

Market Survey Waste and Circular Economy in Ghana

July 2019

An assignment of Holland Circular Hotspot





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Cover photo: Street view next to the Agbogbloshie e-waste dumpsite in Accra, May 2019

Expert



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Abbreviations

CE	Circular Economy
MESTI	Ministry of Environment, Science, Technology and Innovation
MMDAs	Metropolitan, Municipal and District Assemblies
MSME's	Micro, small and medium-sized enterprises
MSWR	Ministry of Sanitation and Water Resources
PPA	Power Purchase Agreement
SWM	Solid Waste Management

Exchange rate: 100 Ghanaian New Cedi = 16.33 Euro (3 July 2019)

Summary

This market report on waste management and circular economy in Ghana is the result of a 6-10 May, 2019 mission of a delegation of four experts from the Netherlands: Mr. Freek van Eijk of Holland Circular Hotspot, Mr. Reinhardt Smit of Closing the Loop, Mr. Hans van Ek of the Netherlands Enterprise Agency and Mr. Bert Keesman of the company MetaSus. The mission coincided with the 7-8 May, 2019 EU event: “*Circular Economy Opportunities in Ghana*”. It was financed by the Netherlands Enterprise Agency (RVO) and gracefully supported by the Royal Netherlands Embassy in Accra. The report was elaborated by Mr. Bert Keesman with inputs from the other team members.

The purpose of the project by RVO was: Stimulating the circular economy in Ghana leading to improved waste management (including plastic and recycling) and other socioeconomic conditions as well as increased bilateral cooperation and concrete opportunities for the Dutch and Ghanaian private sector (trade, investments and innovation) opportunities.

At the “Holland meets Ghana @ Recycling Fair” matchmaking event held October 26, 2017 in Gorkum, the Ambassador of Ghana to the Netherlands Mrs. Sophia Horner-Sam advertised Ghana as “Africa for beginners”. In the market study it was found that indeed, Ghana is a pleasant country to be in with a stable economy and a free democracy. However, the complicated investment climate, problems with land ownership and the lack of financing of the waste/CE sector make doing business a challenge. Same as in many export markets, one has to go in as an entrepreneur and for the longer term.

Waste plastics and e-waste pollution stand out in the minds of Ghanaians as priority environmental problems. They are also high on the list of business interests of Ghanaian entrepreneurs in waste/CE. In the case of plastics, specific legislation has been (and will be) drawn up, donor agencies have stepped in and there is a significant private sector active in plastics processing. This generates opportunities for Dutch suppliers of waste management technology, services and higher value circular business models in waste plastics. In e-waste, the Agbogbloshie e-waste dump (and similar others) is a scar on the environmental score sheet of Ghana. Countries in Western Europe are partially to blame because of the vast amounts of used electronics they send to Ghana. Donor agencies have stepped in here as well. This creates opportunities for Dutch suppliers of locally applicable e-waste processing technology and business models.

In the Ghanaian waste sector not only the informal sector but also the organized private sector plays a relatively predominant role. This certainly applies for the company Zoomlion and other member companies of the Jospong Group. Their standard of waste management appears to be relatively high and they are an important contact for the Dutch waste/CE sector. Before establishing such contacts, it is recommended to contact fellow Dutch entrepreneurs who have already done business with Zoomlion. The LinkedIn group as advertised in this report is the recommended platform for this.

The May 7-8, 2019 EU event on circular economy attracted a large audience. The concept of circular economy is new in Ghana but it certainly has potential. For the Netherlands, to (help) establish a sort of circular economy incubator may be a sound investment in the future. At the same time, it is important to support and upgrade the waste management infrastructure and set

of regulations and enforcement, if only to create a (future) market for more sophisticated Dutch waste management equipment and services that will help higher end circular business models.

Ghana, surprisingly, is depending on food imports. Sustainable and circular agriculture (including circular solutions for organic waste), possibly based on cooperative models as a result of the challenging land ownership situation might answer a need. Abundant residual biomass resources so far go to waste or are used for energy generation. The field is wide open for business models which are higher up on the Biomass Value Pyramid, such as the production of pharmaceuticals from biomass, food and feed, bioplastics and bulk chemicals.

