

Supported by:



Federal Ministry
for the Environment, Nature Conservation,
Nuclear Safety and Consumer Protection



based on a decision of
the German Bundestag

2024

MARKET ENTRY STUDY FOR E- WASTE RECYCLING FACILITY IN GHANA

THIS REPORT IS PART OF THE PROJECT "CONCEPT DEVELOPMENT FOR THE SUSTAINABLE RECYCLING OF WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT IN GHANA"



Imprint

Publisher

Fraunhofer Institute for Environmental, Safety, and Energy Technology UMSICHT
Institute Branch Sulzbach-Rosenberg
An der Maxhütte 1
92237 Sulzbach-Rosenberg
+49 172 69 77 466
<https://www.umsicht.fraunhofer.de/>

Authors

Rafaela Craizer, Tarun Shesh
BlackForest Solution GmbH

Editorial staff

BlackForest Solutions GmbH
Kopenhagener Str. 60-68
13407 Berlin
Germany
<https://www.blackforest-solutions.com/>

Status

April 2024

Supported by:



based on a decision of
the German Bundestag

LIST OF FIGURES

Figure 1-1: Overview of potential financing instruments. Source: BFS, 2023. 2

LIST OF TABLES

Table 1-1: Relevant funding organisations and available financing mechanisms. Source: BFS, 2023.**Error!**
Bookmark not defined.

Table 2-1: Overview of key government stakeholders in the waste management sector in Ghana.**Error!**
Bookmark not defined.

Table 2-2: Contact details of relevant networks in Ghana. Source: BFS, 2023. 7

1 INTRODUCTION

This report provides a high-level summary of:

- ☐ Funding instruments and programs for WEEE treatment in Ghana, including a short evaluation of their advantages and disadvantages.
- ☐ Administrative processes and regulatory developments as well as the key contacts at local authorities and ministries.
- ☐ International and local players in the field of WEEE recycling and secondary metal smelting.

The purpose of this report is to support the implementation of an e-waste treatment facility in Ghana. The perspective applied to the research revolved around how to facilitate implementation of an e-waste management concept financially and technically in Ghana.

This report is part of the project “Concept Development for the Sustainable Recycling of WEEE in Ghana (EAG²-Rec)”, project led by Fraunhofer Institute, in partnership with BackForest Solutions GmbH and RETech e.V, and financed by the BMUV.

The project applied for pursues the following objectives as part of a feasibility study:

1. Development of an economically viable, sustainable and locally adapted concept for the recycling of WEEE, with the participation of local stakeholders;
2. Review of the technical and economic feasibility of the concept via market analysis; and
3. Organization of a matchmaking event to initiate the implementation of the concept and direct investments by German SMEs and the local recycling industry in Ghana.

This report shows the results achieved during phase 2 of the project. However, its findings are not limited to the implementation of the concepts developed within this project.

There are a multitude of financing mechanisms available with the Ghanaian government pledging support to improve e-waste management in the country as well. However, strong cooperation with local partners is needed for market entry in order to avoid the bureaucratic nature of setting up industrial facilities in Ghana. While market competition remains relatively low, the presence of potential monopolies could raise obstacles for project implementation.

2 FUNDING INSTRUMENTS

Figure 1 below illustrates the financing sectors, investment instruments, and financing institutions that typically provide funding for circular economy solutions. Funding received from each sector, instrument, or institution has specific advantages and disadvantages. To understand the best option for each opportunity, it is important to check the funding criteria, target regions, financial conditions, among others.

Thus, it is important to assess the suitability of each financing mechanism with the specific project.

