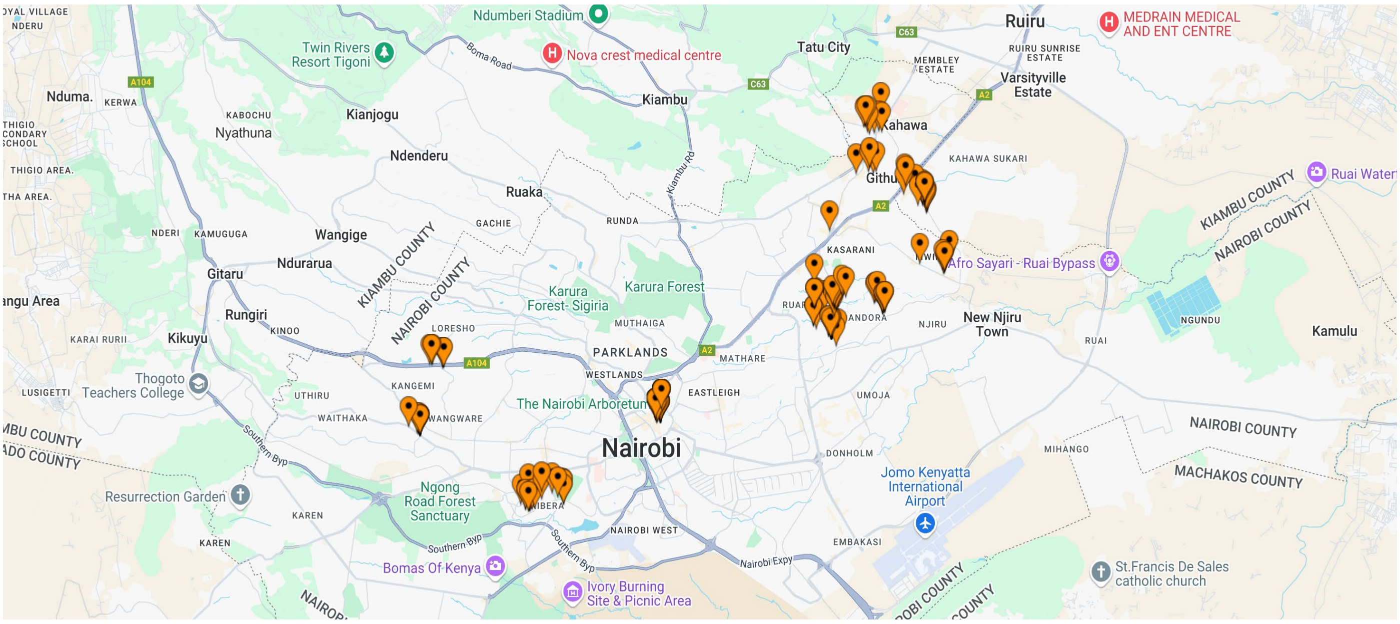


Figure 7: Location map points

WEEE handlers were distributed across these locations with Githurai and Kangemi having the highest concentration of businesses (20.2% and 20.8% respectively), followed by Kasarani and Westlands (both 12.7%). Korogocho had the smallest representation at 6.4%.

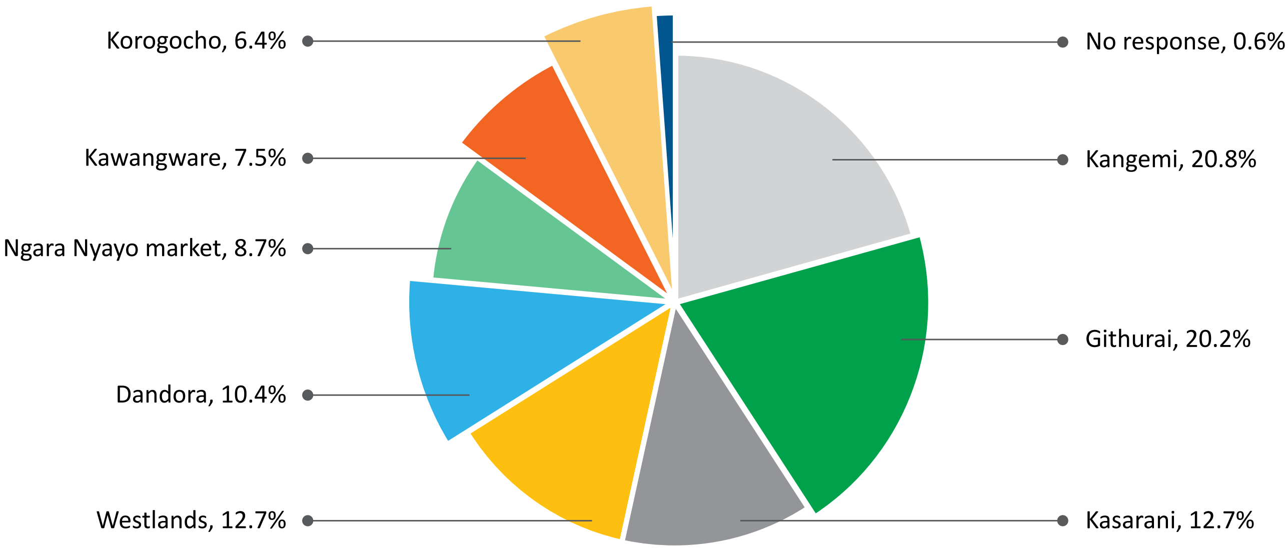


Figure 8: Distribution of respondents by study locations (n=174)

6.2.1.2. Educational Background

A majority of the respondents (44%) had completed secondary education, followed by 32% who attained college education. Primary school graduates comprised 15% of the participants, while 8% held university degrees. A small minority (1%) reported having no formal education. 97 respondents (57.4%) indicated they do not possess relevant academic qualifications to handle WEEE, whereas 71 respondents mentioned that they do have academic qualifications pertinent to their work.

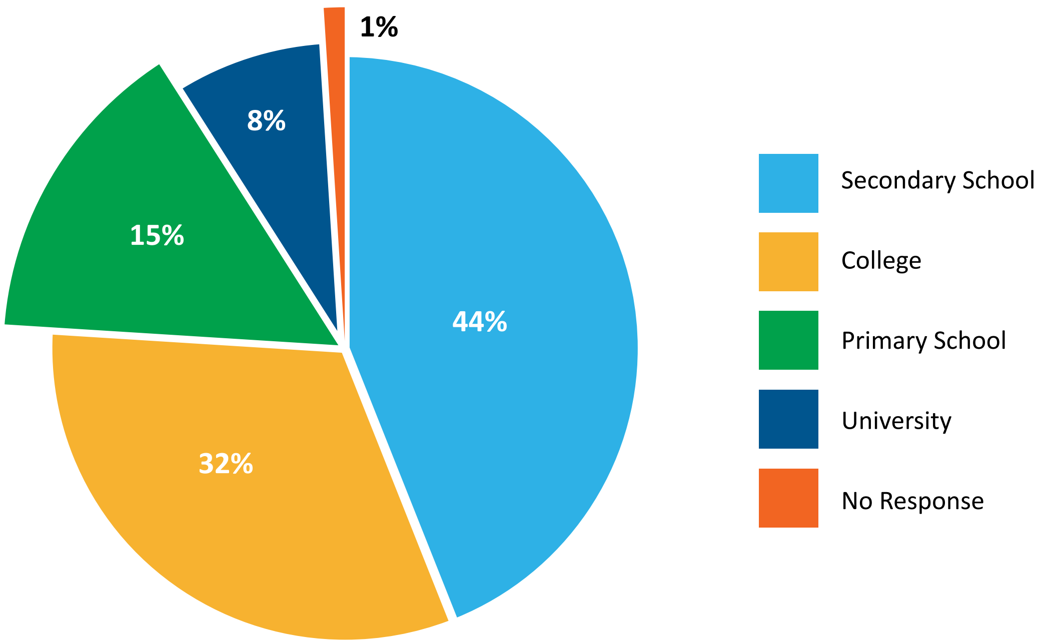


Figure 9: Education Level of Respondents (n=174)

6.2.2. Operational Setup

The informal sector has a very varied and diverse set up ranging from operations in semi-permanent structures to open-air set ups. In Githurai participants operate from informal structures, leaving them vulnerable to weather, fire and theft. Kibera participants mainly operate from "vibandas" (rail/roadside kiosks) and open-air spaces, also facing security and infrastructure challenges. Kahawa and Ngara Market participants mainly operate from a county market, benefit from better infrastructure but still struggle with space limitations.

Figure 10: A collector at his Informal WEEE business

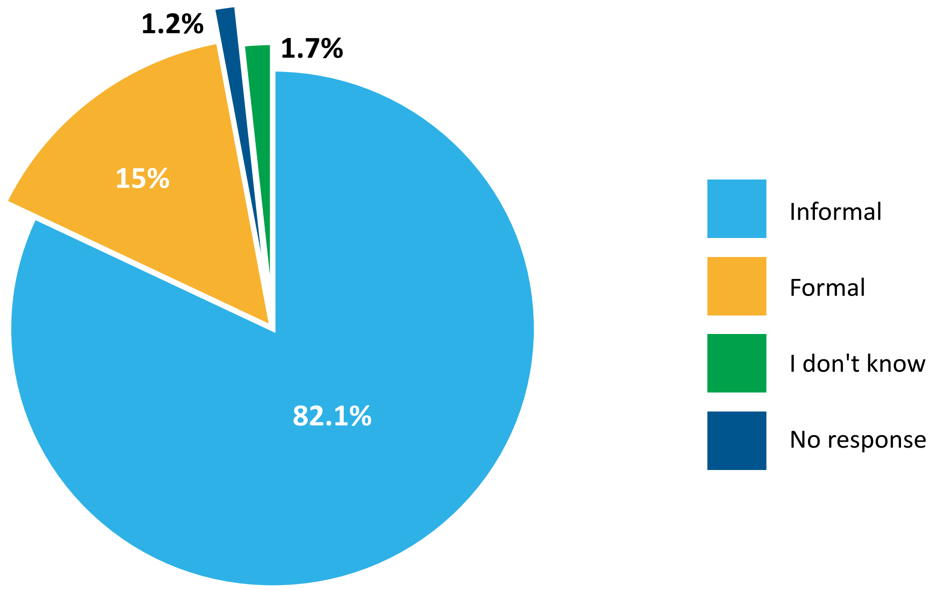


Figure 11: Respondents perception of their business compliance status

6.2.3. Licensing and Finances in the informal sector

In Kenya, businesses must register with county and national governments, while Waste Electrical and Electronic Equipment (WEEE) handlers require additional permits such as disposal, transportation, and NEMA licenses (refer to chapter4.2). Licensed WEEE handlers are more trusted and avoid police harassment.[47]

In Githurai, most participants operated without licenses, whereas those in Kahawa reported obtaining weekly licenses from Nairobi County. Kibera participants did not mention licensing, likely indicating they lacked it. Licensing enforcement and regulatory implementation varied across locations. Githurai participants relied on informal sources such as chamas (savings groups), mobile lending apps, and soft loans due to limited access to formal financial services. Kahawa participants reported similar challenges, citing high-interest rates of up to 26%, compared to the central bank's 16% base lending rate. This highlights the financial struggles of informal businesses and the need for more accessible financing options. Kibera participants did not specify their capital sources, suggesting a lack of access or prioritization.

Overall, the research found inconsistent licensing enforcement and financial constraints among informal WEEE handlers.

> *I started specializing in laptops due to the low capital requirement after my initial business failed during COVID.*
>
> ***– A respondent during the FGD in Ngara***

47 Capita Registrars. (n.d.). P*rocedure of Registering a Company in Kenya. Retrieved 24.03.2025,* from https://capitaregistrars.co.ke/procedure-of-registering-a-company-in-kenya/

6.2.3. WEEE Flow and Handling Practices in the informal sector

6.2.4.1. WEEE Collection

The survey revealed a diverse range of WEEE sources among respondents.

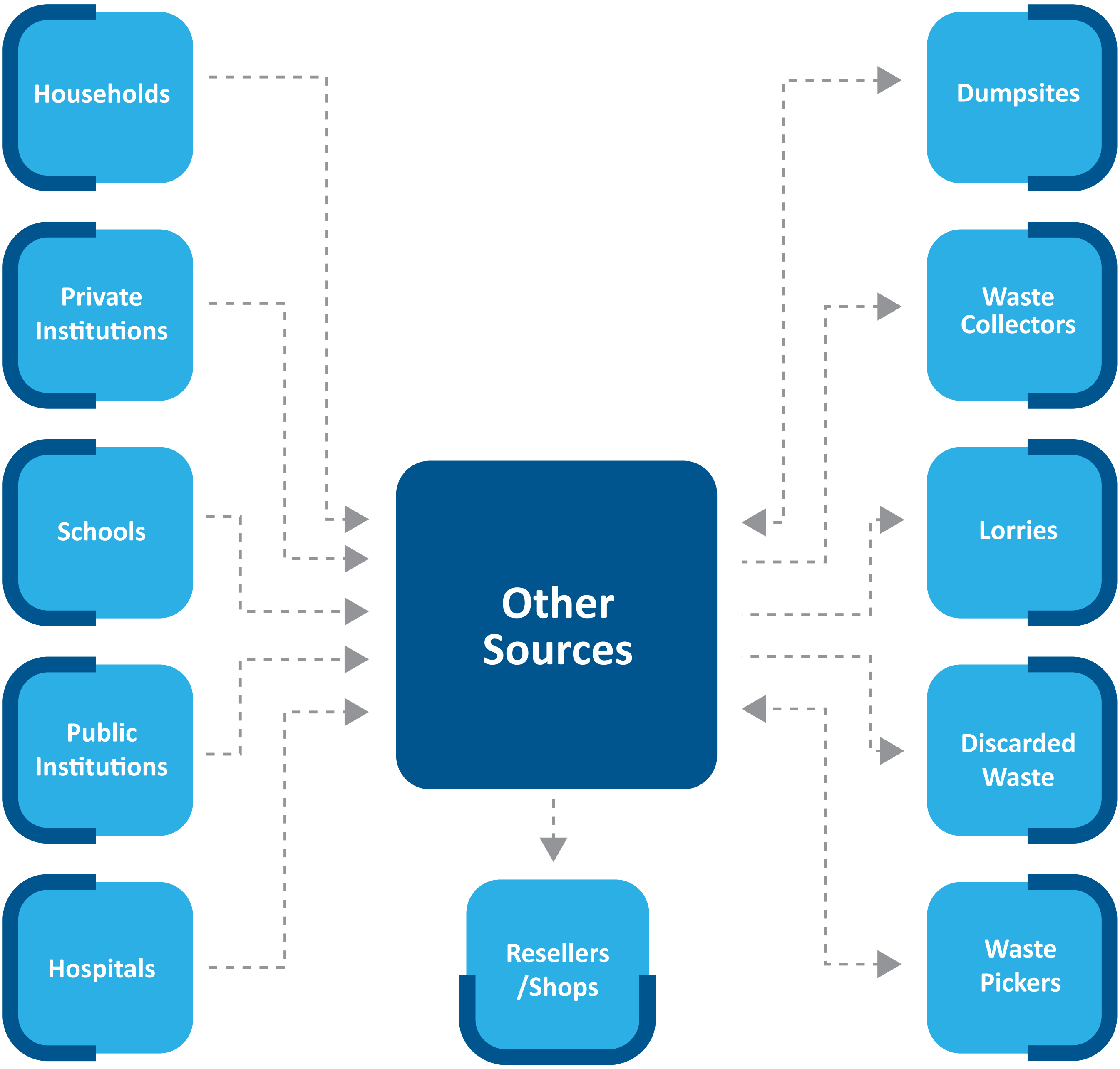


Figure 12: WEEE material flows in Kenya according to informal respondents (own illustration)

A majority (51%) sourced WEEE from various "other" sources, indicating a complex supply chain beyond the predefined categories of households, private institutions, schools, public institutions, and hospitals. Respondents reported scavenging from dumpsites, including those located along rivers and in garbage dumps to source for WEEE. Sourcing from informal waste collectors, often referred to as "watu wa takataka" was also common, highlighting the role of individuals and groups involved in informal waste collection. This practice aligns with reports of sourcing WEEE directly from waste transport vehicles (lorries) en route to formal disposal sites. Some respondents also indicated they collect WEEE from dustbins and sourcing it from discarded waste.

Direct acquisition from individuals (buying from other people or walk-ins) and buildings (possibly demolition sites, referred to as "mijengo") was also noted. Specific locations, such as the Donholm dumpsite, Kariobangi, Kayole, Mukuru, Gikomba, Kariokor, and Luthuli Avenue, were identified as sourcing hubs, suggesting the presence of localized WEEE collection networks. Resellers and shops were also mentioned as sources, indicating a secondary market for WEEE.

The prevalence of dumpsite scavenging and sourcing from garbage collectors underscores the crucial role of the informal sector in WEEE collection. The variety of locations cited suggests localized networks and hubs for WEEE activity, while the presence of resellers and shops points to an existing secondary market. There's a concentration of activity in Nairobi, with many operators focusing on specific neighborhoods or serving local communities. Other operators have established regional or even national collection networks. The use of specific collection points like dumpsites, workshops, and households further illustrates the diverse ways in which WEEE is sourced. The following figure gives an overview about the sources that were named mostly in the questionnaires.