As a next step it is recommended to organize a business mission on waste, agri-food and biomass, and circular economy later this year. This way, the interest on the part of the Dutch waste/CE sector can be tested and the possibility of an RVO Partners for International Business or Impact Cluster program may be explored.

Opportunity: SBIR Ghana

Keep an eye out for the upcoming Ghana call of the Small Business Innovation Research program (SBIR). Entrepreneurs will be asked to come up with solutions for specific challenges in sustainable city management. Waste/circular economy will be a prime topic. The launch of the call will be announced on the LinkedIn Group.



1. Introduction

“Ghana is Africa for beginners”. With these words the Ghanaian Ambassador to the Netherlands, Mrs. Sophia Horner-Sam, opened the “Holland meets Ghana @ Recycling Fair” event on October 26th, 2017. This matchmaking activity was the climax of an incoming one-week mission of a high-level delegation of 21 representatives of the Ghanaian waste management sector. It was headed by the Minister of Water and Sanitation Mr. J. Kofi Adda.

It has been a while, but in the week May 6-10, 2019 this mission was followed up by a market study on waste management and circular economy in Ghana. It was financed by the Netherlands Enterprise Agency through the Holland Circular Hotspot. This survey was carried out by a team of four: Mr. Freek van Eijk of the Holland Circular Hotspot, Mr. Reinhardt Smit of the company Closing the Loop, Mr. Hans van Ek of the Netherlands Enterprise Agency and Mr. Bert Keesman of MetaSus. The current report of the survey has been elaborated by Mr. Bert Keesman of MetaSus with valuable inputs from the other team members. It is very much a working document without any scientific ambitions. It is primarily meant to help Dutch entrepreneurs to decide whether it is worthwhile to become active in Ghana (and whether Ghana can indeed be considered “Africa for beginners”).



2. Ghana

2.1 A very brief introduction

Situated in Western Africa close to the equator, the Republic of Ghana borders Ivory Coast in the West, Burkina Faso in the North, Togo in the east and the Gulf of Guinea in the south. It is about 5.7 times the size of the Netherlands. With a population of roughly 30 million it is quite a bit less crowded.

In olden days, Ghana was known as the “Gold Coast”, so it is no surprise that colonial powers developed a keen interest in this part of Western Africa. In the 15th century the Portuguese were the first to set foot on the Gold Coast region, followed by the Dutch, the Swedes, the French and the Danes. The southern part of Ghana became a center for the slave trade. Many forts along the coast are lasting reminders of this period. In 1874 Great Britain established control over part of Ghana and gradually expanded this control in the years after. On the 6th of March 1957 Ghana became the first country in the sub-Saharan region to gain independency.

English is the official language in Ghana. Additionally, there are eleven officially recognized local languages. Akan, the most important one, is spoken widely in the south. Ghana is a largely

Christian country, with a sizable Muslim minority in the north. Religion plays quite an important and visible role in Ghana. The abundant signs on cars and buses (“Give thanks to God”) are testimony to this.

Ghana has been a relatively stable country for quite some time now. Over the past decades, sitting presidents have stepped down in favor of democratically elected successors. The current President Mr. Nana Akufo-Addo was elected in 2017. This stability has no doubt contributed to Ghana’s steady GDP growth since 1984. The GDP stood at 4,290 US\$ PPP in 2017. Interestingly, the Netherlands is number five in the list of top export destinations for Ghana with



annual sales of US\$ 911 million (data 2017, OEC¹). In that same year, Ghana imported US\$ 404 million worth of products and services from the Netherlands.

The biggest cities in Ghana are Accra and Kumasi. Coastal Accra is reported to have a population of about 2.5 million with an annual growth rate of 2%². Kumasi, situated 250 kms inland from Accra, has over 2 million inhabitants. For starters on the Ghanaian market, the Accra - Tema corridor along the coast (population approximately 2.7 million) is probably the zone to focus on (depending on your line of business). This is a fast-growing region with relatively good logistics and has been the main focus of this market survey. If you want to become active in other parts of Ghana, the size of the country and the poor road connections are factors to keep in mind.

2.2 Ghana in a global perspective

The parameters below can help to put Ghana in perspective relative to other countries.