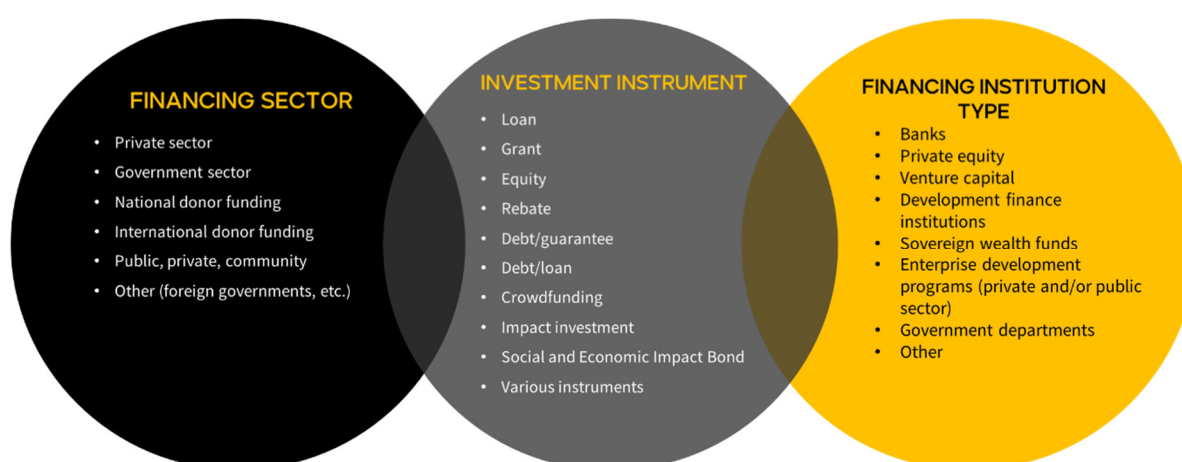


Figure 1: Overview of potential financing instruments. Source: BFS, 2023.

Some of the important factors that should be taken into consideration when deciding on a financing mechanism are:

- ☐ **Funding stability:** Stable and reliable source of funding that contributes to the long-term sustainability of a project.
- ☐ **Tax incentives:** Tax incentives or favourable regulatory treatments that are often associated with government-funded projects.
- ☐ **Bureaucratic processes:** Application and approval processes can be time-consuming and counterproductive to project development.
- ☐ **Policy dependence:** Funding may be subject to changes in government policies which could negatively impact a project.
- ☐ **Funding volume:** Availability of substantial funding that allows for the implementation of large-scale projects.
- ☐ **Additional governance support:** Besides, funding, availability of opportunities for additional support in terms of technical expertise, capacity building, and networking.
- ☐ **High competition:** Competitiveness for a funding source.
- ☐ **Eligibility requirements:** Compliance and reporting requirements may be stringent and require a significant investment of time and resources.
- ☐ **Sustainability commitment:** Fnds are specifically designed for environmental projects, ensuring alignment with local priorities.
- ☐ **Potential local support:** Ease of cooperation due to support from local communities and stakeholders.

Table 1 provides an assessment of the various relevant financing instruments using the aforementioned criteria. Valid examples per financing instrument have also been provided.

Table 1: Relevant funding organizations and available financing mechanisms. Source: BFS, 2023.

Financing instrument	Advantages	Disadvantages	Examples
Government grants and subsidies	<ul style="list-style-type: none"> • Stable funding: Government grants often provide a stable and reliable source of funding, which can contribute to the long-term sustainability of a project. • Tax incentives: There may be tax incentives or favourable regulatory treatments associated with government-funded projects. 	<ul style="list-style-type: none"> • Bureaucratic processes: Application and approval processes for government grants can be bureaucratic and time-consuming. • Policy dependence: The funding may be subject to changes in government policies, which could impact the project. 	<ul style="list-style-type: none"> • International Climate Initiative (IKI) • DeveloPPP
International development organizations	<ul style="list-style-type: none"> • Significant funding: These organizations offer access to substantial funding, allowing for the implementation of large-scale projects. • Additional support: Besides funding, there may be opportunities for additional support in terms of technical expertise, capacity building, and networking. 	<ul style="list-style-type: none"> • High competition: The application process is often highly competitive, with many projects vying for limited funds. • Stringent requirements: Compliance and reporting requirements may be stringent and require a significant investment of time and resources. 	<ul style="list-style-type: none"> • World Bank Group • UNIDO • Asian Development Bank • Asian Infrastructure Investment Bank • German Development Bank (KfW) • French Development Agency (AFD) • The Dutch Entrepreneurial Development Bank (FMO)
Environmental funds	<ul style="list-style-type: none"> • Dedicated environmental focus: These funds are specifically designed for environmental projects, ensuring 	<ul style="list-style-type: none"> • Limited funding: Environmental funds may have limited financial resources compared to 	<ul style="list-style-type: none"> • Ghanaian e-waste fund which allocates 40% of funding for downstream WEEE facilities

	<p>alignment with local priorities.</p> <ul style="list-style-type: none"> • Potential local support: Accessing environmental funds may also come with support from local communities and stakeholders. 	<p>larger funding sources.</p> <ul style="list-style-type: none"> • Eligibility criteria: Strict eligibility criteria may limit the number of projects that qualify for funding. 	<ul style="list-style-type: none"> • Green Climate Fund (GCF)
Green financing and impact investment	<ul style="list-style-type: none"> • Private sector involvement: Involves private investors and financial institutions, bringing in additional resources. • Sustainability commitment: Demonstrates a commitment to sustainability, attracting environmentally conscious investors. 	<ul style="list-style-type: none"> • Equity considerations: Requires consideration of equity or profit-sharing arrangements with investors. • Due diligence: Private investors often conduct thorough due diligence, which can be time-consuming and resource intensive. 	<ul style="list-style-type: none"> • KfW DEG Up-Scaling Program offers interest-free loans • KfW DEG AfricaConnect offers low interest loans • The Audacious Project
European Union financing	<ul style="list-style-type: none"> • Substantial funding: Access to a significant pool of funding from the European Union. • Collaboration opportunities: Potential for collaboration with other projects and organizations funded by the EU. 	<ul style="list-style-type: none"> • Intensive application process: The application process is often complex and time-consuming. • Strict compliance: Stringent adherence to EU regulations and standards is required. 	<ul style="list-style-type: none"> • Project Horizon • European Investment Bank • European Bank for Reconstruction and Development • Global Gateway Africa – Europe Investment Package • European Fund for Sustainable Development (EFSD+)
Corporate social responsibility initiatives	<ul style="list-style-type: none"> • Shared values: Collaboration with companies that share similar values and interests. • Long-term partnerships: Potential for establishing long- 	<ul style="list-style-type: none"> • Limited funding: Funding may be limited compared to larger organizations. • Corporate priorities: Funding is dependent on corporate 	<ul style="list-style-type: none"> • Partnership with brands

	term partnerships that go beyond financial support.	priorities and budget cycles.	
Private sector investors	<ul style="list-style-type: none"> • Significant funding: Access to significant funding for project development and implementation. • Expertise and mentorship: Private investors may provide expertise and mentorship to support project success 	<ul style="list-style-type: none"> • Equity requirements: Usually involves giving up equity or profit-sharing, impacting ownership. • High return expectations: Investors often expect high returns on their investment, increasing financial pressure. 	<ul style="list-style-type: none"> • Collaborating with existing local stakeholders

3 ADMINISTRATIVE PROCESSES

In recent years, Ghana has been viewed as an attractive market for development projects by European and Asian companies.

In turn, Ghana has also been increasingly liberalising imports from the European Union in order to facilitate increased investments. The Ghanaian government has been playing a crucial role in opening the market with a particular focus on improving the environmental situation in the country.

Various ministries and authorities are tasked with functions such as drafting new environmental regulations in addition to monitoring and implementing the regulatory framework. Some of the key government actors are listed in Table 2.

Based on Table 2, the important stakeholders in terms of implementing an e-waste management facility are the EPA and local metropolitan, municipal, and district assemblies (MMDA). Facilities should be registered and obtain permits in accordance with LI 1652. Since the EPA is the nodal agency for any potential treatment facilities, registration and permit issuance occurs through them. Additionally, intermediate treatment facilities and final disposal facilities must be licensed by the EPA and MMDA. However, the times taken to issue permits is unclear and could depend on the facility type.

Table 2: Overview of key government stakeholders in the waste management sector in Ghana. Source: BFS, 2023.

Organization	Roles
Ministry of Local Government and Rural Development (MLGRD)	Promote the creation and development of a dynamic and well-resourced decentralised system of local authorities. Oversees the Directorate of Environment and Hygiene.
Ministry of Sanitation and Water Resources (MSWR)	Develops guidelines, plans, and programmes for sanitation and sustainable management of solid and non-solid waste.
Ministry of Environment, Science, Technology, and Innovation (MESTI)	Promotion of technologies that take into account environmental aspects. Networking of international organizations in the field of green technologies.
Environmental Protection Agency of Ghana (EPA)	Responsible for the preservation and improvement of Ghana's environmental situation with efficient resource management. Oversees the implementation of national environmental policy through 12 regional offices.
Local Assemblies (MMDA)	Responsible for the provision of facilities, infrastructure services and programmes for effective and efficient waste management
Ministry of Sanitation and Water Resources (MSWR)	Promote the creation and development of a dynamic and well-resourced decentralised system of local authorities. Supervises Directorate of Environment and Hygiene.
Ministry of Environment, Science, Technology and Innovation (MESTI)	Guidelines, plans and programmes for sanitation and sustainable management of solid and non-solid waste.

The reform of the waste management sector provides opportunities for the private sector to enter into cooperation with public-sector stakeholders within the framework of a PPP. Due to high levels

of price competitiveness, technology suppliers seeking to enter the Ghanaian waste sector must be prepared to explain potential economic and environmental benefits offered as opposed to companies operating at a lower price point. Organizations such as the German Desk, an AHK initiative in partnership with the DEG and Access Bank, facilitate financing options for market entry at an early project stage. Other organizations such as the African Development Bank (ADB), World Bank, DEG, and German Trade and Invest (GTI) offer potential access to financing. Details of important organizations are provided below in Table 3.

Table 3: Contact details of relevant networks in Ghana. Source: BFS, 2023.

Organization	Sector	Email Address	Website
AFD (French Development Agency)	Plastic Waste / International Institutions and Organizations	afdaccra@afd.fr	www.afd.fr/en/le-reseau-des-agences/our-agency-ghana
AGI (Association of Ghana Industries)	Plastic Waste / National Association/ Private sector	agi@agighana.org	www.agighana.org
Atlantic Recycling International Systems	E-Waste/ Private Sector	recyclinginternational@aol.com	
Blancomet Recycling Ltd	E-Waste/ Private Sector	info@blancomet.co.uk	www.blancomet.co.uk
City Waste Ghana	E-Waste/ Private Sector	cwmcl@gmx.net	www.cwmcl0.wix.com/citywastegroup
ESPA (Environnemental Service Providers Association)	E-Waste / National Association / Private sector	info@espaghana.com	www.espaghana.com
EWROTA (E-Waste Roundtable Association)	E-Waste / NGO	info@atssol.com	www.ewrotagh.com
Jekora Ventures Ltd (JVL)	Waste management / Private sector	info@jekoraventures.com	www.jekoraventures.com/contact
JOSPONG Group	Waste Management / Private sector	info@josponggroup.com	www.josponggroup.com
Ministry of Environment, Science, Technology and Innovation (MESTI)	Environment / Institution / Ministry	contact@mesti.gov.gh	www.mesti.gov.gh
SGS Renovo Ghana	E-Waste / Electronic waste collection / National Association / public sector	renovo@sgs.com / info@epa.gov.gh	
World Bank (European Union)	Plastic Waste / International Institutions and Organisations	ghanaalert@worldbank.org	www.worldbank.org/en/country/ghana
Zoomlion	Waste Management / Private Sector	info@zoomlionghana.com	www.zoomlionghana.com

4 OVERALL MARKET LANDSCAPE

4.1 PROMINENT GHANAIAN SMELTERS

There is a ban on the export of ferrous metals from Ghana in order to protect the local ferrous smelters. As a result of government intervention, there has been an increase in the establishment of good quality ferrous metal smelters in Ghana with up to eight smelters identified.

Most of the companies are situated around Tema. Some identified companies include:

- ❑ Sentuo Steel Limited: This is a joint venture between China-based Fujian Chinese Overseas Industrial Group and Ghanaian government's Social Security and National Insurance Trust. It is estimated that Sentuo Steel Ltd. has a nameplate production capacity of 800,000 MT per year (Oxford Business Group, n.d.; Sentuo Group, n.d.).
- ❑ Tema Steel Company Limited: This is an Indian owned business with an approximated capacity of 4,500 MT per year (Oxford Business Group, n.d.).
- ❑ Ferro Fabrik Limited: A Chinese-owned company, Ferro Fabrik Ltd. offers products such as high-tensile reinforcement bars, mild steel reinforcement bars, angle bars, U channels, nails, etc. Ferro Fabrik has an estimated nameplate production capacity of 150,000 MT per year (Ferro Fabrik Ltd., n.d.; Oxford Business Group, n.d.).
- ❑ Special Steel Ltd.: A Ghanaian firm with an estimated production capacity of 3,500 MT per year (Oxford Business Group, n.d.).
- ❑ Western Castings Ltd: Another Ghanaian firm with an estimated production capacity of 2,000 MT per year.
- ❑ United Steel Company: A Lebanese-owned firm which established a production capacity of up to 180,000 MT per year. However, this company is currently under administration due to debts accrued (Ghana Business News, 2021; Oxford Business Group, n.d.).

Other steel production businesses include Rider Steel Ltd., Fabrimetal Ghana Ltd., and B5 Plus Steel Manufacturing. Currently, the domestic demand for steel goods is approximately 400,000 MT per year which is exceeded by the domestic production capacity of over 600,000 MT per year (Dawa Industrial Zone, 2022).

The Ghanaian EPA is tolerant of exports of non-ferrous metal scrap due to a lack of quality local options. Currently, there are 2 operational smelters in Ghana; however, the 2 smelters only process aluminium and lead, but not copper. The two identified non-ferrous metal smelters are Non Ferrous Metals Ghana Ltd. and the state-owned Volta Aluminium Company (VALCO). VALCO has a nameplate capacity of 200,000 MT per year but has only a currently operational production capacity of 80,000 MT per year due to offline potlines (Guthrie, 2020).

4.2 POTENTIAL COMPETITORS AND PARTNERS

There are currently 3 tyre-based pyrolysis facilities in Ghana. In fact, recently, a Ghanaian customer purchased a small-scale 2 MT per day pyrolysis plant from the Henan Doing Company. This plant has an input of raw materials such as waste tyres, plastic, oil sludge, etc. Similarly, the Doing group has also supplied a 12 MT per day waste tyre pyrolysis plant in Ghana as well. (Doing, 2023). Similarly, private Ghanaian customers have also purchased 5 batch-type tyre pyrolysis plants from the Huayin Company with a capacity of 10 MT per batch (Huayin Group, n.d.). It is

possible that the resultant pyrolysis oil is sold to refineries but it is believed that the pyrolysis oil is predominantly exported out of Ghana to undisclosed countries.

Ghana is the final destination of many non-functional electronic devices which are often mislabelled as used goods. While some device repair does occur, a large share of WEEE is incinerated for material recovery. Due to the large quantities of WEEE in Ghana, various companies are actively providing disposal and recycling services. Some key organizations and companies are shown below in Table 4, together with their business activities and obtained regulatory permits.

The three main permits required by each company are:

- EPA
- The Ghana National Fire Service (GNFS) – enforcement of fire safety measures
- The Department of Factories Inspectorate (DFI) – prevention of occupational accidents and diseases due to potential exposure in a working environment

Table 4: Summary of EPA audit on businesses operating along the e-waste value chain. Source: EPA, 2021.

#	Name of Entity	E-waste Value Chain Activity								Regulatory Permits		
		Collection	E-Waste Dismantling	Repair/Refurbishment	Transportation	Cable Recycling	ULABs Management	Fridge Degassing	Others	EPA	DFI	GNFS
1	Blancomet Recycling Ltd	X ^{(e)(f)(g)}	X ^{(f)(g)}		x	X ^(e)	X ^(f)			Y	Y	Y
2	J. Stanley-Owusu								X ^(d)			
3	City Waste Recycling	X ^{(b)(e)(g)}	X ^{(b)(g)}			X ^(e)			X ^(g)			
4	Green Advocacy Ghana	X ^(e)								Y		Y
5	Presank Enterprise Ltd	X ^(g)	X ^(g)						X ^(g)			
6	Recyclers Ghana Ltd	X ^(f)	X ^(f)			X ^(e)				Y		
7	Caritas Ghana	X ^{(a)(b)(c)}								Y		
8	Resell Ghana Ltd	X ^{(a)(h)}	X ^{(a)(h)}	X ^(a)								
9	Integrated Recycling and Compost								X ^(d)	Y		
10	Atlantic Recycling International Systems		X ^{(a)(b)}	X ^{(a)(b)}								
11	Success Africa Ghana		X ^(f)				X			Y	Y	Y
12	Sentuo Resources Ltd		X ^{(a)(g)(h)}			X ^(e)				Y		
13	Non-ferrous Metals Ltd					X ^(e)	X ^(f)			Y		Y
14	Eco-Star Environmental Ltd								X ^(d)	Y	Y	Y
15	Electro Recycling Ghana		X ^(b)	X ^(b)						Y		
16	Zeal Environmental Services - Takoradi								X ^(d)			
17	Zoil Ghana Limited - Takoradi								X ^(d)			

(a) Mobile phones; (b) Computers and televisions; (c) Mobile phone and computers; (d) Other (non-hazardous waste, oily waste, healthcare waste, etc.); (e) Cables; (f) Lead-acid batteries; (g) Fridge, air-conditioners; (h) IT and telecommunications equipment

The Ghana EPA has conducted an audit of the e-waste service providers active in the country along the value chain. The audit also focussed on the overall compliance levels of the companies. The compliance categories are described below:

- ☐ **Compliance (C):** The organization adequately satisfies regulatory requirements, industry practices, and adherence to facility procedures.
- ☐ **Partial Compliance (PC):** The organization only partially satisfies regulatory requirements, industry practices, and adherence to facility procedures.
- ☐ **Non-Compliance (NC):** The organization does not adequately satisfy regulatory requirements, industry practice and adherence to facility procedures or no information is available to verify the level of compliance.
- ☐ **Observation (OBS):** A finding that, in the judgement of the audit team, does not constitute a material deviation from the applicable requirements, or conditions where management practices could be improved by the auditee.

The general conclusion of the EPA audit was that no single company could provide end-to-end waste management services in Ghana.

Based on Table 4, potential partners could include the following due to either existing operational network, availability of permits, and general influence in the industry:

- ☐ Blancomet Recycling Ltd.: Active in cable recycling.
- ☐ City Waste Recycling: Extremely involved in e-waste management; however, they lack the required permits for operations.
- ☐ Recyclers Ghana Ltd.: Active in ULAB, cable, and tyre waste processing coupled with pyrolysis.
- ☐ Sentuo Resources Ltd.: A Chinese company active in e-waste management.
- ☐ Non-Ferrous Metals Ltd.: Active in ULAB and cable recycling.

5 CONCLUSION

In summary, there is not only an urgent need for waste management solutions in Ghana, but also mechanisms available for project implementation. Most importantly, government initiatives to promote industrial growth in Ghana by promoting public-private cooperation form a solid basis for investment.

There are numerous financing mechanisms available, the selection of which depends on the desired funding, potential cooperation with local partners, and eligibility requirements, among others. Various international development organizations and African development banks are offering attractive incentives for the development of sustainable infrastructure. While there are plenty of European investing mechanisms also available, these are highly competitive and have more stringent eligibility requirements.

Due to the government's ambitions to modernise Ghana, there are various entities that can also serve as liaisons to navigate the administrative processes. Organizations such as the German Desk, the African Development Bank (ADB), World Bank, DEG, and German Trade and Invest (GTAI) assist potential investments at the early stage of market entry. The primary challenge for project implementation could be price competitiveness within the waste management sector.

In terms of market competition, there are no companies that can provide end-to-end and high-quality services along the value chain; however, there are few companies that are vastly experienced in certain parts of the value chain. There is a high domestic demand for ferrous metals and copper which is inadequately met. This has been partly addressed by the Ghanaian government through the export ban of ferrous metals to boost local smelters. Copper continues to be exported in large quantities. Smelting in Ghana largely occurs at the informal level with most smelters processing ferrous metals. However, there are several large e-waste management companies with fairly strong technical and financial backgrounds which could serve as potential partners.