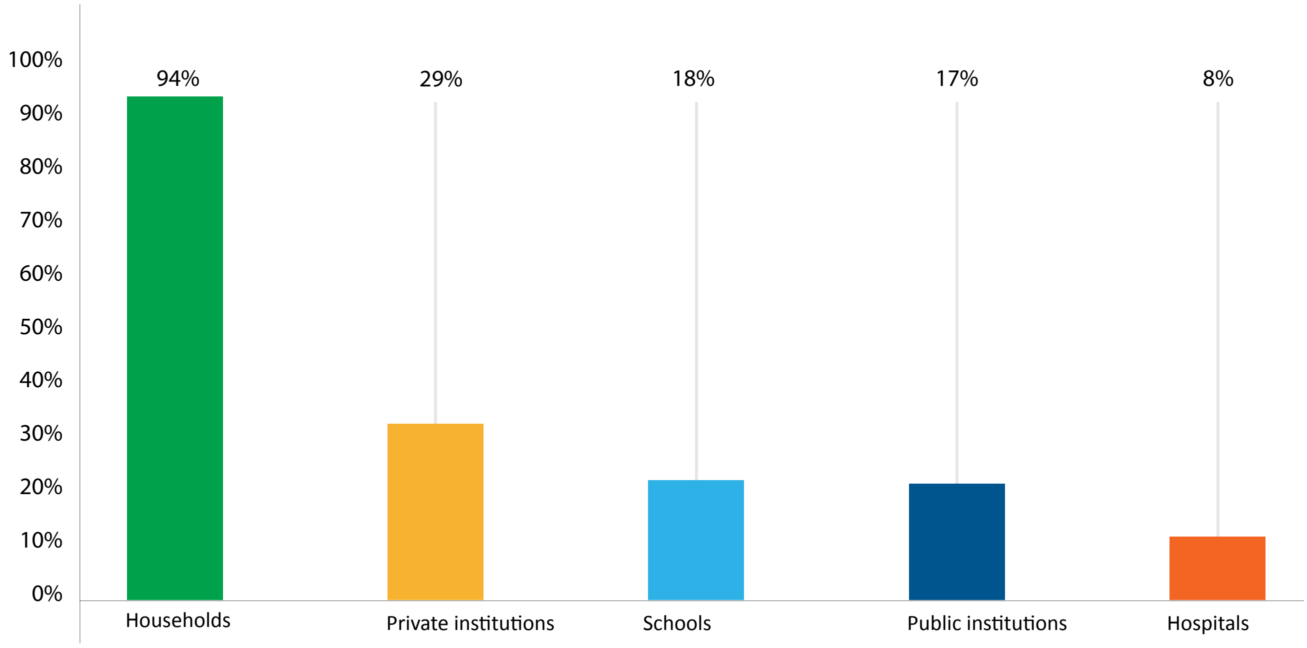


Figure 13: Main source of WEEE from informal respondents (multiple responses possible) (n=162)

6.2.4.2 Informal Repair, Dismantling and Sales

Repair and Dismantling

WEEE handling practices in the informal sector encompass repair, dismantling, and what is locally understood as recycling. Repair activities focus on restoring functionality to electronic devices for reuse. Repairs would include replacement of parts, rewiring, reconfiguration or combination of parts to make whole.

Dismantling involves taking apart WEEE to separate components and materials. Common dismantling techniques include hammering, unscrewing, cutting, shredding or even burning. In the informal context, recycling often differs significantly from formal industrial recycling processes.

It typically involves the recovery of valuable materials from WEEE through rudimentary and often environmentally harmful methods. Some of the processes include burning cables to extract copper, melting down metals, or manually separating components. These practices often lack proper safety measures and can expose workers and the environment to hazardous substances.

Sales

The sale of WEEE and recovered materials follows various channels, involving a range of actors with distinct roles. At the base are individual collectors, often operating informally, who gather WEEE from households, businesses, and even dumpsites.

These individuals may sell directly to consumers for reuse or repair for example, a collector might sell a working second-hand phone directly to someone in the community. Alternatively, they might sell to aggregators, small-scale businesses that collect WEEE from multiple individual collectors and bulk it for sale to larger players. Aggregators act as intermediaries, streamlining the flow of materials.

Wholesalers then purchase WEEE in bulk from aggregators or directly from larger collectors. They play a crucial role in sorting, dismantling, and sometimes repairing WEEE before selling it on to other businesses. Scrap metal dealers, particularly those dealing with WEEE containing high metal content, purchase metallic fractions such as copper, aluminium, and steel—often after these materials have been recovered by dismantlers or wholesalers. These metals are then sold to recycling facilities or used in manufacturing.

Some WEEE will be exported and sold abroad. These include PCBs, batteries containing cobalt, and certain amounts of copper, which will offset shipping costs and still generate profit. The export of copper is restricted, because it has led to demolition of public infrastructure due to harvesting.[48] The concerned export markets are in Europe and Asia.

Disposal Practices

The informal WEEE sector lacks a formal, environmentally sound end-of-life management facility. This lack of infrastructure significantly impacts disposal practices, leading to environmentally and socially problematic outcomes. Common disposal methods observed within the informal sector include dumping in open dumpsites or landfills, open burning to recover metals, and indiscriminate disposal in waterways, public spaces, or alongside roads. For example, discarded electronics can be observed alongside roads in Dandora dumpsite in Nairobi. Open burning, often used to extract copper from cables, releases toxic fumes and leaves hazardous ash. Air pollution from burning WEEE exposes both handlers and surrounding communities to harmful toxins, contributing to respiratory problems and other health issues.

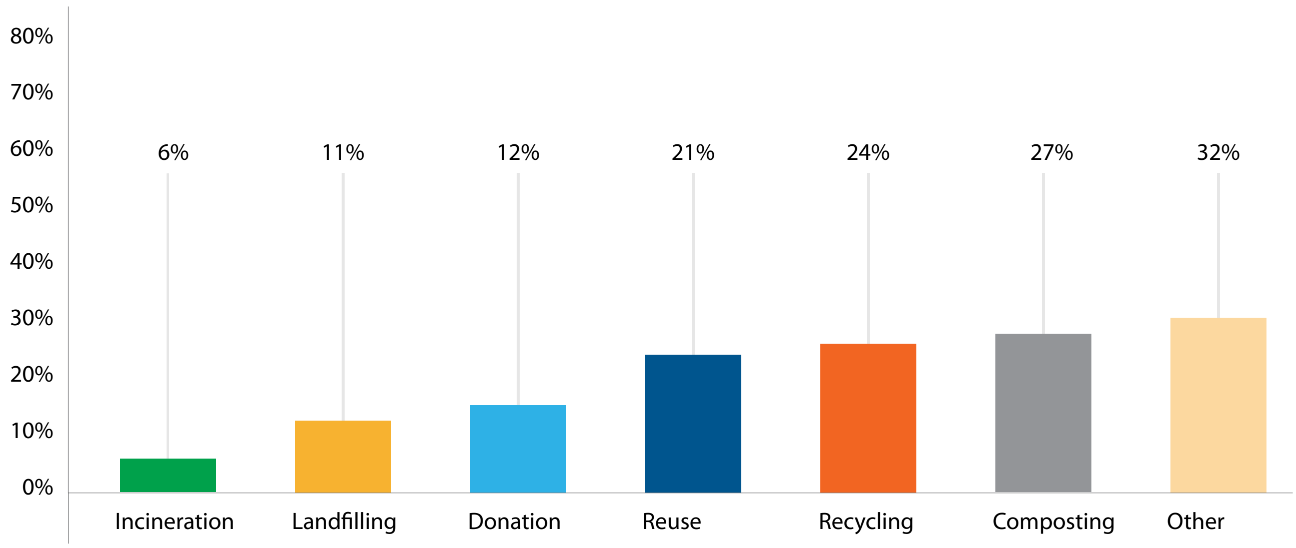


Figure 14: Management of non-valuable WEEE fractions according to respondents (n=174)

Respondents reported a diverse range of approaches to managing rejected WEEE materials, demonstrating a blend of responsible and concerning practices.

Dumping was at 27% and recycling at 24% emerged as prominent strategies, demonstrating some level of environmental awareness, and reuse/repurposing at 21% offered further avenues for extending material lifespans. Through reuse or repurposing the materials extend their second life, although the cost of extending is unclear. Donation, 12%, though less common, suggested that some materials find a second life through charitable channels.

However, less environmentally sound practices like composting, landfilling at 11% and open burning at 6%   were still reported, raising concerns. This is likely because it is frowned upon as unsafe practices and the respondents may not be sincere. A section of respondents at 33% said they use other methods, exposing improper disposal methods. Within this group, dumping, whether at dumpsites, in public bins, or simply as regular trash, was reported frequently, highlighting a significant gap in proper WEEE management solutions and raising serious concerns about environmental contamination. Even more disturbing was the reported practice of burning, with its associated release of harmful pollutants and detrimental impact on air quality and public health.

48 Consumers Federation of Kenya. (2024). *Kenya Power boss calls for total ban on export of copper and aluminium to cut vandalism costs.* Retrieved 05.05.25, *from* https://cofek.africa/kenya-power-boss-calls-for-total-ban-on-export-of-copper-and-aluminium-to-cut-vandalism-costs/

The data revealed that some rejected materials are sold or given to other collectors or scrap dealers. While this practice might temporarily divert waste from immediate disposal, there are no documented business opportunities to invest in long-term disposal of these materials. However, money for end-of-life disposal needs to come from a combination of extended producer responsibility (EPR) schemes, government subsidies, and costs that can be pushed to consumers. While some respondents embrace responsible methods like recycling, a significant reliance on environmentally damaging actions like dumping and burning persists, also considering that not all materials are recyclable.

6.2.5. Processing Capacities and Materials Handled

6.2.5.1. Processing Capacity

Businesses involved in collecting, dismantling, recycling, and refurbishing WEEE can manage incoming waste streams, but most lack adequate infrastructure (tools, machinery, storage), skilled labor, financial resources, and regulatory compliance. The survey highlights diverse specializations, with repairers as the most common, followed by informal collectors, dismantlers, recyclers, and refurbishers. While some processing capacity exists, it is difficult to quantify how many tons of material recyclers can process by types.

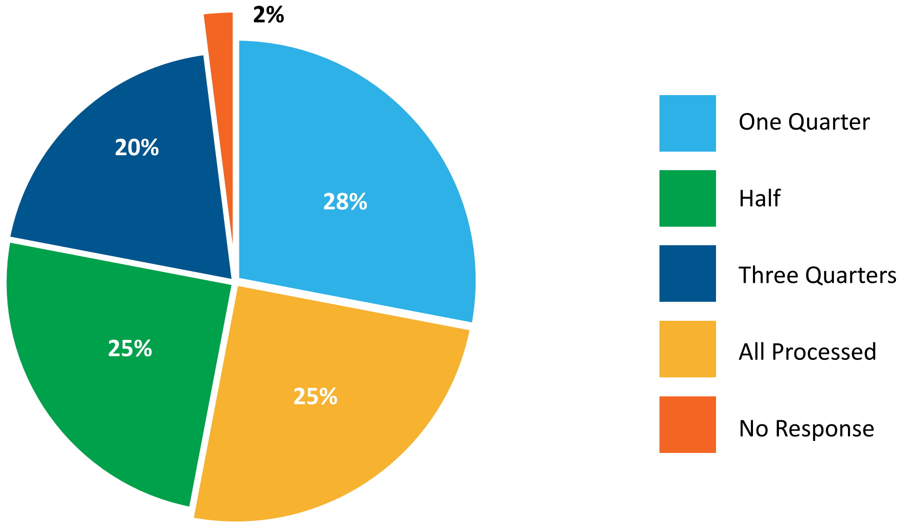


Figure 15: Proportion of WEEE materials dismantled or repaired (n=174)

The chart illustrates the proportions of collected WEEE materials that are processed (dismantled, repaired or segregated) as reported by the informal WEEE sector respondents (n=174).

The majority, 28%, indicated that they processed a quarter of their collected WEEE. At least 25% reported dismantling or repairing all of their collected WEEE, another 25% indicated that they recycle, dismantle or repair about half of their collected WEEE.

20% of the respondents reported that they processed about three quarters of their WEEE collected. While a combined 52% of respondents process either all or half of their WEEE, a significant 29% only process a quarter, and 18% process three-quarters. This suggests a range of practices within the WEEE handling sector. Some businesses focus on full processing and recovery, while others may specialize in specific components or only handle a portion of the materials they collect. The high number of informal waste handling respondents who process a quarter of their WEEE suggests that there may be a significant amount of WEEE that is not being fully processed or recycled. Most of the unprocessed waste is often dumped in open fields, burned or mixed with municipal waste. The remaining WEEE which is not dismantled, repaired or segregated are likely sold as is, stored for further processing or improperly disposed in open fields, burned or mixed with municipal waste.

6.2.5.2. Equipment and Volumes

The equipment used by handlers in the WEEE sector includes dismantling tools, processing machinery, and safe storage facilities. The availability and quality of this equipment significantly influence the capacity of handlers to process WEEE efficiently and safely. The majority of survey respondents reported using basic hand tools such as screwdrivers (96%) and pliers (88.4%), indicating that much of the WEEE processing involves manual disassembly. Hammers, used by 54.9% of respondents, are likely applied for breaking down larger items. Soldering guns and irons were also mentioned, suggesting that soldering and desoldering are common activities, probably related to component recovery and repair. Testing equipment such as multimeters, digital meters, and testers were widely used, highlighting the importance of diagnostics and functionality assessment in WEEE management.

Specialized equipment was less common: drills were reported by 37% of respondents, grinders by 24%, and welders by 13%, suggesting that more advanced processing techniques are not widespread. Other tools mentioned included hot air guns for component removal, magnets for separating ferrous metals, knives, brushes for cleaning, and equipment such as lamination machines and rework stations. Overall, key WEEE management activities remain centered around manual disassembly, component recovery, and basic repair. The broad use of testing equipment underlines the priority placed on identifying reusable components, while the lower presence of specialized machinery implies limited application of advanced techniques like shredding.

A majority (53%) of respondents reported not having specialized equipment or tools, while a smaller but notable portion (44.4%) indicated that they did. This points to limitations in processing capacity, efficiency, and the ability to handle certain WEEE fractions effectively. It may also reflect a lower level of investment in advanced technologies, possibly due to financial constraints or the smaller scale of operations. There is likely some equipment for tasks such as shredding, material separation, precious metal recovery, or specialized dismantling, but its availability is not widespread. The reliance on manual methods by a large segment of the sector may limit the recovery of valuable materials and increase the risk of improper disposal, while the presence of a significant minority with specialized tools suggests that some capacity for more advanced processing exists, albeit limited.

A substantial portion of respondents (47.3%) indicated they do not have access (even at a small fee) to specialized shared equipment or space for handling WEEE, such as crushers, cable strippers, or other special tools. A smaller percentage (17.2%) reported having such access. The 17.2% who do demonstrate that shared resource models are feasible, pointing to a significant opportunity to expand such initiatives and improve overall WEEE processing capacity. The unmet need for shared specialized equipment and resource centers could be a valuable strategy for increasing access to technology and promoting more efficient processing. Many respondents expressed strong support for the concept of shared equipment and space, reinforcing the perception that shared resources would be beneficial. Respondents emphasized the importance of ensuring that shared equipment is both easily available and affordable. They also stressed the need for equipment and workspaces to be conveniently located and priced within reach. Several respondents mentioned specific tools they would like to see in shared facilities, including cable strippers, circular saws, routers, screen burning machines, IC repair machines, separators, laminators, fridge equipment tools, welding machines, micrometers, scolding machines, and microscopes. In addition to tools, respondents highlighted the need for adequate space for storage, processing, and operations. They also expressed interest in having direct contact with the international market through these shared facilities, viewing them as potential hubs for market access and collaboration.

The following table indicates the types of tools, equipment or machinery used amongst respondents within the informal sector:

Value	Frequency	Percentage
Screwdrivers	155	92%
Pliers	145	86%
Hammer	90	53%
Drill	61	36%
Grinder	39	23%
Welding machines	22	13%

Table 6: Types of tools, equipment or machinery used by respondents (n=174)

The reported average monthly WEEE quantities ranged from 1 kg to 5,000 kg (5 metric tons), covering various fractions such as ICT equipment, office electronics, household appliances, consumer equipment, and medical devices. This range reflects the varied sizes of WEEE management operations, from small-scale individual efforts to potentially larger businesses. The majority of respondents (43%) operate at the lower end of the scale, managing between 1 kg and 50 kg of WEEE each month. Middle-sized operators, handling between 50 kg and 500 kg, accounted for 27% of respondents, representing a segment of businesses processing more substantial volumes. A smaller group, making up 12% of respondents, reported managing large quantities between 1,000 kg and 5,000 kg per month, likely corresponding to larger businesses or organizations involved in WEEE collection, processing, or recycling on a wider scale. These figures suggest a potential opportunity for clustering lower-volume handlers and small-scale operators to collectively manage larger quantities of WEEE.

During Focus Group Discussions (FGDs), Community-Based Organizations in Githurai reported specific WEEE volume estimates. Kibera participants indicated handling between 100 kg and 500 kg per week, while those in Kahawa managed between 20 kg and 100 kg weekly. These differences likely reflect the varying scales of operation and access to collection networks in each area. Kibera participants primarily collect WEEE in its original form, purchase parts and components, scavenge from garbage, and source from old stock. In contrast, Githurai participants reported sourcing from a wider range of channels, including households, collectors, garbage trucks, shops, scrap dealers, dumpsites, and county bins. Kahawa participants mainly obtained WEEE from households, other sellers, scrap metal dealers, and importers.

6.2.5.3. Products, Fractions, and Materials Handled

The WEEE sector is highly diverse, with the range of items sold by respondents suggesting a fragmented market. This market includes walking community members, other handlers, and sales to markets upcountry. Respondents sold electronic components like motherboards, cables, chargers, batteries, and spare parts for phones, laptops, and TVs. Several also sold household appliances, both new and used, including electric jugs, blenders, microwaves, irons, and fridges. Some specifically mentioned metallic fractions, scrap metal, or metals such as copper and aluminium. The scrap metal market was more advanced than other fractions, having existed longer and developed a mature value chain. Other items reported included bulbs, remotes, sockets, switches, tools, and even showerheads.

Some businesses specialize in particular product categories, while others handle all types of WEEE. Specialization is often driven by skills, market demand, ease of handling, profitability, and availability. The most frequently mentioned categories were laptops, mobile phones, TVs, small household electronics, amplifiers/sound systems, cables and chargers, solar products, and motherboards. Many respondents cited skills, experience, and training in repairing specific products as reasons for specializing, alongside demand, ease of handling, and profitability, with fast-moving products being especially attractive. Other reasons included personal interest, environmental concerns, ease of marketing, and turnover speed.

Respondents reported selling a wide range of products, including components like motherboards, chargers, batteries, and spare parts for phones, laptops, and TVs. Household appliances, both new and used, such as electric jugs, blenders, microwaves, irons, and fridges, were also common. TVs, radios, amplifiers, and speakers were frequently mentioned. Some sold metallic fractions like copper and aluminium. Others handled bulbs, remotes, sockets, switches, tools, showerheads, repaired components, spare parts, and refurbished laptops. A few indicated selling anything they come across, while a small number reported not selling at all.

All FGD respondents and their groups handle a mix of WEEE, including mobile phones, TVs, household appliances, and components. Githurai participants highlighted the value of motherboards and copper. Kibera participants focused on motherboards, memory cards, screen protectors, and batteries, suggesting a focus on mobile phone repair. Kahawa participants specialized in small household and electronic items, likely due to an existing network for collecting these from repair shops, households, and other handlers.

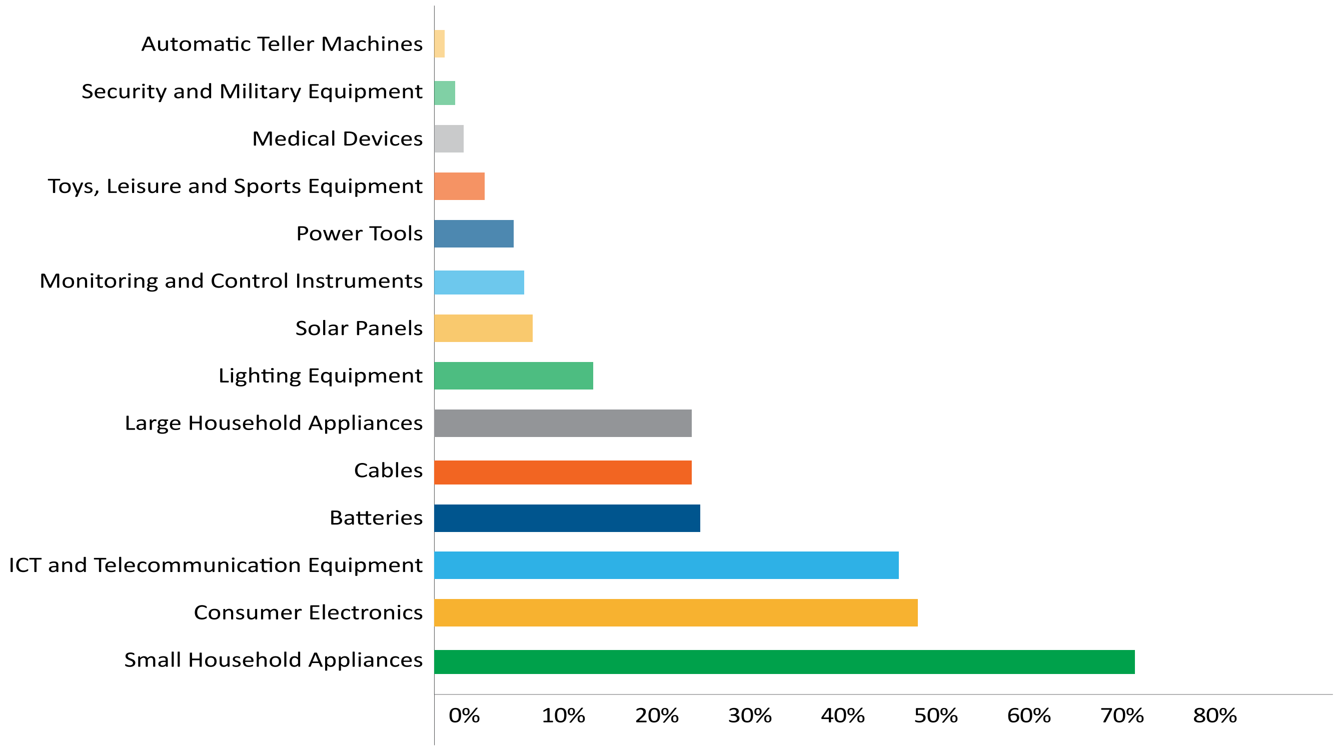


Figure 16: Items with which survey respondents deal with (n=174)

Figure 17: Printed Circuit Boards being weighed for resale at a local offtaker shop

6.2.6. Revenue Models and Pricing

Different components of WEEE, known as fractions, hold varying market values. Some generate revenue when sold (revenue makers), while others incur costs through processing or disposal (loss makers). Revenue-generating fractions are essential for the financial viability of WEEE businesses, as their proceeds help cover the costs of handling less valuable or loss-making fractions. Whether a fraction is profitable depends on market demand, material value (e.g. precious metals), and processing costs. Reported prices for valuable WEEE in Kenya display a remarkable degree of variability, ranging from near zero to several thousand Kenyan Shillings per kilogram, reflecting the complex and fragmented nature of the WEEE market.

The analysis identified a mean price of 1,352.75 KES/kg, heavily skewed by a few exceptionally high values. In contrast, the median price of 475 KES/kg offers a more realistic picture of typical transactions, being less influenced by outliers. Prices are shaped by factors such as the type of WEEE (e.g. precious metals versus plastics), its quality and quantity, the buyer (e.g. recyclers, resellers, or processors), market fluctuations, and the extent of processing or dismantling involved. Further investigation into the types of WEEE being traded at different price points is necessary to better understand market dynamics.

In Nairobi's informal WEEE sector, prices are diverse, with several respondents reporting values between 100 and 500 KES per kg, indicating a market segment for low-priced materials. At the other end, prices can reach as high as 5,000 KES/kg, typically for valuable fractions or specialized processing, such as motherboard mineral extraction. Some respondents reported zero value, likely indicating bulk sales without price-per-kilo breakdowns or sales of working electronics by piece. This suggests niche markets for certain materials or cases where businesses operate more as service providers than product sellers. Metal fractions are typically sold by weight, though without standardized or controlled weighing practices. In other cases, working electronics or components are sold individually, depending on appearance and demand.

Record keeping in the informal sector is largely informal, relying on memory or basic tallying rather than structured systems. Different materials attract different prices: for example, motherboards and precious metals like gold and silver command higher prices than plastics and cables. Specific motherboard components such as CPUs and RAM are especially valuable and in high demand. Copper and aluminium are common, high-value fractions.

The market is highly fragmented, with pricing negotiated between individuals on a case-by-case basis, influenced by quality, quantity, and timing. A RAM module might sell for 2,000 KES in one shop and 1,000 KES next door within the same hour. Larger, better-quality volumes typically fetch higher prices. Buyers vary from recyclers to resellers and specialized processors, each offering different rates. Prices also fluctuate based on local demand, often coordinated through mobile phone and WhatsApp groups, where urgent demand can drive prices up until satisfied. Additionally, global commodity markets for precious metals affect local pricing, with spikes possible during periods of increased WEEE generation, such as end-of-year disposals.

WEEE that has been sorted, dismantled, or partially processed commands higher prices than intact units. For instance, a dismantled computer CPU, separated into motherboards, CPUs, RAM, and hard drives, is more valuable than selling the complete unit, as buyers prefer sorted fractions to avoid dismantling costs themselves.

The following table shows different fractions, their cost and market price:

Fraction	Collection Cost	Processing Cost	Offtaker Price (Variation)	Interpretation
Lead-acid Batteries and batteries from UPS	Medium	High	50 to 100 KES per kg	High demand for recyclable materials (e.g., lithium, cobalt). However, some battery types pose environmental risks and require specialized (and potentially costly) handling.
PCBs	Medium	High	200 to 500 KES per kg	Contain valuable metals (gold, silver) but require complex and safe processing due to hazardous components.
ABS Plastics	Low	High	25 to 35 KES per kg	Processing cost does not offset offtaker price, hence low re-use rate. Less sought after fraction, hence low information rate among actors.
Repairable Solar Panels	Medium	High	150 to 300 KES per panel	Tricky fractions. Growing demand for recovered materials from solar panels, but specialized recycling technologies are needed.
Copper	Low	Low	400 to 600 KES per kg	High market value and consistent demand, but fluctuating prices e.g. due to exchange rates.
UPS as Business Enterprise	Medium	Medium	200 to 400 KES per piece	UPS systems can be refurbished and reused, creating business opportunities. However, battery management within UPSs can be a challenge.
Large Household Appliances	High	High	20 to 50 KES per kg	Bulky and often costly to collect and process. Specific fractions (styrofoam, fiber, water heating systems, refrigerants) require different handling methods.

Table 7: Overview of the pricing of different WEEE fractions according to respondents and market research

Spotlight 1 : Batteries

Batteries are fractions found everywhere in modern electronics, powering everything from mobile phones and laptops to torches and drills. They come in varied chemical composition, including lead-acid, nickel-cadmium, nickel-metal hydride, and lithium-ion, each with different recycling requirements and environmental impacts. In the informal sector, discarded batteries are a common sight in the WEEE value chain, as they are included in many of the WEEE dismantled, but are also collected as single items when replaced by users.

01 Collection

Battery collection in Nairobi is largely informal. Individual collectors, often scavenging dumpsites or collecting from households, play a significant role. Some small shops may also collect used batteries from customers.

02 Handling & processing

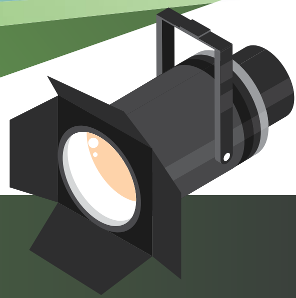
Informal handling of batteries in Nairobi is a growing concern. Due to a lack of specialized equipment and knowledge, batteries are often dismantled using hand held tools, posing risks of exposure to hazardous materials. Valuable metals like lead, nickel, and cobalt might be recovered, while the other components are discarded improperly.

03 Selling or not selling

Recovered battery components, particularly metals, are typically sold to scrap metal dealers. The value depends on the type and quantity of metal. Whole batteries, if still functional, might be resold for reuse, especially lead-acid batteries. This has been the case with local battery manufacturers who have a (more informal) take back scheme to repair and refurbish used batteries and resell them to the market.

04 Disposal

Disposal: Non-valuable battery fractions, including plastic casings and chemical residues, are often improperly disposed. This can include dumping in open dumpsites, burning or disposal in the general waste stream.



Spotlight 2 : Printed Circuit Boards

PCBs are the heart of most electronic devices, containing intricate networks of conductive circuit lines and soldered components. They are found in everything from computers and mobile phones to televisions and appliances. PCBs contain valuable metals (gold, silver, copper) but also hazardous substances (lead, brominated flame retardants). PCBs are a sought-after component due to their value. There are different grades of PCBs, as older PCBs have a higher metal content than PCBs from newer equipment.

01 Collection

PCBs are collected through informal channels. WEEE collectors often target PCBs specifically, recognizing their value. They are removed from WEEE during dismantling processes, either by individual handlers or within small workshops.

02 Handling and Processing

The handling and processing of PCBs are often rudimentary and unsafe. PCBs are typically dismantled manually, with limited safety precautions. Valuable components might be salvaged for reuse, and metals are extracted using methods that can release toxic fumes and contaminate the environment, but this is handled outside the country when they are exported out.

03 Selling or Not Selling

Recovered fractions such as PCBs which contain valuable metals such as gold, palladium, silver, copper among others are sold to specialized dealers or wholesalers who in turn export them to European and Asian markets for profit.

04 Disposal (of Non-Valuable Fractions/Parts)

Due to the lack of proper waste management facilities, these fractions often end up in landfills, open dumps, or are burned, if not exported.

Spotlight 3 : Solar Panels

Solar panels (photovoltaic modules or PV modules) convert sunlight into electrical energy through the photovoltaic effect. In Kenya, their use is steadily increasing across both household and commercial applications. PV modules are manufactured in different types based on their semiconductor material, including silicon-based monocrystalline and polycrystalline panels, as well as thin-film technologies. They contain valuable materials such as silicon, aluminium, and silver, alongside small quantities of hazardous substances like lead, cadmium, and other heavy metals depending on the technology type.

01 Collection

Collection of discarded solar panels especially from smaller installations and solar home systems is still developing, because the volume of end-of-life panels is currently low. Collection is likely handled informally, similar to other WEEE, with individual collectors or small businesses gathering panels from households or businesses.

02 Handling and Processing

Handling and processing of solar panels is likely limited due to the specialized knowledge and equipment required for safe and effective recycling. Panels might be dismantled to recover aluminium frames or glass, but the more complex material recovery processes are not available locally.

03 Selling or Not Selling

Recovered materials from solar panels, such as aluminium frames, might be sold to scrap metal dealers. The sale of other components, like silicon wafers, is less likely due to the lack of specialized markets or processing facilities.

04 Disposal (of Non-Valuable Fractions/Parts)

Improper disposal of non-valuable solar panel fractions, including broken glass, plastic backing, and potentially hazardous materials, is a concern. These materials are likely disposed of in the general waste stream.

6.2.7. Business Networks and Partnerships

6.2.7.1 Interactions with Business Partners

Collectors have emerged as key players in the informal WEEE value chain, forming a robust network of individuals and businesses that gather and consolidate materials otherwise at risk of improper disposal. This interconnected market serves diverse buyers, including regular customers, walk-ins, spare-part seekers, and repair technicians (Fundis), who highlight the reuse and repair sector's significance. Scrap dealers and resellers also play a major role, feeding recycling streams and secondary markets, while brokers, recyclers, hospitals, and schools further illustrate the trade's breadth. Githurai participants noted competition from Ngara-based businesses, which benefit from their central Nairobi CBD location and broader customer base. In contrast, Kahawa handlers face shrewd brokers who dominate by buying in bulk and accessing distant markets, dictating low prices that defy typical supply-and-demand dynamics and squeeze profits. These findings point to a need for interventions that help WEEE handlers secure better market access and fairer pricing.

6.2.7.2 Support Opportunities

It is worth noting that when WEEE is available but capacity to handle it is insufficient, as reported during the FGD, this leads to improper disposal or stockpiling. Capacity must be improved through strategic use of technology, targeted training programs, and provision of necessary infrastructure.

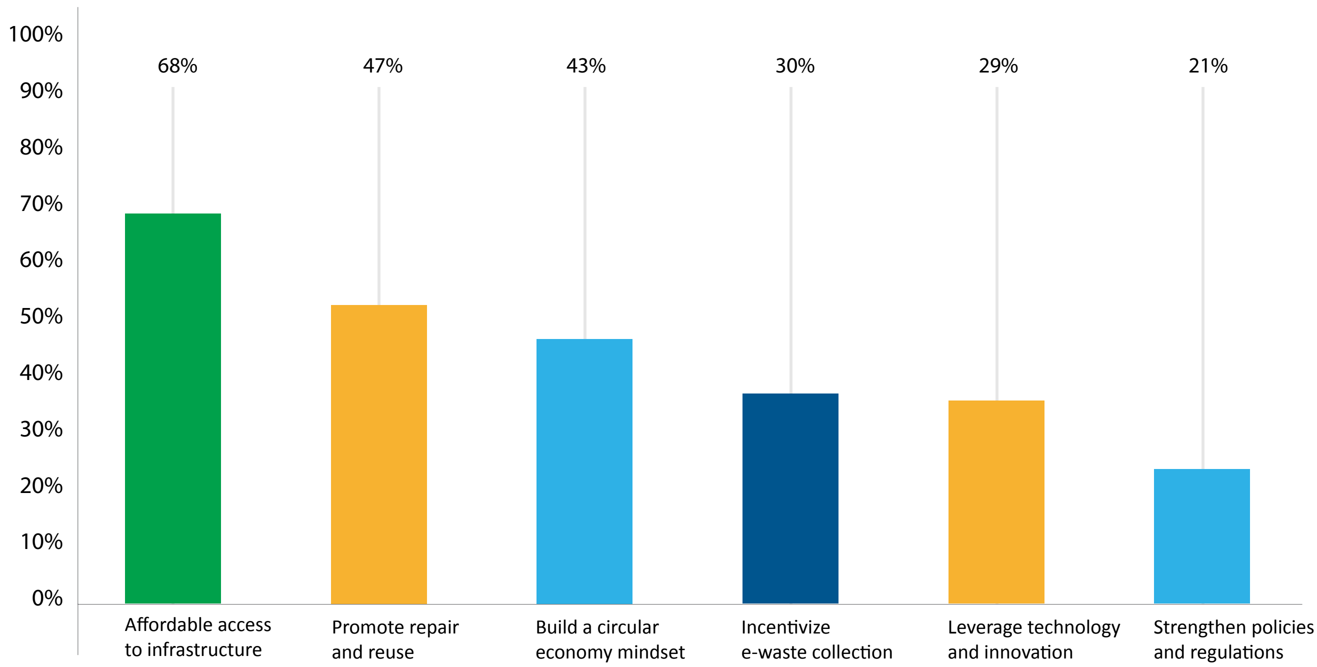


Figure 18: Actions or Support that would help increase the amount of WEEE collected, according to respondents

When asked, "What actions or support would help increase the amount of WEEE you are able to collect and manage?", access to infrastructure was the most supported factor, cited by 69.8% of respondents. This entails having adequate facilities for collection, storage, and processing. Funding for such infrastructure could come from government grants, private sector investment by handlers, or partnerships with international organizations. Promoting repair was also identified as impactful, with 48.8% indicating that initiatives encouraging repair and reuse would significantly boost WEEE collection and management. These could be driven by government programs, NGOs, or private enterprises, funded through grants, subsidies, or CSR initiatives.

Recognition and fostering of innovation were seen as helpful by at least 30% of respondents. Supporting new ideas and technologies in WEEE management can improve the sector, through grants for incubation projects, competitions, or innovation hubs. Favorable policies (22%) and an enabling environment based on circular economy principles (45%), combined with increased awareness of broader regulatory frameworks, were also noted as important.

CBOs, as mid-sized operators, have opportunities for consolidation. Variations in scale are shaped by access to capital, technology, collection networks, and regulation, influencing capacity and operational efficiency. Large-scale operators tend to be more specialized and host recycling facilities. In Nairobi, CBOs play a key role in coordinating WEEE collection, consolidating material from smaller handlers for more efficient processing and recycling. Scale of operations is influenced by the tools and equipment used, application of technology, and resource needs across different WEEE sector segments.

An enabling environment refers to supportive government regulations and conditions. This includes incentives for recycling, tax breaks for WEEE businesses, carbon credit programs, and a regulatory framework facilitating proper disposal. Respondents identified capital access, cheaper and available spare parts, and reduced prices for components as factors that could increase collection volumes. Owning transport systems or securing larger handling and storage spaces could enhance operations. Businesses could collaborate to share transport, invest jointly in larger facilities, or mobilize funds from their chamas for expansion.

Skills development, including repair training and broader workforce development, was flagged as a need. Access to laptops in bulk, increasing stock of saleable, presentable items, and challenges in sourcing and market access were highlighted. Business-to-business collaboration and consolidated importation could ease bulk WEEE access. A unique challenge cited was the need to improve technology resilience against damage from cockroaches.

Practical support, particularly in infrastructure and repair promotion, remains essential for increasing WEEE management capacity. This could involve better storage, pest control, and developing more durable products. Collaboration and shared best practices would help address financial and logistical barriers. While broader frameworks like circular economy principles were mentioned, there was clear evidence of limited direct government support for the informal sector, pointing to a need for greater advocacy by sector players.

6.2.8 Challenges of the informal WEEE Sector

One of the major challenges faced by WEEE sector players is the lack of viable markets for specific WEEE fractions. Respondents cited having to sell at low or throwaway prices, difficulties selling certain materials (e.g., plastics from scanners, small fragments), and price fluctuations. This stems from the absence of established markets, limited knowledge, and low visibility among handlers. To address this, players could form cooperatives, conduct market research to identify potential buyers, and collaborate with government and private initiatives to create awareness and demand for recycled materials.

Disposal practices also face barriers, including a lack of designated areas and means for disposal, delays in collection (e.g., by county government lorries), and uncertainty over where to dispose of materials like batteries. Disposal costs often outweigh material value, creating financial losses. Logistics, especially for bulky items and with limited storage space, add further strain. These can be addressed by developing better storage facilities and efficient transport systems.

Additional challenges include financial burdens related to the cost of spare parts, tools, and operations, as well as technical issues sourcing quality components for repair and reuse. Counterfeit parts were another concern.

Customer-related difficulties were reported, such as returns, complaints, and payment issues. Regulatory and enforcement challenges include harassment from council staff and police, and the burdensome licensing process. In Kenya, Jua Kali, the informal sector, faces additional difficulties linked to environmental conditions affecting operations and WEEE quality. Security, risk of fires, and lack of electricity connections at collection sites were noted. Respondents highlighted materials like PVC plastics, phone batteries, and flyback transformers as problematic due to health, safety, and handling risks. The burning of cables for copper recovery was flagged for its environmental and regulatory implications.

A recurring issue is the absence of markets for low-value fractions like hard plastics, emphasizing the need for innovative recycling methods. A possible processing solution involves shredding/grinding sorted plastics (e.g., ABS, PS, PP, PVC), cleaning the shredded material, and reprocessing it through melting and molding into new products — a process requiring specialized equipment.[49]

The data reveals a web of interconnected challenges: market access, disposal difficulties, logistics, financial and technical hurdles, customer-related problems, and external regulatory burdens. Environmental conditions further complicate WEEE management. Comprehensive, integrated solutions are needed to address these challenges.

While improving WEEE collection and processing infrastructure is essential, infrastructure alone is insufficient. It must be paired with educational initiatives to raise awareness of the environmental and health risks tied to improper WEEE handling. Infrastructure should cover the full disposal ecosystem. Additionally, the informal and often opaque circulation of materials underscores the need for stronger tracking, regulation, and oversight to ensure responsible WEEE handling from collection to final processing.[50]

6.2.9 Recommendations for the Informal Sector

Based on the WEEE baseline study, key recommendations to enhance efficiency, sustainability, and profitability in Kenya's informal WEEE sector include:

49 Maina, J., & Jungblut, S.-I. (05.3.2025). *E-waste start-up EWIK contains the country's growing waste while offering vulnerable communities a chance to earn an income. RESET – Digital for Good.* Retrieved 12.02.2024, from https://en.reset.org/ewik-enabling-kenyas-informal-settlements-participation-in-sustainable-e-waste-management/

50 Otieno, I., & Omwenga, E. (2016). *E-waste management in Kenya: Challenges and opportunities. University of Nairobi.* Retrieved 26.03.2025, from https://erepository.uonbi.ac.ke/bitstream/handle/11295/155124/Onyango%20I_E-waste%20Management%20in%20Kenya-%20Challenges%20and%20Opportunities.pdf?sequence=1

Access to Finance: Targeted financial support should be made available to small-scale recyclers and repair technicians through:

- **Grants and Subsidies:** To support infrastructure development, training programs (particularly in dismantling, repair, and recycling), and equipment acquisition.
- **Equity and Debt Financing:** Encouraging impact investors to engage with the sector and offering low-interest loans to stimulate growth.
- **Microfinance Solutions:** Provision of working capital loans to improve day-to-day operations and resilience.

Infrastructure Development: Improving infrastructure is essential to professionalize the sector and increase operational safety and efficiency:

- **Cooperatively Managed Spaces:** Adopt the Ngara Market model which should provide structured, secure, and affordable rental spaces for informal actors.
- **Modern Facilities:** Workshops and recycling spaces should be equipped with tools such as cable strippers, heavy-duty shredders, baling machines, and material separators.

Co-Shared Workspaces: Co-shared workspaces should offer access to advanced tools such as PCB diagnostic equipment and specialized repair stations, enabling users to conduct precise electronic repairs and diagnostics. To enhance accessibility and ensure inclusivity, a fee-for-service model can be introduced, allowing small businesses and entrepreneurs to utilize shredders, separators, and testing tools at affordable rates. These workspaces can also serve as training hubs, offering skill development programs, certifications, and best practices in e-waste management.

Collection Models: The deployment of easily accessible 40-ft container collection points can increase the volume of WEEE collected and improve revenue streams for recyclers. These collection hubs should serve multiple functions beyond collection — acting as awareness centers, repair points, advocacy hubs, and community repair cafés. To remain financially viable, the centers should be designed to attract high-value e-waste materials, including reusable components and recoverable metals. Incentives for drop-offs and a structured operational model will further boost their effectiveness.

Enhancing Business Models for High-Value Fractions: To improve profitability and material recovery:

- **Prioritize High-Value Outputs:** Focus on repairs, component reuse, and component recovery.
- **Strengthen Market Intelligence and Networks:** Facilitate access to pricing information among traders to improve knowledge of the industry and market trends.
- **Increase Recovery Rates:** Aim to boost the salvage value from the current 30% to at least 70%.
- **Establish Digital Marketplaces:** Develop structured online platforms to trade refurbished devices and spare parts.
- **Expand Value-Added Services:** Expand business models to include services such as data destruction, component testing, and advanced material recovery services for higher profitability.

Skills Building: WEEE-related education should be integrated into school curricula at an earlier level in order to build a skilled workforce. The current vocational training programs should also be enhanced in dismantling, repair, and recycling.

Interlinkages with the Formal Sector: Strengthening ties between the informal WEEE value chain and formal manufacturers is critical to fostering a circular economy. This includes promoting the use of recovered materials in production and implementing structured disposal mechanisms with formal facilities to ensure regulatory compliance, profitability, and sustainable management of electronic waste.

6.3. Formal Sector Practices

The insights gathered shed light on the roles, practices, challenges, and opportunities within the formal sector, contributing to a more holistic understanding of Nairobi's WEEE management ecosystem. The Waste Sector and WEEE Sector in Kenya remains untransparent, with few numbers formally available, but a lot of industry expert knowledge was tapped into through the qualitative interviews.

6.3.1. Profile of Formal Sector Companies

This chapter presents findings from interviews conducted with formal sector actors engaged in various aspects of e-waste management within Nairobi County. A total of twelve organizations were interviewed, including two formal E-waste recyclers, a telecommunications company, solid waste management companies, a community-based waste recyclers association, a solar lighting product reseller, an electronic equipment reseller, and a national regulatory institution responsible for overseeing the ICT sector. Many organizations declined the request for an interview due to stated data protection considerations.

6.3.1.1. Company Types and Locations

The companies interviewed represent a cross-section of key formal actors in Kenya's e-waste value chain, including formal e-waste recyclers, off-grid solar product distributors, telecommunications providers, electronics retailers, solid waste collectors, and community-based organizations (CBOs). These organizations are primarily based in Nairobi and its metropolitan area, with some extending their reach through satellite offices or agent networks across urban and rural areas of the country.

Formal recyclers operate centralized facilities in urban centers, focusing on the systematic collection, dismantling, and segregation of e-waste. Telecommunications providers manage e-waste through third-party subcontractors who handle collection, storage, and recycling. Solar product distributors and electronics retailers operate centralized warehouses in urban areas and have extensive agent networks reaching remote regions.

CBOs typically operate at the local level in underserved or low-income areas, focusing on door-to-door collection, informal aggregation, and basic sorting.

6.3.1.2. Licensing and Compliance

Licensing and regulatory compliance varied among the companies interviewed based on their involvement in e-waste management. Most formal e-waste recyclers and collectors were fully licensed by the National Environment Management Authority (NEMA), specifically for the collection, transport, and aggregation of electronic waste. These companies demonstrated awareness of regulatory frameworks and typically complied with requirements for safe handling, documentation, and hazardous waste reporting.

Solar product distributors and electronics retailers often adhered to voluntary compliance beyond local requirements, particularly when affiliated with international investors or global sustainability programs. These companies implemented internal environmental policies for managing the collection, storage, and transfer of e-waste to licensed partners.

Companies not primarily focused on e-waste, such as solid waste collectors and community-based organizations (CBOs), did not always hold e-waste-specific licenses. These organizations handled e-waste incidentally as part of broader waste management services. Collected e-waste was either transferred to licensed recyclers or sorted, with valuable fractions sold to local offtakers.

6.3.1.3. Operational Setup

The companies interviewed employed various operational setups based on their roles in e-waste management. Formal recyclers operated centralized facilities with dedicated storage, processing zones for sorting, dismantling, and temporary storage, as well as structured documentation systems. They either maintained their own transport fleets or coordinated logistics for e-waste collection from partner drop-off points.

Solar and telecommunications companies used decentralized return systems, with field agents and technicians collecting end-of-life products for consolidation at central warehouses before transferring them to recycling partners, following internal environmental protocols.

Electronics retailers and distributors facilitated product recovery through in-store drop-off points, which were then sent to formal recyclers.

Community-based actors and informal aggregators employed flexible collection models, using door-to-door collection and collaborating with local offtakers for sorting and recovery.

6.3.2. WEEE Flow and Handling Practices

6.3.2.1. Formal Solid Waste Collection and Handling

Understanding the flow of waste electrical and electronic equipment (WEEE) in Kenya requires a clear distinction between WEEE and general solid waste streams. While these two often intersect, they follow different regulatory and operational pathways. Solid waste management in Kenya is a devolved function, meaning that each of the country's 47 counties, representing its decentralized governance framework, is independently mandated to manage its own solid waste operations.[51] This has made the organization of the sector and specifically, its budget, difficult. Whereas some counties may be able to fund municipal waste management (at least collection) due to higher revenue generation from taxes, business activities and government budget allocations, showing higher interest and awareness towards the topic; but most counties are not able to do so. They would outsource or just leave it to private sector to collect waste at household and business level. NEMA, Kenya's National Environmental Management Authority, is licensing these private collection services as well as all other actors in the supply chain.

While focusing on the solid waste management chain in Kenya goes beyond the scope of this report, we highly recommend reading the Study on Plastic Value Chain in Kenya from 2021 that still maintains validity.[52]

> *Shouldn't an e-waste collector come by and take my WEEE, compensate me for it given it didn't just fall from the sky into my compound [but it produced costs of collection and sorting]? Can I declare my e-waste somewhere, so somebody comes by to collect?*
>
> ***— Solid waste recycler***

51 Sustainable Waste Management Act, No. 31 of 2022, Section 9. (2022). *Functions of County Governments. Kenya Law.* Retrieved 26.03.2025, from http://kenyalaw.org:8181/exist/rest//db/kenyalex/Kenya/Legislation/English/Acts%20and%20Regulations/S/Sustainable%20Waste%20Management%20Act%20-%20No.%2031%20of%202022/docs/SustainableWasteManagementAct31of2022.pdf

52 UNIDO. (2021). Study on plastic value chain in Kenya. *United Nations Industrial Development Organization.* Retrieved 26.02.2025, from unido.org/sites/default/files/unido-publications/2022-12/Plastic-value-chain-in-Kenya.pdf.

It is important to note that:

- In Kenya, there is mandated, but no enforced segregation of waste at source. This means that e.g. private households will not distinguish between organic waste, diapers, PET bottles, smaller WEEE items such as alkaline batteries, charging cables and lighting equipment, but even larger pieces such as toasters, blenders and extension cables.
- The contamination of waste means that fractions will be less likely recyclable, e.g. PET in Kenya has likely been contaminated and should thus not be used for rPET. Non-segregation at source has an implication on collection and the other way around: currently, solid waste collectors will come with one truck (with one loading space) to collect everything together. The waste will be sorted on the truck, with no to limited Personal Protection Equipment (PPE), into different waste streams and then offloaded or sold to aggregators or recyclers depending on the vertical integration of the value chain.
- Collectors who also function as recyclers will bring all of the solid waste to their facility. They may have sold off PET and other valuable fractions on the way if it makes financial sense to them. At the facility, all waste will be offloaded, sorted and then processed.

Since WEEE is made up largely of plastics, it is often sorted and processed as such. This can mean that e.g. blenders will be chopped up with other hard plastics fractions, and metal pieces will be chucked to the side. Larger WEEE and valuable items, such as copper cables and all other WEEE that find their way to the facility, could also be stored aside and sold off to WEEE collectors, cherry pickers, scavengers or formal WEEE handlers. This will depend on the cost incurred for collection, sorting and storage, and whether there is a fee to dispose of it (with formal WEEE handlers, including transport there), or whether somebody buys it off, approaching if not a profit, at least closer to a break-even. If broken down at the facility, WEEE's plastic fractions will join the respective hard plastics pile.

6.3.2.2. Formal WEEE Collection and Handling

Kenya currently has two formal WEEE handlers operating independently: Enviroserve and the WEEE Centre. Both entities collect waste from a range of sources, including companies, households, and designated collection points, and also allow for direct drop-offs at their respective facilities. Notably, their primary focus is on waste originating from companies and international organizations, with comparatively limited engagement with collection points. In most cases, companies pay for the disposal services provided by these formal recyclers, in which case a disposal at the facility of the paying company can be arranged.

6.3.2.3. Formal Disposal of WEEE

Currently, formal disposal of WEEE in Kenya is limited to landfilling or the export of WEEE and its dismantled fractions. There are no end-of-life treatment facilities for WEEE in Kenya or the broader Eastern African region. Landfilling remains a prevalent method for managing all waste streams.

In Nairobi, waste disposal practices, including those involving WEEE, are largely informal and loosely regulated. Waste handlers transporting materials to landfill sites typically know the appropriate dumpsite locations. Upon arrival, the process varies depending on the perceived value of the waste load. If a truck is identified as carrying high-value waste, such as from commercial sites or airports, the driver may be directed to a separate area within the dumpsite, where a negotiated payment is offered for the load. In such cases, the driver receives compensation on-site.

Conversely, if the load is considered non-valuable, such as general solid waste, the recycler is required to pay a disposal fee, typically around KES 1,200 per truckload. The driver must also negotiate a suitable dumping spot to avoid vehicle entrapment. Although a receipt for the transaction can be theoretically issued, this is not a standard practice. Waste loads are not subjected to inspection; instead, dumpsite workers assess the material's value based on experience and ensure the entire truck is emptied on-site.

A difference to the informal sector is that among formal WEEE handlers, there are players exporting hazardous fractions to existing end-of-life facilities in other countries, e.g. the United Arab Emirates. Since the costs of shipping and disposal as well as any export licenses, are incurred, the shipping container has to be balanced in goods: the valuable shipped fractions offset incurred costs of transport and disposal.

6.3.3. Processing Capacities & Materials Handled

6.3.3.1. Amounts handled

The two formal WEEE handlers in Kenya currently process approximately 240 tons and 135 tons of e-waste per year, respectively, a figure that has remained relatively constant over the last years. These capacity levels are a result of multiple factors, including availability and collection of feedstocks, focus on specific fractions, their ease of handling, market prices, labor availability and skills.

Both formal handlers employ a mix of permanent and casual workers, which allows them to scale operations quickly depending on the market dynamics. Notably both facilities have machinery and equipment that is underutilized (see chapter 5.2.3), showing potentially underused capacity.

Among general solid waste handlers who collect WEEE incidentally from the households, WEEE typically constitutes between 0.1% of their total waste streams. One leading appliance reseller with a customer take-back scheme handles between 60 and 84 tons of WEEE annually.

It is important to note that most actors do not maintain precise data logs of tonnage handled; estimates are primarily based on internal company knowledge and visual assessments. Moreover, WEEE streams include items that are repairable, some suitable for refurbishing or spare parts harvesting, making it more complex to estimate actual end-of-life waste volumes.

6.3.3.2. Products, Fractions, Materials handled

Products handled in the formal WEEE value chain, including those handled by handlers from solid waste management, are any product available on the Kenyan market reaching end-of-life or being of no use anymore to the consumer.

For private households, the WEEE will include any household appliances from TV, radio, blenders, extension cables, inverters, faulty chargers, lighting equipment and more. For rural households, solar lighting systems and lanterns are a form of WEEE.

For public institutions and government, the WEEE can include all types of IT equipment, but also lighting equipment, security equipment, and so on. For companies, it depends on their sector. Telcom companies will have larger WEEE from decommissioned telecommunications stations all over the country, for example.

Hence, the kind of WEEE is diverse in nature and unclear in amount present in the country today. The smallest common denominator of the WEEE is that when it comes to valuable fractions, it is commonly agreed that they are dominated by metals including copper, aluminium, brass, and stainless steel. These fractions can be locally smelted and re-used, and due to the value, the industry is controlled by the Scrap Metal Council, which gives licenses to country-wide scrap metal dealers.

Another commonality is various kinds of plastics, including PVC from e.g. charging cables, ABS from larger components, and polycarbonates (PC) from blenders, CDs, and others.

The same holds true for fractions that would not be classified as WEEE but find their way to handlers due to transportion; this is true for cardboard, which often represents a large fraction. Cardboard is locally picked up and recycled. The same is true for glass, which represents an opportunity for creating a recycling industry from that waste stream, but the value chain and aggregation of glass is currently underdeveloped. Furthermore, glass can have diverse compositions making recycling complex. With limited quantity to build up feedstock and limited to no awareness of use cases of recycled glass, the glass will currently find its way to the landfills.

The solar photovoltaic industry in Kenya is steadily growing and has outperformed expectations. An important factor to note is that this is a more recent development, which means that many sites have been commissioned in the last eight to ten years. This means that, at least for the larger Solar PV plants which are grid-connected, there is a (theoretical) WEEE management plan in place, whose cost, especially decommissioning, is also included in the cost calculation for power purchase agreements. For smaller C&I (commercial and industrial) installations that often are put in place for captive use, this may not be the case. Due to lower volumes, aggregation and storage would prove difficult. Additionally, C&I installations are present all throughout the country, making the collection difficult.

6.3.3.3. Machinery and Equipment in use

The following equipment is commonly in use among Kenya's two formal recyclers, with estimated utilization rates over a given time based on internal operator assessments:

Plastic shredder	5-10%
Cable Granulator	10%
Battery Testing (running at full capacity):	100%
Hard Disk Shredder	15%
Cable shredder:	5-10% at one of the handlers and 10-20% at the other
Battery analyzer & balancer for lithium-ion batteries	90%
ABS plastics shredder	10%
CRT cutter	10%
Proper toolboxes incl. specific screwdrivers and pliers, as well as hammers.	

Table 8: Commonly used equipment by formal recyclers in Kenya.

Proper toolboxes incl. specific screw drivers and pliers, as well as hammers. Preprocessing is done for better output, such as manual cable stripping before granulation to separate PVC from copper for better sorting and spot welding for batteries.

For solid waste handlers who are not specialized in WEEE and come across WEEE incidentally, tools and methods are rudimentary. Equipment may include pangas (a knife similar to a machete) and hammers to dismantle WEEE with plastic fractions.

Figure 19: Cable granulator at Enviroserve

For resellers of appliances, either for household or for the off-grid solar sector, they often have customer service centers where EEE will be repaired, dismantled for spare parts or declared as end-of-life or dead-on-arrival. These service centers have all equipment usually used for maintaining and repairing EEE, like: drills, multimeters, irradiance meters, thermal cameras, glue guns, blowers and air dusters, automatic battery testers and oscilloscopes. The goal of the handlers is often to keep the machinery and equipment as easy to maintain and repair as possible, preferring low-tech and in-house technicians for this work. Some observed plastic shredders have a good 20 years of lifespan.

However, the above-mentioned Lithium-ion machine is not easy to repair, which means a dependency on international technicians and dependency on stable internet connectivity.

6.3.4. Revenue Models and Pricing

6.3.4.1. Fractions that Create Value

Most valuable materials include metals, mostly copper, brass, hard and soft aluminium. Printed Circuit Boards and cables belong to revenue-making WEEE, followed by car batteries (which are mostly lead-acid batteries) which even have a take-back scheme from the manufacturers in Kenya of between 80 and 100 KES per kg. Due to increasing volumes of battery testing and clear use-cases for second-life batteries, this previously problematic, non-value fraction is turning into a profit opportunity.

Figure 20: Dismantling of Battery Packs at Enviroserve

6.3.4.1. Fractions that Create Losses

For formal WEEE handlers, they charge mostly companies a disposal fee. This is for example the case for solar panels, which are charged to avoid losses, and the same for printers. Items with small screens, phones and lithium-ion batteries all have high processing costs that are most likely not recovered.

One formal WEEE handler mentioned that they would prefer to handle problematic and hazardous fractions for companies who pay for this disposal, and make sure the fractions are dismantled and exported for end-of-life disposal, if the related processing, transport, shipping and disposal costs are offset by the fees charged. The handler sees their value in handling those fractions that don't create revenue for others.

However, when shipping WEEE for end-of-life disposal out of the country, a container has to be balanced in costs and revenues. This means: The container cannot be filled solely with solar panels, which represents a negative business case, but the amount must be offset with, for example, motherboards that create value. Motherboards and the extraction of its precious fractions cannot be handled in Kenya (yet), which is why they are exported. This enables the export and break-even of costs for disposal of problematic fractions.

For formal solid waste handlers who find themselves with WEEE, larger WEEE creates losses since it is end-of-life. Even if there would be potential to harvest, the solid waste handlers lack the equipment, space and time to do so. So, most WEEE creates losses since the collection, transporting, sorting and disposal costs are not offset with financial value created from those smaller amounts of valuable fractions, and storage space for aggregating and selling in bulk to traders is lacking.

Currently, there is no end-of-life disposal in Kenya and costs to dispose hazardous materials in other countries, such as the UAE, have to be covered by e.g. a company paying a formal WEEE handler to dispose.

6.3.5. Business Networks and Partnerships

An important operational dynamic observed among formal WEEE and solid waste handlers in Kenya is the strategic interaction with external business partners, both formal and informal, to manage and dispose of waste fractions that are either non-valuable, hazardous, or economically infeasible to process. These fractions, often termed "unhandleable," represent a consistent cost center within the e-waste management ecosystem. To mitigate financial strain and optimize operational capacity, handlers engage in offloading such fractions through a network of recyclers, exporters, aggregators, and informal actors.

Among the fractions most diverted are cardboard and glass, particularly hardened or tempered glass derived from screens, scanners, and other consumer electronics which are disposed of locally. While glass is currently used only rarely as additional material for recycled posts or other construction material, cardboard has a stronger positive business case and can be sold for 12 to 15 KES per kilogram. Glass for specific recycling use gets processed in formal ways, however the majority of it will be landfilled. Companies like Taka Taka Solutions, a solid waste management company that operates a vertically integrated model, also collects and sorts glass waste and repurposes it into new glass products.

Cardboard is a more informally structured recycling sector, meaning it could be sold off to handlers in the informal space. Interestingly, the formal WEEE and solid waste sector don't only have interactions with the informal sector upstream, but also downstream in the supply chain. This means that certain dismantled and collected fractions will be processed formally, and then they could be channeled back into informal networks for specific use cases or to eventually be disposed, if not disposed of directly by the formal handler.

Printed circuit boards cannot be harvested and/or recycled locally, thus are collected by aggregators and eventually exported to various regions and countries including Turkey, EU, Singapore and United Arab Emirates where all different qualities of PCBs can be processed. PCBs are collected through all stages within the value chain, including from landfills. Industry experts suspect that the absolute majority of PCBs are exported without a license from NEMA. Since PCBs generate good revenue and "fast cash", without serious enforcement, these movements are likely to continue.

For cables, formal WEEE handlers have machinery to shred or even granulate and to sell off the PVC and the copper fractions, respectively, to local handlers. The copper will be sold off, together with other metals, to scrap metal dealers with a license from the Scrap Metal Council. While aggregating metals and selling bulk quantities off with ultimate objective of local smelting, the reality is that mostly smaller, weekly quantities will be sold off to traders and collectors to generate liquidity. When it comes to solid waste handlers that will find cables in their collected waste, they will put them to the side. The cables will either be sold off to formal and informal collectors who process them further, or the handlers will be burning the cables themselves to harvest copper and generate quick revenue.

Figure 21: WEEE for shipment to Dubai for end-of-life disposal at Enviroserve

Challenges arise with all non-valuable, negative value and hazardous fractions at the level of solid waste recyclers. These products produced costs of collection and sorting but have no obvious market value. For ABS plastics, few handlers will know that clean ABS plastics can be sold to specialized recyclers. Mostly, handlers don't want or cannot incur further costs of transport by bringing it to recyclers, since they may not be compensated for the WEEE brought in. However, also landfilling the WEEE produces costs. Currently, most handlers treat those fractions as a clear negative business case whose cost has to be subsidized through profitable fractions. The transparency of how high that cost is, is in all likelihood not evaluated internally.

Furthermore, there is a legislative gap for solid waste handlers, as they are by regulation not allowed to handle WEEE if they do not have a license, but they will not get or want to apply for that license. So, the likelihood of numbers being reported and the likelihood of proper disposal of WEEE is further diminished.

6.3.6. Challenges of Formal WEEE Sector

The formal WEEE sector in Kenya faces several challenges limiting its growth and operational efficiency. A core issue is the lack of collection systems and incentives for companies and households to properly dispose of electronic waste, resulting in low and inconsistent feedstock availability. Public procurement practices worsen this, as end-of-life equipment is often expected to generate revenue instead of being budgeted for decommissioning and disposal. Without a stable, reliable feedstock supply, it becomes difficult to justify investments in new business lines like glass recycling or specialized processing, stalling sector growth.

An infrastructure gap further constrains the sector. While formal handlers have access to basic tools suh as cable strippers, they struggle to acquire modular, low-tech equipment suited for Kenya's landscape. Global OEMs typically offer large, high-cost machinery incompatible with low feedstock volumes, limited capital, and a shortage of skilled technicians for maintenance. The lack of appropriate, scalable equipment limits local WEEE processing, forcing costly exports and missing opportunities for domestic value creation. Strengthening local value chains and minimizing export volumes would reduce disposal costs abroad.

Limited storage space is another key constraint. Insufficient storage prevents companies from aggregating enough feedstock to efficiently utilize machinery, driving up operational costs. Addressing this would improve feedstock volumes, enhance machinery efficiency, and make it economically viable to process specific fractions locally, reducing reliance on external processing and retaining more value within the country.
A significant skills gap persists across the sector, particularly in handling specific WEEE fractions. Formal players like WEEE Centre and Enviroserve depend heavily on internal training and occasional donor support for capacity development. Additionally, a lack of standardized WEEE handling practices, especially for second-life batteries, creates uncertainty. Without clear lifespan or quality standards, product performance varies, undermining consumer trust and hindering market development for second-life products. Poor product experiences risk reputational damage for the entire sector.

The sector also lacks access to structured market data, equipment specifications, revenue models, and processing information. Even formal operators remain relatively invisible, limiting their ability to build partnerships. Improper handling of valuable or hazardous fractions due to information gaps results in lost revenue and environmental risks. The absence of clear data contributes to inefficiencies: solid waste handlers not licensed for WEEE often receive it due to poor segregation at source. With neither technical capacity nor financial incentives, like the required KES 100,000 annual license, these handlers seldom manage WEEE properly, adding to the sector's opacity and hindering feedstock aggregation for formal handlers.

Once WEEE enters the informal sector, traceability is lost. There's no clear data on how specific fractions are processed or disposed of, nor on the volumes of WEEE imported and exported. Without a national tracking mechanism, sector planning and policy development remain hampered. The value chain is untracked, undermining the potential for a structured, scalable formal WEEE sector.

Overall, the sector lacks funding to invest across the complete WEEE value chain. The informal sector will likely continue focusing on repair, harvesting, and dismantling for valuable fractions. In contrast, the formal sector could address end-of-life disposal and hazardous waste gaps — but this will require financial support. A structured Producer Responsibility Organization (PRO) could coordinate investments, responsibilities, and subsidies across the value chain. In the long term, costs must be shared by producers, importers, and companies seeking formal disposal of their WEEE through a PRO-led infrastructure capable of capturing all relevant fractions.

6.3.7. Recommendations from the Formal Sector

Foster Collaboration Between Formal and Informal Sectors: Instead of operating in competition, formal recyclers could benefit from structured collaboration with the informal sector. Training programs and formalization pathways should be established to

> *I am not even licensed to handle paper, medical waste or WEEE, but we cannot keep them from coming, if there is no segregation at source. Better would be to be allowed to handle these fractions.*
> ***— Solid waste recycler***

integrate informal collectors and dismantlers into the regulated system, especially with a focus on safe handling of non-valuable and hazardous fractions. Given the sector's heavy reliance on word-of-mouth, targeted training and awareness campaigns could also map out formal actors—highlighting their services, locations, and purchase prices—to foster more transparent and efficient material flows between the formal and informal sector. This integrated approach would enhance overall recycling rates while minimizing environmental and health risks.

Invest in Skills Development and Specialized Training: The formal WEEE sector faces a significant skills gap, particularly in handling specialized fractions such as second-life batteries and in executing complex dismantling processes. Most companies rely on informal, on-the-job learning. To address this, structured training programs should be developed in partnership with technical institutions, supported by grants or public-private initiatives. These programs should not only cover technical handling and safety procedures but also include financial and business training to enhance operational efficiency and sustainability among recyclers.

Strengthen Collection and Supply Chains: A key challenge for the formal WEEE sector is the inconsistent supply of electronic waste. To increase feedstock volumes, efficient collection systems should be established supported by public awareness campaigns and take-back schemes coordinated with retailers or manufacturers. Partnerships with local governments and businesses can further enhance collection infrastructure and logistics, ensuring more consistent and traceable material flows to formal recyclers.

Develop Local Recycling and Processing Capacity: Due to limited local processing capacity, formal recyclers export specific e-waste fractions, reducing profitability and value retention. Strategic investment in domestic recycling infrastructure, such as specialized material recovery plants and end-of-life facilities would improve local processing capabilities and improve the profitability of local recyclers. Public-private partnerships could facilitate the development of such infrastructure, particularly for non-valuable and hazardous fractions that lack a viable business case. To ensure financial sustainability, such facilities may require subsidies, for example through an Extended Producer Responsibility (EPR) scheme. A regional approach to such infrastructure should be considered, capturing feedstock beyond Kenya's borders to justify capital and operational costs. A thorough feasibility and necessity assessment of a regional end-of-life facility is essential prior to investment as the capital investment and especially operational cost may not be sustainably covered.

Diversify and Optimize Revenue Streams: Formal recyclers face financial strain due to high processing costs and competition from the informal sector. To improve revenue streams, companies should expand into value-added processing as seen with batteries repurposing and establish partnerships with manufacturers for direct material sourcing. Additionally, integrating waste fractions that have emerging markets, such as glass or plastic recycling, can diversify revenue and boost feedstock volumes.

Align Investments in Machinery with Feedstock Availability: While investment in advanced machinery can enhance processing efficiency, such investments must be carefully aligned with feedstock availability and storage capacity. Current limitations in both areas make large-scale equipment acquisition financially risky. Formal recyclers should first focus on securing stable supply chains and adequate storage solutions. Where consistent streams exist, such as in solar panel recycling or battery refurbishing, modular, low-cost processing technologies should be prioritized. This approach reduces export dependence, optimizes capacity utilization, and improves cost-efficiency.

Improve Data Collection and Transparency: Accurate and reliable data on e-waste generation, collection, and recycling rates is essential for effective decision-making, policymaking and sector development. A centralized digital e-waste database could be established, requiring regular reporting from formal recyclers. This data would help actors to track progress, highlight sector gaps, enhance traceability and transparency on lack of data available on the WEEE sector in Kenya. This will not only support the handlers, but also potentially the development of EPR schemes. Improved data availability would also benefit regulators in implementing and enforcing supportive legislative frameworks, support transparency, and enable evidence-based planning to strengthen Kenya's WEEE sector.

Enhance Public Awareness and Consumer Participation: Consumer behavior plays a crucial role in WEEE management. Many consumers are unaware of the environmental and legal implications of improper e-waste disposal. Targeted awareness campaigns, incentives for proper disposal, and partnerships with educational institutions can encourage responsible e-waste disposal and drive more waste towards the formal sector.

Improve Financial Incentives for Formal Recyclers: Formal recyclers face financial challenges due to high operational costs and competition from the informal sector. Introducing subsidies, tax benefits, or access to low-interest loans would support the sustainability of formal businesses. Additionally, incentivizing manufacturers to work with formal recyclers through extended producer responsibility (EPR) mechanisms would increase the volume of WEEE processed legally.

6.4. WEEE Collection Case Study

As part of the WEEE Value Chain Study, a pilot collection of Waste Electrical and Electronic Equipment (WEEE) was carried out at the AHK (Delegation of German Industry and Commerce in Kenya) office. The aim was to assess the collection, categorization, and dismantling processes, and to map the flow of materials across the WEEE value chain in a real-life office setting. Furthermore, this case study aimed at observing internal processes of letting WEEE go and how to incentivize and make staff aware of the necessity of a WEEE collection. The collection ran from 13th November 2024 to 28th February 2025, targeting WEEE generated by the office and its staff of 30 people. This took place with the subcontractor Minimise, a German start-up that allows for full traceability on their online portal. Minimise enables documented, environmentally sound e-waste recycling and provides impact data to partner companies through its central data platform, for which AHK received log-in data to get full insights into the dismantling outcomes.

Figure 22: WEEE Collection at AHK Offices, Kenya

130.7 kg
Total Collected Weight

12
Number of Product Categories

Highest
Contributing Item: Printers (accounting for the largest weight share)

6.4.1. Overview of Collected WEEE

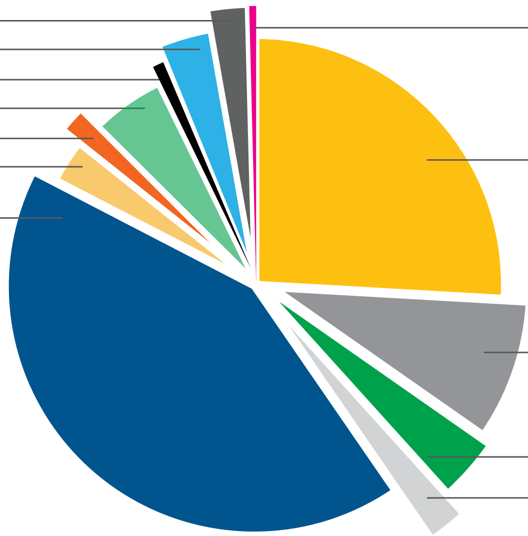


Figure 23: Weighted share of total input by category

6.4.2. Material Outputs from Dismantling

Minimise contracted Enviroserve to collect and dismantle the WEEE. Enviroserve brought the collected items to their facility in Nairobi, where they followed their usual dismantling processes. The dismantled components resulted in 17 output categories set by the recycler, weighed during the dismantling, inserted into the data platform and made visible to the customer, reflecting the varied nature of recoverable materials in typical electronic waste. The top three output materials by weight were: Steel Alloys with 40.4 kg, ABS Plastic with 34.8 kg and lead-acid batteries with 15.1 kg.

Output Item	Weight in Kg
Mixed Waste	9.8
Lead-Acid	15.1
ABS	34.8
Brass	0.1
Lamps	0.2
Motors	0.3
Alkaline	0.6
Electrical Components	0.6
Glass	0.7
Aluminium	1
Other	2.3
Li-Ion	2.8
Transformers	3.3
Copper	3.8
Circuit Boards	6.1
Wiring Cables	8.8
Steel Alloys	40.4

Table 9: Material output categories.

6.4.3. Source and End Destination of Key Materials

- Lead-acid Batteries (15.1 kg) were collected as a single batch, mainly sourced from Uninterruptible Power Supply (UPS) systems. These were handed over to agents of ABM, a lead-acid battery facility in Kenya.
- ABS Plastic (34.8 kg), commonly used in printer housings and electronic casings, was sold to a broker. The broker is responsible for sourcing clients interested in processing or repurposing the plastic for secondary use.
- Steel Alloys (40.4 kg), which formed the largest weight share, were primarily recovered from the internal frames and casings of printers. These were directed to local recyclers for processing and resale into the metal industry.

6.4.4. Summary

Overall, the collection scheme has shown all those topics that the overall research of the sector reflects. The procurement and finance departments were more than just hesitant to let go of not-repairable items such as printers, hoping that the item would still generate revenue. The awareness amongst staff for the collection scheme and the importance of collecting WEEE was subject to many short presentations and small campaigns during team meetings. On the actual items collected and the output materials, it showed that the WEEE of a standard office setting in Nairobi is quite diverse, as are its output materials. All in all, the traceability on the online portal, and the ease and speed of the actual collection and dismantling has been higher than anticipated and generated positive response in the office for various environmental management policies and general awareness of the topic. The case study highlights the need for awareness campaigns and also action leaders within organizations to drive such initiatives forward.

7. Business Case Development and Improvement

Chapter 7 presents identified business cases and strategic improvement opportunities for WEEE management in Kenya, aiming to strengthen operational models, increase resource recovery, and enhance financial viability across the sector.

7.1. Identified Business Cases

The identified downstream operations along the WEEE value chain in Kenya are displayed in Figure 25. They can be separated into four main clusters representing four business case areas.

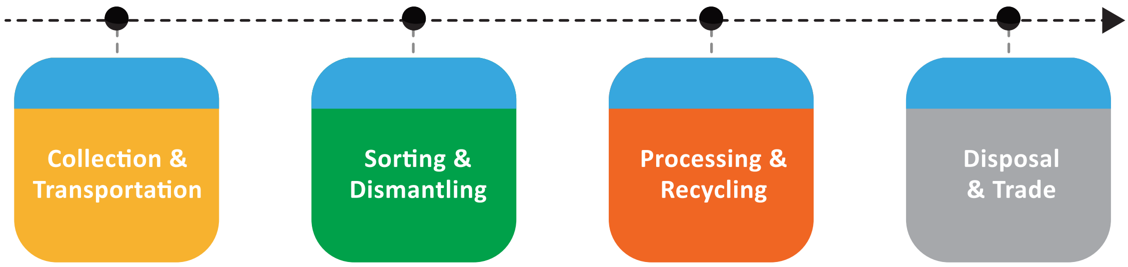


Figure 24: Identified and clustered downstream operations along the WEEE Value Chain in Kenya

The following subchapters describe the gaps and opportunities for each cluster that were identified and analyzed in relation to its applicability.

7.1.1. Collection and Transportation

7.1.1.1. Task Definition and Cluster Description

This cluster focuses on gathering WEEE from various sources, households, businesses, and informal collectors, and moving it to processing facilities. Tasks include setting up collection points, coordinating logistics (e.g. reverse logistics or mobile units), and ensuring cost-effective transport, especially across Kenya's diverse rural and urban landscapes.

7.1.1.2. Identified Gaps and Challenges

Decentralized rural collection areas in northern Kenya face long transport distances, resulting in high logistics costs. In contrast, the densely populated south has mountainous terrain, which similarly drives up transportation expenses.

The average household income in Kenya is relatively low, with a financial health gradient that improves from north to south, making it unfeasible to implement waste transport fees in rural regions. Additionally, there is a lack of Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)-compliant collection containers for WEEE and batteries.

7.1.1.3. Identified Opportunities

Well-established local waste management companies, such as Taka Taka Solutions, could integrate e-waste collection into their daily operations, thereby expanding their service offerings. This enhancement could elevate their reputation as leading service providers in the waste management industry. The additional transportation costs for handling WEEE could be offset by support from the local Producer Responsibility Organization (PRO).

Reverse logistics systems could be introduced, enabling logistics companies that deliver consumable goods to northern Kenya to collect WEEE containers and transport them back south, minimizing empty return trips. Digital applications could connect trucks with available capacity to collection point managers, streamlining the handover of waste bins. The logistics companies could receive compensation for their services through the PRO. Collecting and transporting valuable waste streams alongside low-value WEEE can help balance the costs of managing WEEE. For example, lead-acid batteries and toner cartridges, which have significant resale value due to recyclable materials like lead, are profitable. By pairing these high-value items with negative-value fractions, such as fluorescent tubes that require expensive, specialized disposal, recyclers can develop a more financially viable business model.

Given the shortage of WEEE-specific waste collection bins in Kenya, there is a business opportunity to supply ADR-compliant waste bins for WEEE and batteries. Providers could enter the market if the PRO establishes regulations mandating certified containers for the collection and transportation of WEEE and batteries. Manufacturing these bins locally in Kenya could further generate economic value within the country. Additionally, given the diverse range of WEEE in Kenya, including lamps, batteries, solar panels, and large equipment, specialized collection containers of varying sizes and specifications are needed. This creates business opportunities for container production and retail.

Retailers selling EEE and batteries in Kenya could be incentivized to serve as collection points if the PRO offers payments based on the weight of WEEE collected. This approach could boost the formal collection of WEEE while raising public awareness about WEEE. Digital tools could notify retailers when collection containers are full, improving efficiency.

The team identified a business opportunity to provide a service for enhanced tracking of second-hand EEE shipments entering the country, ensuring their safe transport to designated locations. This could primarily target Business-to-Business (B2B) EEE transactions.

Kenya's high level of digital penetration among the population and businesses offers an opportunity to implement digital solutions for optimizing collection and logistics planning. Digital service providers could develop infrastructure that encourages stakeholder participation and collaboration, while ensuring compliance with PRO regulations.

7.1.2. Sorting and Dismantling

7.1.2.1. Task Definition and Cluster Description

This cluster involves categorizing collected WEEE into distinct fractions (e.g., batteries, PCBs, plastics) and breaking down complex devices into manageable components. Tasks include manual or mechanical sorting to separate hazardous from valuable materials, as well as dismantling larger items like appliances or ICT equipment to prepare them for further processing.

7.1.2.2. Identified Gaps and Challenges

The absence of source separation results in valuable WEEE being lost to landfills and the informal sector. It also causes contamination of valuable materials with organic matter, accelerating corrosion and polluting waste streams.

7.1.2.3. Identified Opportunities

PROs like EPROK could establish buyback programs with the informal sector to enhance the number of incoming materials and offer higher prices for unprocessed devices. This would discourage and prevent informal workers/actors from preprocessing WEEE under unsafe and environmental unsound conditions.

PROs like EPROK could create a nationwide treatment standard and certification system in Kenya to elevate waste processing quality and ensure environmentally friendly downstream operations. This standard could also include personal protective measures for waste handlers to bolster human health safeguards.

The Kenyan government should increase the enforcement Extended Producer Responsibility (EPR) regulations to strengthen financing mechanisms for downstream operations. This could boost collection rates by funding awareness campaigns and improving take-back systems.

7.1.3. Processing and Recycling

7.1.3.1. Task Definition and Cluster Description

This cluster centers on transforming sorted WEEE components into reusable raw materials or refurbished products. Tasks include shredding, chemical extraction, or smelting to recover metals (e.g., copper, gold), recycling plastics like ABS, and refurbishing devices such as phones or printers, all while adhering to environmental and safety standards.

7.1.3.2. Identified Gap/Challenge

Insufficient or underutilized treatment equipment. Lack of standards related to the refurbishment and repair of EEE.

7.1.3.3. Identified Opportunities

A promising business opportunity involves renting out GPS-tracked processing equipment to informal collectors or formal companies to produce higher-quality secondary raw materials that command better market prices. This equipment could be mounted on a mobile truck and brought to specific locations where informal collectors can process their collected WEEE for a fee. Alternatively, it could be leased at decentralized recycling hubs, available for reservation by informal collectors or formal companies for a designated time period.

Another viable business case is to offer a safe workspace for informal collectors, enabling them to process their waste fractions to the highest treatment and safety standards. This setup could include proper safety equipment, along with additional services such as storage space and buyback options for the processed waste fractions.

An additional opportunity lies in enhancing or specializing refurbishing activities across Kenya to meet elevated quality standards and increase consumer confidence in refurbished devices. This approach could bolster the market and extend the lifespan of EEE. To support this, PROs like EPROK could introduce a Kenyan certification for repair and refurbishing workshops, enhancing their reputation and market standing.

7.1.4. Disposal and Trade

7.1.4.1. Task Definition and Cluster Description

This cluster manages the end-of-life treatment of non-recyclable or hazardous WEEE fractions and the trade of recovered materials. Tasks include safe disposal of residuals (e.g., mercury-containing lamps, lead-glass) in compliant facilities, as well as selling recycled metals, plastics, or refurbished goods to local or international markets, ensuring economic value is captured.

7.1.4.2. Identified Gaps and Challenges

Insufficient funding to dispose of hazardous or low-value materials in an environmentally responsible way.

Lack of expert knowledge to differentiate between WEEE and second-hand products in trade hubs like Mombasa harbor.

7.1.4.3. Identified Opportunities

The downstream processing of hazardous waste streams represents a viable business case, but it hinges on consistent funding from PROs like EPROK to reimburse operators for their services. Without guaranteed financial support, no business will emerge in such an uncertain market environment.

PROs like EPROK could establish an expert center at the Port of Mombasa and along key inland import routes to assist customs officers in differentiating WEEE from reusable items. This initiative could enhance the quality of second-hand products entering the Kenyan market while preventing the illegal influx of WEEE into the informal recycling sector.

Environmental authorities could reach out to the regional centers of the Basel Convention or Stockholm Convention and propose projects that are eligible for Small Grant Programme (SGP). SGP seeks to provide opportunities to implement selected activities from their business or work plans.

7.2. Improvements for WEEE-Management

The following table gives an overview of certain WEEE fractions and possible strategies to improve the quality of their WEEE management:

WEEE-Fraction	Improvement Strategy
ABS-Plastics	Improve sorting of ABS according to color and chemical composition to increase the quality of the waste stream. Especially ABS waste containing brominated flame retardants should be sorted out to increase the purity and the price. Expensive XRF-or NIR-technology using handheld devices can support the sorting process. Low-tech sorting through Sink-Float Separation can also be implemented.
Batteries	Improved and professionalized battery sorting process increases the value of the waste fraction and reduces safety risks as batteries with high reactivity are sorted out. The process also ensures transport safety.
Solar Panels	Improved sorting of solar panels according to chemical system improves the purity of the waste stream and increases the chances of off-takers. A long-term strategy could be to implement a Kenyan recycling process for solar panels, but it needs a high mass flow to make it economically feasible.
Lamps	Lamp recycling processes are usually a negative business case without the incentive of downstream operation through PROs. For Mercury containing lamps, there might be a funding option through the Minamata Convention or via the Global Environment Facility (GEF) they are connected to several multilateral funds aiming to implement sustainable projects worldwide.
Cooling Devices containing CFCs	CFCs containing cooling devices were phased out of the market since the adoption of the Montreal protocol in 1987, giving developing countries time until 2010. But this means that CFC containing devices might still be in use up to now. A U.S.-based company previously offset carbon credit costs for refrigerant destruction in a project in Guatemala through a voluntary carbon credit mechanism. Similar business opportunities could be explored, Alternatively, funding opportunities could be explored through the GEF or Montreal Convention Regional Centres. However, it is important to note that most of these funding mechanisms require co-financing from the project countries.
Information and Telecommunication Technology (ICT)	As already touched on in chapter 7.1.2, standards related to the refurbishment and repair of ICT equipment set by PROs like EPROK could improve the market quality, increase the life of the devices, and trust of consumers in second-hand devices, also making it possible for refurbishment and repair companies to charge higher prices for the devices.
Printer Cartridges	Printer cartridges (toner and ink) are a special WEEE-fraction that should not be neglected or forgotten when compiling an EPR legislation. These cartridges have a well-established circular economy that includes a worldwide network of collectors, aggregators, and refurbishers. Including printer cartridges under the umbrella of an EPR system could increase collection activities in Kenya. Additionally, downstream operation for the treatment of non-refillable toner cartridges that pose a significant risk for human health and the environment due to the fine powder they contain at the end of their life is an option that is only feasible through compensation through an EPR system.
Printed Circuit Boards (PCBs)	PCBs are a waste fraction that contains a high number of valuable metals. In a computer, one of the valuable parts is considered to be PCBs. But due to economic and technical development newer generation PCBs contain a lower amount of these valuable metals. Therefore, a pre-sorting according to the age of the device or the origin of the PCB can increase the value of the PCB fraction. A low-tech approach, such as workers visually inspecting the categorizing PCBs into three fractions: High-Grade PCBs (from IT equipment like servers and smartphones), Medium-Grade PCBs (from consumer electronics like TVs or printers), and Low-grade PCBs (from small appliances and toys).

WEEE from critical sources	To secure a society's safety and prevent environmental contamination the regulatory body, PROs like EPROK should enforce that no WEEE from military institutions or the hospital sector ends up in the informal waste stream. Examples like the "Goiâna incident" in Brazil should by all means necessary be prevented. During the incident a container with radioactive material from a radio therapy device was stolen and dismantled by informal actors which caused one of the most awful nuclear disasters in history.[53]
CRT-TV	CRT-TV dismantling requires a special setup to prevent lead contamination.

Table 10: Overview of different WEEE fractions and their improvement strategies

Generally, once Extended Producer Responsibility (EPR) regulations are enforced and a stable framework is established for investors and operators, the downstream market for WEEE is likely to develop. Key factors include securing funding for handling negative-value operations, ensuring a consistent input mass flow to maintain steady utilization of processing equipment, and fostering collaboration among stakeholders like PROs, recyclers, and informal collectors. Each WEEE fraction typically requires its own downstream process due to its unique material composition. Individual processes can be identified for the following WEEE fractions and parts:

1	ABS-Plastics	**9**	Medical Devices (diagnostic tools etc.)
2	Air Conditioners	**10**	Printed Circuit Boards
3	Batteries (Lead-acid, Lithium-Ion, NiMH, Etc.)	**11**	Printer Cartridges
4	Cables and Wires	**12**	Refrigerators
5	CRT-TVs	**13**	Small Household Appliances (toasters, kettles, toys etc.)
6	Displays	**14**	Small ICT-Equipment
7	Lamps	**15**	Solar Panels
8	Large Household Appliances (washing machines, etc.)		

Table 11: WEEE fractions and parts

In Kenya, the scalability of WEEE management varies by process: advanced techniques like CFC extraction and mercury recovery may necessitate centralized facilities, while simpler processes, such as cable and plastic recycling, can build on decentralized or informal systems with appropriate upgrades. Additionally, components like batteries and PCBs often appear across multiple fractions, such as ICT equipment and toys, yet their downstream processing remains consistent, typically requiring separate handling within larger devices to ensure efficient recovery or safe disposal.

53 **Nuclear Energy.** (n.d.). *Goiânia accident, Brazil.* Retrieved 23.04.2025, from https://nuclear-energy.net/nuclear-accidents/goiania-brazil

7.3. PRO Integration Improvement

PROs like EPROK play a key role in the WEEE management sector in Kenya and has significant potential to enhance the WEEE management landscape. The following key topics could be addressed by PROs to improve and scale up the WEEE management landscape in Kenya.

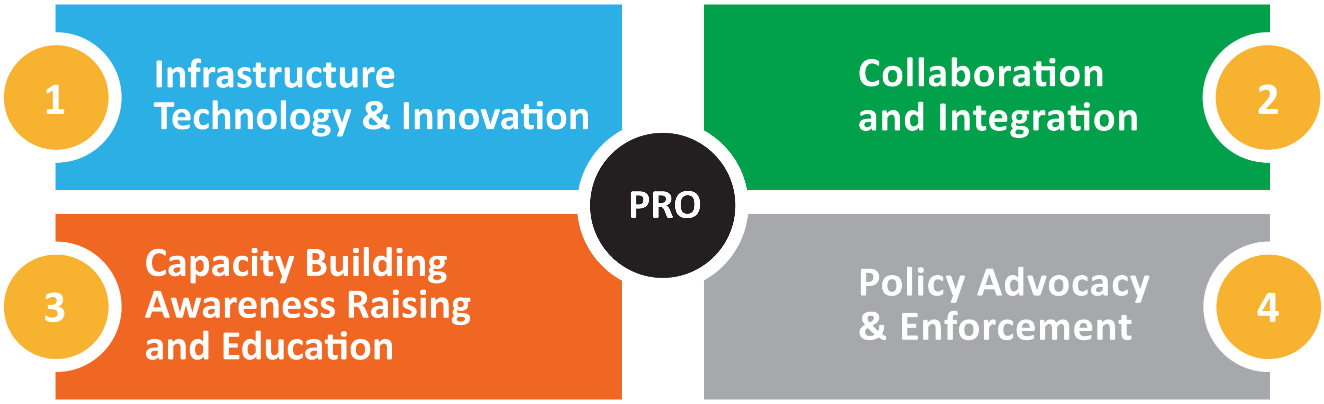


Figure 25: Main topics to be addressed by EPROK to improve PRO integration.

1. Infrastructure, Technology, and Innovation

- Collection network expansion: expand the collection network for WEEE across rural and underserved areas to increase accessibility
- Mobile collection units: Implement mobile collection units where stationary collection points are not feasible to reach remote areas. This makes it easier for households and small businesses to dispose of their WEEE responsibly. Offer the pickup service for free.
- Recycling facility investment: when EPR regulations are enforced and market stability is reached, partner with private investors or international donors to scale up recycling capacities for WEEE.
- Refurbishment programs: Develop refurbishment standards and scale up refurbishment activities to extend product lifecycles and enhance trust in second-hand products.
- E-waste mapping: Use geo-information system and material flow models to identify WEEE hotspots to improve collection infrastructure and develop optimized collection routes. Identify areas where mobile collection is more reasonable by combining material flow data with economic calculations.
- Digital tracking: Increase usage of digital platforms/apps amongst consumers to improve participation and transparency. This could also improve route planning for mobile collection units, if consumers are able to schedule pickups digitally.

2. Collaboration and Integration

- Engage the informal sector: Improve relationship with informal sector by offering training, safety equipment and stable payment structures to reduce hazardous practices.
- Partner with other PROs: Exchange ideas with other PROs abroad or in Kenya to align strategies and improve practices within the organization.

3. Capacity Building, Awareness and Education

- Public campaigns: Increase awareness raising campaigns across Kenya to educate broader public about dangers of improper WEEE treatment.
- School programs: Introduce environmental education related to waste management in schools and universities to multiply awareness. Set up collection competitions amongst public bodies to increase collection rates and spread awareness.
- Corporate Outreach: Target businesses and importers of WEEE to emphasize benefits of joining PROs like EPROK.