Per capita income

The per capita GNI is the gross national income divided by the mid-year population. As mentioned earlier, in 2017 Ghana registered US\$ 4,290 per capita. This is in the same range as Bangladesh and Sudan (Source: World Bank). Surrounding countries have a per capita GNI of US\$ 3,820 (Ivory Coast), US\$ 1,810 (Burkina Faso) and US\$ 1,720 (Togo).

GDP Growth

In the period 2008-2017, average GDP growth in Ghana has been a healthy 6.92%. In 2011, GDP growth peaked at over 14%, whereas in 2015 a lower end of 2.18% was registered. In 2017 GDP growth was back at 8.14% (source: World Bank).

Trade freedom

As far as trade freedom goes, the Heritage Foundation ranks Ghana worldwide at place 109 in the “mostly unfree” category. The overall trend is upward though. According to the Heritage Foundation, Ghana’s economy has thrived for decades under relatively sound governance and a competitive business environment, but it has suffered in recent years as a consequence of loose fiscal policy, high budget and current account deficits, and a depreciating currency. A further remark is that the process to get clear title over land is often difficult.

Corruption

On the Corruption Perception Index of Transparency International, Ghana ranks number 78, same as India and Turkey (data 2018). It is observed that corruption exists in all branches of Ghanaian government, and there is often a lack of accountability. The creation of the Office of the Special Prosecutor has instilled new hope in Ghana’s anti-corruption efforts.

¹ The Observatory of Economic Complexity.

² This estimate is in line with official figures. Some say that Accra’s population is more like 4,5 to 5 million, even growing to 7 million during the day. This would make the waste situation all the more urgent.

Education

On the UNDP Human Development Index Ghana is at place 138.

Ghana has been categorized as a middle-income country since 2010. All in all, Ghana still has quite a way to go on the pathway towards development, especially when it comes to sustainable development, but in Sub-Saharan Africa it is a relatively stable economy.

3. Current solid waste situation in Ghana

3.1 Waste production and expected growth

Reliable and recent data on waste generation in Ghana is scarce. In December 2015, Kodwo Miezah et al. of the Kwame Nkrumah University of Science and Technology in Kumasi published the results of a practical study into the quantities and composition of household waste for different types of regions in Ghana. For the whole of Ghana, the group came up with a figure of 0.47 kgs/pppd. This seems low. On the other hand, a national figure of 1 kgs/pppd is reported pretty consistently but it is doubted whether this figure is more than a convenient estimation. For the purpose of this study, an average of 0.75 kgs/pppd is assumed, a figure which can be used for back-of-the-envelope calculations but should not be quoted. With a population of 30 million, this would put the waste output in Ghana at 22,500 tons per day. The Accra-Tema corridor is a relatively dynamic and affluent area where a waste output of 1 kgs/pppd may actually be a proper estimation. With an estimated population of 2.7 million the waste output here is 2,700 tons per day.

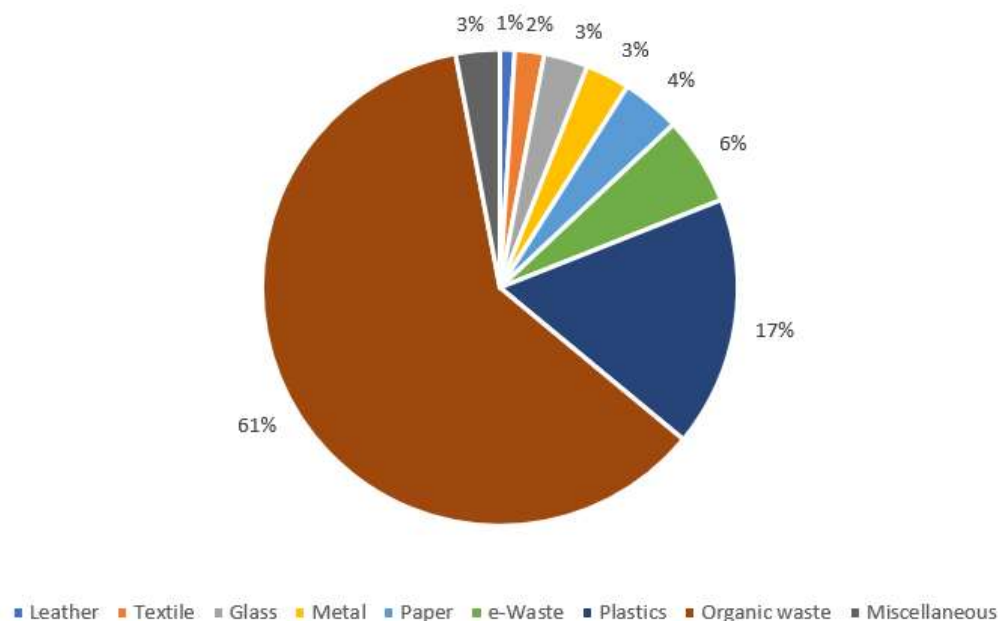


FIGURE 1. COMPOSITION OF MUNICIPAL WASTE IN GHANA³.

The composition of the waste is typical for developing countries, with an organic waste content reaching 61% in this case. Miezah et al reported 67% in 2015 but they included paper. Recyclables including plastics, textiles, metals, glass, rubber and leather accounted for 22% in their study.

³ Source: Press statement by the Ghana Plastic Manufacturers Association on 7 May 2019.

3.2 Waste collection, transport, treatment and recycling

3.2.1. Waste collection and transport

Same as in many other countries on the road towards development, the emphasis in Ghana is on collection and transport of the waste and less on waste treatment and disposal. The fact that the waste collection companies are also in charge of collecting the waste fees no doubt contributes to this situation.

Rich neighborhoods tend to be serviced through door-to-door collection. Citizens that pay the waste fees get serviced, others do not. In poor neighborhoods, households, market vendors etc. have to take the waste to the communal containers. This is done by a wide range of transport vehicles such as donkey carts, three-wheeled tractors, tricycles (see photo) and even headloads.

Bad road conditions in densely populated poor neighborhoods make waste collection a challenge. As a result, lots of waste remains uncollected, contributing to a dirty and unsafe environment.



Over the last decades, the private sector (including waste pickers) has become more and more involved in waste management operations. According to Mr. Anthony Mensah, Director of Sanitation of the Ministry of Sanitation and Water Resources, nowadays 80% of waste services in the 254 Metropolitan, Municipal and District Assemblies (MMDAs) of Ghana are provided by the private sector. The impression is that the shift towards the private sector has effectively improved waste collection services in the major cities in Ghana.

3.2.3. Waste treatment including recycling

Plastics recycling

Area	Quantity	Capacity (tonnes/day)
Accra metropolis	10	140
Tema	10	110
Kumasi metropolis	3	45
Takoradi	2	25
Total	25	320

TABLE 1. NUMBER OF PLASTICS RECYCLING PLANTS IN GHANA, MAY 2019

Over the past 10 years or so, there has been a strong increase in the amount of flexible plastics being recycled in Ghana. Many people have become engaged in the collection and washing of the recyclable waste. These activities are often community based where waste pickers are organized into cooperatives. After collection and cleaning, the recycled plastics are transported to a growing number of recycling plants of various capacities. There are 25 well-established

plastic waste recycling companies (SME's) presently operating in Ghana. Table 1 shows the location of these factories and the quantities processed.

As shown in Table 1, the 25 recycling companies process about 320 tons of plastic waste per day, mostly pure water sachet waste (see picture, even imports from Burkina Faso, Mali and Togo) and other flexible plastic waste from the streets. The value is Ghc 256,000 or EUR 44,100. In a month, the recycling companies pay at least Ghc 6.7 million (EUR 1.15 million) to plastic waste collectors.



Some of the products made from recycled plastics include take-away carrier bags, refuse bags, buckets, dustbins, shoe soles, doormats, car mats etc. This is quite an impressive list but sources from within the sector report that markets for recycled materials are still weak in Ghana. Most of the granules are used for the manufacturing of carrier bags. According to the Ghana Plastics Manufacturers Association, two companies are setting up plants to process plastic waste into diesel fuel.

Opportunity: PET Bottle Waste

In many countries, PET bottles are the most valuable component of the plastic waste. Not in Ghana. PET bottles are everywhere. Beaches are covered with them. How is this possible? According to the Ghana Plastic Manufacturers Association (GPMA), PET bottle production in Ghana currently stands at 68,000 metric tons a year. