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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.

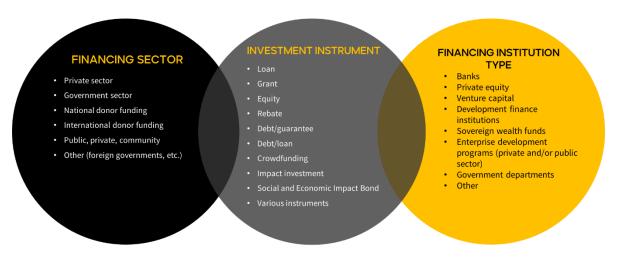


Figure 1: Overview of potential financing instruments. Source: BFS, 2023.

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	Advantages	Disadvantages	Examples
instrument			
Government	 Stable funding: 	 Bureaucratic 	 International
grants and	Government grants	processes:	Climate Initiative
subsidies	often provide a	Application and	(IKI)
	stable and reliable	approval	 DeveloPPP
	source of funding,	processes for	
	which can	government	
	contribute to the	grants can be	
	long-term	bureaucratic and	
	sustainability of a	time-consuming.	
	project.	• Policy	
	• Tax incentives:	dependence: The	
	There may be tax	funding may be	
	incentives or	subject to changes	
	favourable	in government	
	regulatory	policies, which	
	treatments	could impact the	
	associated with	project.	
	government-		
International	funded projects. • Significant	• High	World Bank
development	funding: These	competition: The	
organizations	organizations offer	application	Group • UNIDO
organizations	access to	process is often	Asian
	substantial	highly	Development
	funding, allowing	competitive, with	Bank
	for the	many projects	• Asian
	implementation of	vying for limited	Infrastructure
	large-scale	funds.	Investment Bank
	projects.	• Stringent	German
	• Additional	requirements:	Development
	support: Besides	Compliance and	Bank (KfW)
	funding, there may	reporting	• French
	be opportunities	requirements may	Development
	for additional	be stringent and	Agency (AFD)
	support in terms of	require a	The Dutch
	technical	significant	Entrepreneurial
	expertise, capacity	investment of time	Development
	building, and	and resources.	Bank (FMO)
	networking.		•
Environmental	• Dedicated	 Limited funding: 	• Ghanaian e-
funds	environmental	Environmental	waste fund
	focus: These funds	funds may have	which allocates
	are specifically	limited financial	40% of funding
	designed for	resources	for downstream
	environmental	compared to	WEEE facilities
	projects, ensuring	•	



	alignment with	larger funding	Green Climate
	local priorities.	sources.	Fund (GCF)
•	Potential local	• Eligibility	
	support: Accessing	criteria: Strict	
	environmental	eligibility criteria	
	funds may also	may limit the	
	come with support	number of	
	from local	projects that	
	communities and	qualify for	
	stakeholders.	funding.	
Green •	Private sector	• Equity	KfW DEG Up-
financing and	involvement:	considerations:	Scaling Program
impact	Involves private	Requires	offers interest-
investment	investors and	consideration of	free loans
	financial	equity or profit-	KfW DEG
	institutions,	sharing	AfricaConnect
	bringing in	arrangements	offers low
	additional	with investors.	interest loans
	resources.	• Due diligence:	The Audacious
•	Sustainability	Private investors	Project
	commitment:	often conduct	
	Demonstrates a	thorough due	
	commitment to	diligence, which	
	sustainability,	can be time-	
	attracting	consuming and	
	environmentally	resource	
	conscious	intensive.	
European •	investors. Substantial	• Intensive	Project Horizon
Union	funding: Access to	application	European
financing	a significant pool	process: The	Investment Bank
imancing	of funding from the	application	European Bank
	European Union.	process is often	for
•	Collaboration	complex and time-	Reconstruction
	opportunities:	consuming.	and
	Potential for	• Strict	Development
		Strict	
	collaboration with	compliance.	•
	collaboration with	compliance: Stringent	 Global Gateway
	other projects and	Stringent	 Global Gateway Africa – Europe
	other projects and organizations	Stringent adherence to EU	 Global Gateway Africa – Europe Investment
	other projects and	Stringent adherence to EU regulations and	 Global Gateway Africa – Europe Investment Package
	other projects and organizations	Stringent adherence to EU regulations and standards is	 Global Gateway Africa – Europe
	other projects and organizations	Stringent adherence to EU regulations and	 Global Gateway Africa – Europe
	other projects and organizations	Stringent adherence to EU regulations and standards is	 Global Gateway Africa – Europe
Corporate	other projects and organizations funded by the EU. Shared values:	Stringent adherence to EU regulations and standards is required. • Limited funding:	 Global Gateway Africa – Europe Investment Package European Fund for Sustainable Development (EFSD+) Partnership with
social	other projects and organizations funded by the EU. Shared values: Collaboration with	Stringent adherence to EU regulations and standards is required. • Limited funding: Funding may be	 Global Gateway Africa – Europe Investment Package European Fund for Sustainable Development (EFSD+)
social responsibility	other projects and organizations funded by the EU. Shared values: Collaboration with companies that	Stringent adherence to EU regulations and standards is required. • Limited funding: Funding may be limited compared	 Global Gateway Africa – Europe Investment Package European Fund for Sustainable Development (EFSD+) Partnership with
social	other projects and organizations funded by the EU. Shared values: Collaboration with companies that share similar	Stringent adherence to EU regulations and standards is required. • Limited funding: Funding may be limited compared to larger	 Global Gateway Africa – Europe Investment Package European Fund for Sustainable Development (EFSD+) Partnership with
social responsibility	other projects and organizations funded by the EU. Shared values: Collaboration with companies that share similar values and	Stringent adherence to EU regulations and standards is required. • Limited funding: Funding may be limited compared to larger organizations.	 Global Gateway Africa – Europe Investment Package European Fund for Sustainable Development (EFSD+) Partnership with
social responsibility	other projects and organizations funded by the EU. Shared values: Collaboration with companies that share similar values and interests.	Stringent adherence to EU regulations and standards is required. • Limited funding: Funding may be limited compared to larger organizations. • Corporate	 Global Gateway Africa – Europe Investment Package European Fund for Sustainable Development (EFSD+) Partnership with
social responsibility	other projects and organizations funded by the EU. Shared values: Collaboration with companies that share similar values and interests. Long-term	Stringent adherence to EU regulations and standards is required. • Limited funding: Funding may be limited compared to larger organizations. • Corporate priorities:	 Global Gateway Africa – Europe Investment Package European Fund for Sustainable Development (EFSD+) Partnership with
social responsibility	other projects and organizations funded by the EU. Shared values: Collaboration with companies that share similar values and interests. Long-term partnerships:	Stringent adherence to EU regulations and standards is required. • Limited funding: Funding may be limited compared to larger organizations. • Corporate priorities: Funding is	 Global Gateway Africa – Europe Investment Package European Fund for Sustainable Development (EFSD+) Partnership with
social responsibility	other projects and organizations funded by the EU. Shared values: Collaboration with companies that share similar values and interests. Long-term	Stringent adherence to EU regulations and standards is required. • Limited funding: Funding may be limited compared to larger organizations. • Corporate priorities:	 Global Gateway Africa – Europe Investment Package European Fund for Sustainable Development (EFSD+) Partnership with