4. Policy Advocacy and Enforcement

- Government Synergy: Work closely with NEMA to enforce EPR regulations, secure funding and discuss tax incentives to improve economic feasibility for recycling activities.
- Standardize practices: Advocate and develop national standards of WEEE management to ensure consistency and safety in the sector.
- Data collection: Improve data collection to measure WEEE volumes, EEE put on the market, collection rates and recycling outcomes. Use the data to refine policies and attract international investment and funding.
- To enhance the integration of PROs like EPROK in Kenya's WEEE sector, robust EPR regulations, strengthened financial capacities, and high-quality standards are critical pillars for building a resilient, self-sustaining circular economy. Only through their cohesive collaboration can thriving WEEE management practices be achieved. PROs play a central role in the development of economically, environmentally and socially sustainable downstream processes for WEEE in Kenya.

7.4. Case Study Identification

For this chapter, desktop research was conducted to investigate case studies worldwide that were implemented in the WEEE sector to improve the status quo and support a transition towards formalized WEEE management with eco-friendly downstream processes. During this process, three case studies were identified that could be implemented or mirrored in Kenya. The results are presented in the following subchapters.

7.4.1. Case Study 1: Chintan Environmental Research and Action Group: Transforming E-Waste Management in Delhi

7.4.1.1. Background: India's E-Waste Crisis

India, the most populous country globally, generated over 3.23 million tons of e-waste in 2019, making it the world's third-largest WEEE producer.[54]

In New Delhi, the capital city with over 20 million residents, WEEE management has historically been informal, unregulated, and hazardous. Operating without oversight, informal waste pickers often resort to dangerous methods like open burning and acid baths to extract valuable materials from discarded electronics. These practices pose severe health risks and environmental pollution.[55] Additionally, the lack of formal collection systems resulted in significant WEEE being dumped in landfills or inefficiently recycled, leading to resource loss.

Chintan Environmental Research and Action Group (Chintan), a Delhi-based NGO, has tackled India's WEEE crisis since 2007 by integrating informal waste pickers into formal recycling systems. Operating in Delhi, Chintan aims to create sustainable WEEE management practices that reduce environmental harm and improve livelihoods.[56]

7.4.1.2. Approach and Interventions

Chintan's strategy for sustainable waste management[57] integrates policy advocacy, stakeholder collaboration, and informal sector community improvement,[58] making Chintan's initiative inclusive and sustainable.

Chintan actively participated in Government regulations review committees and contributed to India's E-Waste Management Rules in 2012 and their revision in 2016, shaping regulations for safer WEEE handling and inclusivity in legislation.

In 2012, Chintan became the first NGO to secure an WEEE collection license from the Delhi Pollution Control Committee, thus bridging the gap between formal/government entities and the informal sector.

Chintan collaborates not only with well-known local recyclers like Attero and TES-AMM to ensure environmentally sound recycling but also with itinerant buyers and small scrap dealers.

Through Safai Sena, an informal labor union cooperative of over 12,000 waste pickers, Chintan trains workers in safe WEEE handling and provides legal ID cards for better access to WEEE sources.

Chintan offers waste pickers fair compensation based on WEEE quality and quantity, supported by collection offices and vehicles.

Chintan runs education centers for waste pickers' children and training programs like 'Scavengers to Managers' to enhance skills.

7.4.1.3. Outcome

Chintan's waste management initiatives demonstrate a structured and inclusive approach. By leveraging an inclusive model, Chintan enhances the safety, livelihoods, and efficiency of waste pickers while capitalizing on their existing expertise. Chintan manages over 30 tons of solid and WEEE every day in the Delhi region by doorstep collection, segregation, recycling, and composting.[59] This integration is strengthened by strategic partnerships with recyclers, Safai Sena, and organizations such as GIZ, Microsoft (formerly Nokia), Attero and other recyclers, expanding operational capacity and fostering sector-wide cooperation.

54 Sengupta, D., Ilankoon, I. M. S. K., Kang, K. D., & Chong, M. N. (2022). *Circular economy and household e-waste management in India: Integration of formal and informal sectors. Minerals Engineering, 184, 107661.* Retrieved 23.04.2025, from https://doi.org/10.1016/j.mineng.2022.107661

55 Chaturvedi, B., & Bhardwaj, S. (2013). (rep.). *Learning to Re-E-Cycle. New Delhi. Chintan Environmental Research and Action Group.* Retrieved 23.04.2025, from https://www.chintan-india.org/sites/default/files/2019-07/chintan-study-learning-to-re-e-cycle.pdf

56 Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. (2017). *Building the link: Leveraging formal-informal partnerships in the Indian e-waste sector.* https://www.giz.de/en/downloads/giz2017-en-formal-informal-partnerships-e-waste-india.pdf

57 Chaturvedi, B., & Bhardwaj, S. (2013). (rep.). *Learning to Re-E-Cycle. New Delhi.* Chintan Environmental Research and Action Group. Retrieved 23.04.2025, from https://www.chintan-india.org/sites/default/files/2019-07/chintan-study-learning-to-re-e-cycle.pdf

58 Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. (2017). *Building the link: Leveraging formal-informal partnerships in the Indian e-waste sector.* Eschborn, Germany. GIZ. Retrieved 23.04.2025, from www.giz.de

59 Chintan Environmental Research and Action Group. (n.d.). *Chintan Environmental Research and Action Group.* Retrieved 23.04.2025, from https://www.chintan-india.org/

A key driver of Chintan's success is its community engagement, including educational support and helplines, which have built trust and credibility among waste pickers and local residents. The measurable impact of these efforts includes the formal collection and responsible recycling of approximately one ton of WEEE per month, securing waste pickers' incomes with an increase of up to 25%, and facilitating safer working conditions. Additionally, Chintan, through Safai Sena, has tried to formalize thousands of waste pickers by integrating them into structured waste management systems. In Faridabad, Safai Sena partnered with Ramky Infrastructure to absorb informal workers into a formal doorstep collection service, covering over 200,000 households. Workers received contracts, uniforms, training, and helpline support, ensuring fair wages and dignified conditions. Safai Sena also manages a waste processing facility at New Delhi Railway Station, handling 4 tons of waste daily with support from Northern Railways. Chintan's "No Child in Trash" program further supports families by providing education and helping parents explore alternative livelihoods.[60]

7.4.1.4. Challenges

Despite having some successful outcomes, Chintan's waste management efforts face several structural and financial barriers. Regulatory challenges stem from the 2016 E-Waste Management Rules, which require producer responsibility under Extended Producer Responsibility (EPR), yet producers remain reluctant to engage with NGOs, limiting Chintan's reach. Financial constraints further hinder expansion, as sustaining operations demands INR 250,000 monthly for staffing and outreach—funds that remain.[61] Skill development opportunities in WEEE repair and refurbishment could enhance waste pickers' earnings by 30-40%, yet a lack of training infrastructure constrains progress (GIZ, 2017). Lastly, despite its impact, Chintan's capacity remains limited, processing just one ton of WEEE monthly insignificant compared to Delhi's vast WEEE generation.[62]

7.4.2. Case Study 2: E[co]work: Pioneering Safe Co-Working Spaces for Sustainable E-Waste Management

7.4.2.1. Introduction to E[co]work

E[co]work, founded by Dr. Deepali Khetriwal, Dea Wehrli, and Michael Gasser, offers an innovative solution for Delhi's informal WEEE dismantlers.

Inspired by co-working spaces and the sharing economy, E[co]work provides a safe, regulated facility where micro-entrepreneurs can dismantle WEEE efficiently while accessing training and business support.

The initiative aims to improve occupational safety, ensure regulatory compliance, and enhance livelihoods, with a focus on manual dismantling to maximize resource recovery.[63]

7.4.2.2. Approach and Interventions

E[co]work's practical strategies and interventions are aimed at enhancing worker safety, efficiency, and integration into sustainable recycling systems.[64]

E[co]work offers an ergonomic facility with reliable electricity, workbenches, good lighting, ventilation, and simple tools, reducing health hazards and improving efficiency. The space complies with environmental and safety regulations, contrasting with informal open-air dismantling.

Workers receive training in safe dismantling techniques, health and safety, business management, and regulatory compliance.

A storage area for separated materials (e.g., plastics, steel, copper, circuit boards) is rentable to downstream recyclers, allowing dismantlers to deposit materials and receive instant payments without additional logistics, tackling the informal sector's low-margin, cash-dependent model.

The initiative assists micro-entrepreneurs with business registration, permits, and compliance with taxation and environmental laws, and plans to include exploring micro-insurance and access to capital.

A digital platform is in development to track WEEE flows, monitor dismantling processes, and connect workers to downstream recyclers and producers under EPR targets.

60 Choudhary, J. P., & Sena, S. (2001). *Upliftment of the waste workers.* Retrieved 23.04.2025, from https://www.indiasanitationcoalition.org/resources/Case-Study-Chintan.pdf

61 Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. (2017). *Building the link: Leveraging formal-informal partnerships in the Indian e-waste sector.* https://www.giz.de/en/downloads/giz2017-en-formal-informal-partnerships-e-waste-india.pdf

62 Sengupta, D., Ilankoon, I., Dean Kang, K., & Nan Chong, M. (2022). *Circular economy and household e-waste management in India: Integration of formal and informal sectors. Minerals Engineering, 184, 107661.* Retrieved 23.04.2025, from https://doi.org/10.1016/j.mineng.2022.107661

63 EAI, CSDC & RF (2020). *Baseline Market Research on informal e-waste sector in Delhi, India to facilitate the E[co]work concept.* E[co]work Association, Curry Stone Design Collaborative and Resource Futures.

64 ISC3. (n.d.). E[co]work - *Enabling safer, sound and inclusive e-waste management.* Retrieved 23.04.2025, from https://www.isc3.org/page/ecowork-enabling-safer-sound-and-inclusive-e-waste-management

7.4.2.3. Outcome

E[co]work pilot facility was opened in Ghaziabad, Uttar Pradesh, India. It serves as a model that can be expanded to other urban centers facing similar challenges.[65]

Additionally, the E[co]work model aims to incorporate multiple United Nations Sustainable Development Goals (SDGs), particularly SDG 3 (Good Health and Well-being), SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation, and Infrastructure), SDG 10 (Reduced Inequality), SDG 11 (Sustainable Cities and Communities), and SDG 12 (Responsible Consumption and Production).[66]

In recent years, several initiatives have been undertaken, including the collection of approximately 18 tons of WEEE in collaboration with international companies. Additionally, a white paper has been published detailing the results of washing machine dismantling, along with data on recyclables, plastics, and other materials.[67] While the model demonstrates potential, the full scope of these outcomes is still to be evaluated.

7.4.2.4. Challenges

E[co]work faces several challenges, mainly in integrating informal WEEE dismantlers into a formalized co-working model. Many dismantlers prefer owning their workspace rather than renting, making E[co]work's rental-based model less attractive. Additionally, informal WEEE clusters provide strong material supply chains and logistical support, so relocating dismantlers to E[co]work could disrupt these networks, limiting access to materials. Resistance to formalization is another hurdle, as many micro-entrepreneurs operate informally to avoid complex legal compliance, taxation, and regulatory burdens. Furthermore, logistical constraints pose difficulties, as informal recyclers typically transport waste at night due to daytime restrictions, making adaptation to a structured workspace challenging. Overcoming these barriers requires strategic incentives, flexible business models, and targeted support for dismantlers transitioning to formal operations.[68]

7.4.3. Case Study 3: Transforming E-Waste Management: The Handover Centre Initiative in Ghana

Ghana's WEEE crisis is rooted in the global trade of second-hand EEE and the country's limited recycling infrastructure. In 2009, an estimated 215,000 tons of EEE were imported into Ghana, with 70% of second-hand EEE. Around 15% are non-functional, unsellable, and directly contributes to informal recycling.[69]

Many of these imports violate international regulations, such as the Basel Convention, which Ghana ratified to control the transboundary movement of hazardous waste. In 2016, the Ghanaian government passed Act 917, the Hazardous and Electronic Waste Control and Management Bill, to regulate export, import, and promote an environmentally sound waste management.[70]

This case study focuses on informal waste recycling in the Agbogbloshie area, a major e-waste scrapyard. The primary recycling activities include manually dismantling e-waste, burning cables to remove plastic for copper recovery, and extracting other valuable materials. However, non-profitable fractions are discarded within the yard. These practices have significant negative impacts on both human health and the environment.[71]

To address these challenges, the Hand Over Center (HOC) project was established with a 10 million EUR grant from the German government through KfW Development Bank, with additional support from GIZ. This initiative aims to formalize e-waste management and reduce the environmental and health risks associated with informal recycling practices.[72]

7.4.3.1. Approach and Interventions

The HOC project incorporates several strategic initiatives aimed at enhancing WEEE management in Ghana. As a funded initiative, the project also focuses on conducting market studies, developing strategies for both the formal and informal sectors, performing technical audits, and proposing viable recycling concepts for implementation in Ghana.[73]

65 E[co]work Association, Curry Stone Design Collaborative, & Resource Futures (2020). *Baseline Market Research on informal e-waste sector in Delhi, India to facilitate the E[co]work concept.*
66 E[co]work (2024). *Impact of the E[co]workspace.* Retrieved 23.04.2025, from https://www.ecowork.international/sdg
67 Minimise (2024). *LinkedIn Post.* Retrieved 23.05.2025, from https://www.linkedin.com/posts/minimise_white-paper-on-e-waste-resource-extraction-activity-7251849351218524161-3cpk/?utm_source=share&utm_medium=member_desktop&rcm=ACoAAFU0h5QBVXFcY-F30Sti9rD-w24Xi7JXQAs
68 EAI, CSDC & RF. (2021). *End-user and market insight on informal e-waste sector in Delhi, India to facilitate the E[co]work concept.* E[co]work Association, Curry Stone Design Collaborative and Resource Futures.
69 Basel Convention (2024). *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.* Retrieved 18.03.2025, from https://www.basel.int/TheConvention/Overview/tabid/1271/Default.aspx
70 Government of Ghana. (2016). *Hazardous and Electronic Waste Control and Management Act, 2016 (Act 917).* Parliament of Ghana. https://ir.parliament.gh/bitstream/handle/123456789/383/FINAL%20HAZARDOUS%20AND%20ELECTRONIC%20WASTE%20CONTROL%20AND%20MANAGEMENT%20%20BILL,%202016.pdf?sequence=1
71 BusinessGhana (29.10.2024). *E-waste Hand Over Centre inaugurated in Accra.* Retrieved 23.04.2025, from https://www.businessghana.com/site/news/general/316704/E-waste-Hand-Over-Centre-inaugurated-in-Accra
72 GOPA Infra. (n.d.). *Recycling and disposal of waste electrical and electronic equipment in an environmentally sound way.* Retrieved 18.03.2025, from https://www.gopa-infra.de/projects/recycling-and-disposal-waste-electrical-and-electronic-equipment-environmentally-sound-way
73 GOPA Infra. (n.d.). *Recycling and disposal of waste electrical and electronic equipment in an environmentally sound way.* Retrieved 23.04.2025, from https://www.gopa-infra.de/projects/recycling-and-disposal-waste-electrical-and-electronic-equipment-environmentally-sound-way

The key strategies include:

- Establishing a handover center with an incentive system for valuable WEEE, integrating it with national funding or the EPR system. This includes setting up an implementation framework, financial management structure, and a provisional manual of procedures.[74]
- Conducting capacity-building programs and specialized training for key stakeholders in the formal and informal WEEE sectors, as well as local recycling companies.
- Enhancing and expanding collection and handover systems to strengthen the circular economy within Ghana's WEEE sector.
- Developing standards for conducting technical, environmental, and safety audits to ensure sustainable recycling practices.

7.4.3.2. Outcome

The HOC has successfully collected volumes of e-waste, including 476.88 tons of WEEE cables, 37.03 tons of mixed batteries, 31.83 tons of thermoplastics, and 87.27 tons of cathode ray televisions (CRTs), demonstrating its capacity to manage diverse waste streams effectively.[75]

This has led to a reduction in pollution by diverting WEEE from informal burning sites like Agbogbloshie, with controlled processing at the HOC. Economically, the HOC has created over 450 green jobs and trained more than 200 scrap dealers, providing stable income opportunities for informal workers transitioning to the formal sector, while the incentive system has boosted local economies by encouraging participation in formal recycling.[76]

Meanwhile, the EAG2-Rec project, completed in 2024, developed four recycling concepts, with the iCycle® pyrolysis technology identified as a viable solution for treating problematic fractions like capacitors, toner cartridges, thermoplastics, and cable wires.[77]

Additionally, in 2024 a matchmaking event was organized by EAG2-Rec fostered collaboration between nearly 40 German and Ghanaian stakeholders.

This layed the groundwork for future partnerships, and the project's findings suggest potential for replication in countries like Nigeria and Rwanda, offering a scalable model for sustainable WEEE management in the region.[78]

7.4.3.3. Challenges

Despite achieving several of its project goals, the HOC initiative has faced multiple challenges that limit its overall impact and scalability in addressing Ghana's WEEE crisis. A significant obstacle has been land encroachment at the Ghana Atomic Energy Commission site, where the HOC is located. Over 50% of the original 22,500 acres have been lost to illegal settlements, leaving just over 1,000 acres for the project, which has constrained space for operations and future expansion [79].

Furthermore, as the project progresses through its phases, operational challenges remain under evaluation, and comprehensive data on long-term results are still being collected to assess the HOC's effectiveness and sustainability.

Chintan, E[co]work, and Ghana's Handover Centre highlight innovative approaches to sustainable WEEE management through community engagement, safe dismantling spaces, and technology integration. These initiatives provide valuable lessons for Kenya, though operational hurdles and funding gaps emphasize the importance of continuous assessment for long-term success.

In conclusion, this chapter provides a comprehensive analysis of the current state and potential future of WEEE management in Kenya. Through a detailed examination of the downstream value chain, the chapter identifies critical gaps and proposes innovative, locally relevant business cases aimed at improving the collection, transportation, sorting, processing, recycling, and disposal of WEEE.

These business cases highlight both environmental and economic opportunities, particularly when supported by strong regulatory frameworks, robust producer responsibility organisations (PROs), and stakeholder collaboration. The integration of digital solutions, local entrepreneurship, and capacity-building initiatives offers a promising path toward a more efficient, inclusive, and sustainable WEEE management system in Kenya. With the right policy backing and financial incentives, the proposed strategies can drive systemic change and unlock value across the formal and informal sectors.

74 Fraunhofer UMSICHT (2024). *Recycling of waste electrical and electronic equipment in Ghana.* Retrieved 23.04.2025, from https://www.umsicht-suro.fraunhofer.de/en/departments/secondary-resources-assessment/weee-recycling-ghana.html

75 Business Ghana (2024, October 29). *E-waste Hand Over Centre inaugurated in Accra.* Retrieved 23.04.2025, from https://www.businessghana.com/site/news/general/316704/E-waste-Hand-Over-Centre-inaugurated-in-Accra

76 BusinessGhana (29.10.2024). *E-waste Hand Over Centre inaugurated in Accra.* Retrieved 23.04.2025, from https://www.businessghana.com/site/news/general/316704/E-waste-Hand-Over-Centre-inaugurated-in-Accra

77 Fraunhofer UMSICHT. (2024). *Recycling of waste electrical and electronic equipment in Ghana.* Retrieved 23.04.2025, from https://www.umsicht-suro.fraunhofer.de/en/departments/secondary-resources-assessment/weee-recycling-ghana.html

78 Fraunhofer UMSICHT. (2024). *Recycling of waste electrical and electronic equipment in Ghana.* Retrieved 23.04.2025, from https://www.umsicht-suro.fraunhofer.de/en/departments/secondary-resources-assessment/weee-recycling-ghana.html

79 Ministry of Environment, Science, Technology and Innovation (18.03.2021). *Construction of E-waste Handover Centre.* Retrieved 23.04.2025, from https://mesti.gov.gh/construction-e-waste-handover-centre/

Conclusion

This study reveals a fragmented but highly active WEEE management landscape in Kenya, where both formal and informal actors play essential roles in the recovery, repair, and recycling of electronic waste. While the informal sector drives collection and refurbishment, it remains burdened by unsafe practices, inconsistent market access, and limited options for disposing of non-valuable and hazardous fractions. At the same time, the formal sector faces infrastructure constraints and unbalanced operational costs, especially when handling fractions with little or no resale value.

What emerges clearly is the untapped opportunity for collaboration across sectors. Rather than formalizing the informal, this study advocates for recognizing and strengthening the unique contributions of all actors. Informal collectors, dismantlers, and repairers are indispensable in bridging gaps the formal system cannot currently fill. However, the persistent environmental risks linked to the unmanaged disposal of residual waste demand a system-wide solution.

A robust, well-enforced Extended Producer Responsibility (EPR) framework offers one. EPR can relieve both formal and informal businesses of the costly burden of non-valuable fractions, creating a market-supported pathway for safer disposal and treatment. If structured inclusively, EPR schemes can catalyze partnerships between informal handlers, recyclers, and Producer Responsibility Organizations (PROs), improving resource flows, market access, and livelihoods while closing dangerous gaps in the value chain. Moving forward, private sector actors, large and small, formal and informal, hold significant agency to shape their operating environment. Through collective action, improved coordination, and constructive engagement with EPR schemes, the sector can safeguard its interests, protect public health, and position itself for long-term, profitable growth in a fast-expanding market.

To improve Kenya's WEEE landscape, the following steps are recommended:

- Develop incentives to integrate informal handlers into the formal system and make actors visible so mutually beneficial business relationships are feasible.
- Establish shared collection, repair, and recycling hubs with appropriate health and safety standards.
- Promote consumer awareness on the environmental impacts of improper disposal and the benefits of recycling.
- Ensure that producers and importers actively participate in end-of-life management through Producer Responsibility Organizations (PROs).
- Enforce the regulatory landscape and strengthen the uptake of the EPR regulations and formation of PROs.
- Encourage the development of business models that promote circular economy principles, such as refurbishment and upcycling, but take into account end-of-life management.

A coordinated approach involving government, industry, civil society, and informal actors will be essential to build a resilient, inclusive, and environmentally sound WEEE management system in Kenya.

References

Associated Battery Manufacturers EA (ABM Groups). LinkedIn Profile. Retrieved 26.2.2025, from https://www.linkedin.com/company/associated-battery-manufacturers-abm-group/?originalSubdomain=ke.

Baldé, C. P., Kuehr, R., Yamamoto, T., McDonald, R., D'Angelo, E., Althaf, S. et al. (2024). The Global E-Waste Monitor 2024 (International Telecommunication Union (ITU) & United Nations Institute for Training and Research (UNITAR), Hrsg.). Page 66.

Basiye, J. (2022). The WEEE Challenge in Kenya: Policy Gaps and Future Solutions. Journal of Environmental Policy, 14(2), 87-104.

Basiye, S. (2020). WEEE management in Kenya: Current status and future challenges. United Nations Environment Programme (UNEP), Nairobi.

Basel Convention. (n.d.). Overview of the Basel Convention. Retrieved 18.03.2025, from https://www.basel.int/TheConvention/Overview/tabid/1271/Default.aspx

Basel Convention. (2024). Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. Retrieved 18.03.2025, from https://www.basel.int/TheConvention/Overview/tabid/1271/Default.aspx

Business Daily Africa. (2024, August 15). 34 plant shutdowns reveal Kenya manufacturing woes. Retrieved May 19, 2025, from https://www.businessdailyafrica.com/bd/corporate/companies/34-plant-shutdowns-reveal-kenya-manufacturing-woes--4397890

BusinessGhana. (2024, October 29). E-waste Hand Over Centre inaugurated in Accra. Retrieved 23.04.2025, from https://www.businessghana.com/site/news/general/316704/E-waste-Hand-Over-Centre-inaugurated-in-Accra

Capita Registrars. (n.d.). Procedure of Registering a Company in Kenya. Retrieved 24.03.2025, from https://capitaregistrars.co.ke/procedure-of-registering-a-company-in-kenya/

Chaturvedi, B., & Bhardwaj, S. (2013). Learning to Re-E-Cycle (rep.). New Delhi: Chintan Environmental Research and Action Group. Retrieved 23.04.2025, from https://www.chintan-india.org/sites/default/files/2019-07/chintan-study-learning-to-re-e-cycle.pdf

Chintan Environmental Research and Action Group. (n.d.). Chintan Environmental Research and Action Group. Retrieved 23.04.2025, from https://www.chintan-india.org/60

Choudhary, J. P., & Sena, S. (2001). Upliftment of the waste workers. Retrieved 23.04.2025, from https://www.indiasanitationcoalition.org/resources/Case-Study-Chintan.pdf

Consumers Federation of Kenya. (2024). Kenya Power boss calls for total ban on export of copper and aluminium to cut vandalism costs. Retrieved 05.05.25, from https://cofek.africa/kenya-power-boss-calls-for-total-ban-on-export-of-copper-and-aluminium-to-cut-vandalism-costs/

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. (2017). Building the link: Leveraging formal-informal partnerships in the Indian e-waste sector. Retrieved 7.05.2025, from https://www.giz.de/en/downloads/giz2017-en-formal-informal-partnerships-e-waste-india.pdf

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. (2017). Building the link: Leveraging formal-informal partnerships in the Indian e-waste sector. Eschborn, Germany: GIZ. Retrieved 23.04.2025, from https://www.giz.de/en/downloads/giz2017-en-formal-informal-partnerships-e-waste-india.pdf

EAI, CSDC & RF. (2021). End-user and market insight on informal e-waste sector in Delhi, India to facilitate the E[co]work concept. E[co]work Association, Curry Stone Design Collaborative and Resource Futures.

EAI, Curry Stone Design Collaborative (CSDC), & Resource Futures (RF). (2020). Baseline Market Research on informal e-waste sector in Delhi, India to facilitate the E[co]work concept. E[co]work Association.

East African Communications Organization (EACO). (2022). EACO regional WEEE management strategy 2022–2027. Retrieved 18.03.2025, from https://eaco.int/admin/docs/publications/EACO%20Regional%20WEEE%20Management%20Strategy%202022-2027.pdf

E[co]work. (2024). Impact of the E[co]workspace. Retrieved 23.04.2025, from https://www.ecowork.international/sdg

Fraunhofer UMSICHT. (2024). Recycling of waste electrical and electronic equipment in Ghana. Retrieved 23.04.2025, from https://www.umsicht-suro.fraunhofer.de/en/departments/secondary-resources-assessment/weee-recycling-ghana.html

Garbage Dot Com Ltd. (2023, June 10). Addressing the growing waste crisis in Kenya's urban areas. Retrieved 19.05.2025, from https://garbage.co.ke/2023/06/10/addressing-the-growing-waste-crisis-in-kenyas-urban-areas/

Global E-waste Statistics Partnership (GESP). (2022). Kenya E-waste statistics 2022. Retrieved 18.03.2025, from https://globale-waste.org/statistics/country/kenya/2022/

GOPA Infra. (n.d.). Recycling and disposal of waste electrical and electronic equipment in an environmentally sound way. Retrieved 18.03.2025, from https://www.gopa-infra.de/projects/recycling-and-disposal-waste-electrical-and-electronic-equipment-environmentally-sound-way

Government of Ghana. (2016). Hazardous and Electronic Waste Control and Management Act, 2016 (Act 917). Parliament of Ghana. Retrieved 23.04.2025, from https://ir.parliament.gh/bitstream/handle/123456789/383/FINAL%20HAZARDOUS%20AND%20ELECTRONIC%20WASTE%20CONTROL%20AND%20MANAGEMENT%20%20BILL,%202016.pdf?sequence=1

International Trade Centre. (2024). Trade statistics for electrical machinery and equipment (HS Code 85). Retrieved 26.02.25, from https://www.trademap.org

ISC3. (n.d.). E[co]work - Enabling safer, sound and inclusive e-waste management. Retrieved 23.04.2025, from https://www.isc3.org/page/ecowork-enabling-safer-sound-and-inclusive-e-waste-management

Kenya Association of Manufacturers. (2022). Manufacturing Priority Agenda 2022: Manufacturing sector recovery and sustained growth for Kenya's shared prosperity, Nairobi. Kenya Association of Manufacturers. Retrieved 17.04.2025, from https://kam.co.ke/wp-content/uploads/2022/02/MANUFACTURING-PRIORITY-AGENDA-2022-Final-Copy.pdf

Kenya Association of Manufacturers. (2025). Manufacturing priority agenda (MPA) 2025. Retrieved 18.03.2025, from https://kam.co.ke/wp-content/uploads/2025/03/MANUFACTURING-PRIORITY-AGENDA-MPA-2025-Print-5.pdf

Kenya Institute for Public Policy Research and Analysis. (2023). Rejuvenating local manufacturing in the context of the secondhand economy. KIPPRA. Retrieved 17.04.2025, from https://kippra.or.ke/rejuvenating-local-manufacturing-in-the-context-of-second-hand-economy/

Kenya National Bureau of Statistics. (2025). E-Waste and Put on Market (POM) Data Analysis. Presentation for 7th EACO E-Waste Conference, Nairobi, Kenya.

Kenya Roads Board. (2023). Road network conditions map. Kenya Roads Board. Retrieved 26.02.2025, from https://maps.krb.go.ke/kenya-roads-board12769/maps/110400/2-road-network-conditions-map/1000#

Kenya Revenue Authority (2023). Import Duty Exemptions and VAT Policies on Electronic Components. Government of Kenya.

Linah Ngumba, Kenya National Bureau of Statistics (26.03.2025). E-Waste and Put on Market (POM) Data Analysis. Presentation for 7th EACO E-Waste Conference, Nairobi, Kenya.

Maina, J., & Jungblut, S.-I. (05.3.2025). E-waste start-up EWIK contains the country's growing waste while offering vulnerable communities a chance to earn an income. RESET – Digital for Good. Retrieved 12.02.2024, from https://en.reset.org/ewik-enabling-kenyas-informal-settlements-participation-in-sustainable-e-waste-management/

Minimise. (2024). LinkedIn Post. Retrieved 23.05.2025, from https://www.linkedin.com/posts/minimise_white-paper-on-e-waste-resource-extraction-activity-7251849351218524161-3cpk/?utm_source=share&utm_medium=member_desktop&rcm=ACoAAFU0h5QBVXFcY-F30Sti9rD-w24Xi7JXQAs

Ministry of Environment, Science, Technology and Innovation. (2021, March 18). Construction of E-waste Handover Centre. Retrieved 23.04.2025, from https://mesti.gov.gh/construction-e-waste-handover-centre/

Mureithi, M., & Waema, T. (2008). E-waste Management in Kenya. Kenya ICT Action Network (KICTANet). Retrieved 12.02.25, from https://www.rds.org.co/apc-aa-files/ba03645a7c069b5ed406f13122a61c07/e_waste_kennia.pdf

National Environment Management Authority (NEMA). (1999). Environmental Management and Coordination Act (EMCA),1999. Retrieved 14.02.2025, from https://www.nema.go.ke/images/Docs/Guidelines/Environmental%20Act%20(EMCA1999)%20.pdf

National Environment Management Authority (NEMA). (2010). Guidelines for E-waste Management in Kenya. Retrieved 14.02.2025, from https://www.nema.go.ke/images/Docs/Guidelines/E-Waste%20Guidelines.pdf

National Environment Management Authority (NEMA). (2013). Draft E-waste regulations. Retrieved 14.02.2025, from https://www.nema.go.ke/images/Docs/Regulations/Draft%20E-waste%20Regulations-1.pdf

National Environment Management Authority (NEMA). (2024). Extended Producer Responsibility (EPR) and Water Quality Regulations (L.N. 176-177).Retrieved 14.02.2025, from https://www.nema.go.ke/images/Docs/Regulations%202024%20Gazetted/%20EPR%20AND%20WATER%20QUALITY%20REGULATIONS-L.N.176-177.pdf

Otieno, I., & Omwenga, E. (2016). E-waste management in Kenya: Challenges and opportunities. University of Nairobi. Retrieved 22.02.2025, from https://erepository.uonbi.ac.ke/bitstream/handle/11295/155124/Onyango%20I_E-waste%20Management%20in%20Kenya-%20Challenges%20and%20Opportunities.pdf?sequence=1

Sengupta, D., Ilankoon, I. M. S. K., Kang, K. D., & Chong, M. N. (2022). Circular economy and household e-waste management in India: Integration of formal and informal sectors. Minerals Engineering, 184, 107661. https://doi.org/10.1016/j.mineng.2022.107661

Songa, J., & Lubanga, B. (2015). The Health Risk of Electronic Waste in Kenya: Challenges and Policies. Moi University. Retrieved 12.02.2025, from https://www.researchgate.net/publication/281633853_The_Health_Risk_of_Electronic_Waste_in_Kenya_Challenges_and_Policies

The East African. (12.12.2020). EAC bans dumping of electronic waste, calls for recycling. The East African. Retrieved 26.02.2025, from https://www.theeastafrican.co.ke/tea/news/east-africa/eac-bans-dumping-of-electronic-waste-calls-for-recycling-3633632

The Elephant. (2021). Dumped WEEE Threatens Kenyan Lives, Contributes to Global Warming. Retrieved 26.03.2025, from https://www.theelephant.info/analysis/2021/11/06/dumped-WEEE-threatens-kenyan-lives-contributes-to-global-warming

The Republic of Kenya. (2022). Draft E-waste Regulations. Retrieved 26.2.25, from https://www.nema.go.ke/images/Docs/Regulations/Draft%20E-waste%20Regulations-1.pdf.

The Republic of Kenya. (2022). The Public Procurement and Asset Disposal Act (Revised Edition 2022), paragraph 165. Retrieved 26.2.25, from https://ppra.go.ke/ppda/#.

Volza. (2025). Used Electronic, Kenya Imports in Kenya – Market Size & Demand based on Import Trade Data. Retrieved 17.04.2025, from https://www.volza.com/p/used-electronic-or-kenya/import/import-in-kenya/

World Resources Institute (2023). MECS Study on the Repair and End of Life of Electrical Appliances in Kenya. Modern Energy Cooking Services (MECS). Retrieved 15.04.2025, from https://mecs.org.uk/publications/mecs-study-on-the-repair-and-end-of-life-of-electrical-appliances-in-kenya/

Annex

Annex 1: Further information about respondents of the informal sector

Age Distribution	Percentage
25-30	23%
36-40	18%
31-35	16%
41-45	13%
18-24	11%
46-50	9%
51 and above	10%

Table 12: Age distribution of the respondents (n=174)

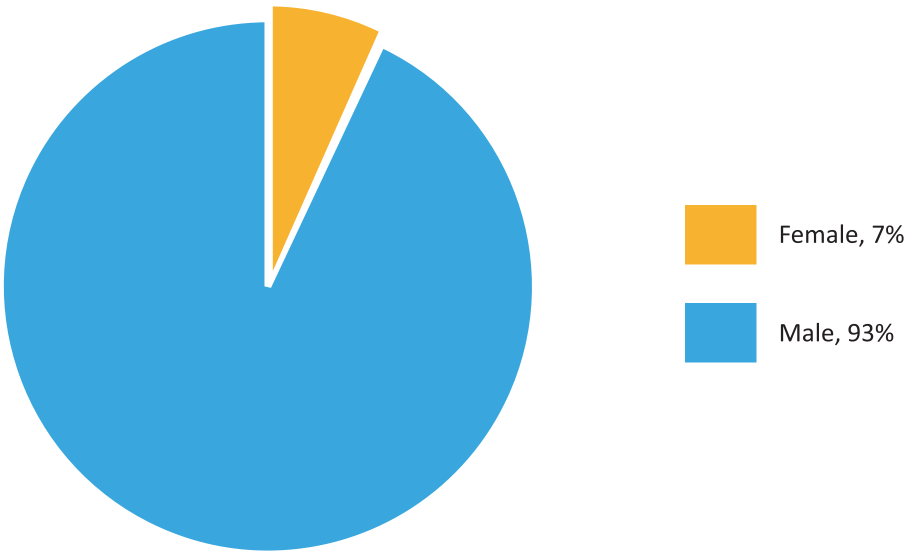


Figure 26: Study respondents by gender (n=174)

AHK Services Eastern Africa Ltd.
West Park Suites, 6th floor Ojijo Road
(opp. Parklands Police Station),
P.O BOX 19016, 00100 Parklands, Nairobi, Kenya
Tel: +254 20 663 - 3000
E-Mail: office@kenya-ahk.co.ke
www.kenia.ahk.de

Supported by:

Federal Ministry
for the Environment, Climate Action,
Nature Conservation and Nuclear Safety

based on a decision of
the German Bundestag