	term partnerships that go beyond financial support.	priorities and budget cycles.	
Private sector investors	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	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.	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 nonsolid 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 (GTAI) 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	Plastic Waste /	afdaccra@afd.fr	<u>www.afd.fr/en/le-reseau-</u>
Development	International Institutions		des-agences/our-agency-
Agency)	and Organizations		<u>ghana</u>
AGI (Association of	Plastic Waste / National	agi@agighana.org	www.agighana.org
Ghana Industries)	Association/ Private sector		
Atlantic Recycling	E-Waste/ Private Sector	<u>recyclinginternation</u>	
International		al@aol.com	
Systems			
Blancomet Recyclin	E-Waste/ Private Sector	info@blancomet.co.	www.blancomet.co.uk
g Ltd		<u>uk</u>	
City Waste Ghana	E-Waste/ Private Sector	cwmcl@gmx.net	www.cwmcl0.wix.com/city
			wastegroup
ESPA	E-Waste / National	info@espaghana.co	www.espaghana.com
(Environnemental	Association / Private sector	<u>m</u>	
Service Providers			
Association)			
EWROTA (E-Waste	E-Waste / NGO	<u>info@atssol.com</u>	www.ewrotagh.com
Roundtable			
Association)			
Jekora Ventures	Waste management /	<u>info@jekoraventures</u>	www.jekoraventures.com/
Ltd (JVL)	Private sector	<u>.com</u>	contact
JOSPONG Group	Waste Management /	info@jospongroup.c	www.jospongroup.com
	Private sector	<u>om</u>	
Ministry of	Environment / Institution /	contact@mesti.gov.g	www.mesti.gov.gh
Environment,	Ministry	<u>h</u>	
Science,			
Technology and			
Innovation (MESTI)			
SGS Renovo Ghana	E-Waste / Electronic waste	renovo@sgs.com/	
	collection / National	info@epa.gov.gh	
	Association / public sector		
World Bank	Plastic Waste /	ghanaalert@worldba	www.worldbank.org/en/co
(European Union)	International Institutions	nk.org	<u>untry/ghana</u>
	and Organisations		
Zoomlion	Waste Management /	info@zoomlionghan	www.zoomlionghana.com
	Private Sector	<u>a.com</u>	
-			



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

Market Entry Study for E-Waste Recycling Facility in Ghana



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/Refurbishmen t	Transportation	Cable Recycling	ULABs Management	Fridge Degassing	Others	EPA	DFI	GNFS
1	Blancomet Recycling Ltd	X ^{(e)(f)(g)}	X ^{(f)(g)}		х	X ^(e)	X ^(f)			Υ	Υ	Υ
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)								Υ		Υ
5	Presank Enterprise Ltd	X ^(g)	X ^(g)					X ^(g)				
6	Recyclers Ghana Ltd	X ^(f)	X ^(f)			X ^(e)				Υ		
7	Caritas Ghana	X ^{(a)(b)(c)}								Υ		
8	Resell Ghana Ltd	X ^{(a)(h)}	X ^{(a)(h)}	X ^(a)								
9	Integrated Recycling and Compost								X ^(d)	Υ		
10	Atlantic Recycling International Systems		X ^{(a)(b)}	X ^{(a)(b)}								
11	Success Africa Ghana		X ^(f)				Х			Υ	Υ	Υ
12	Sentuo Resources Ltd		$X^{(a)(g)(h)}$			X ^(e)				Υ		
13	Non-ferrous Metals Ltd					X ^(e)	X ^(f)			Υ		Υ
14	Eco-Star Environmental Ltd								X ^(d)	Υ	Υ	Υ
15	Electro Recycling Ghana		X _(p)	X ^(b)						Υ		
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

Market Entry Study for E-Waste Recycling Facility in Ghana



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.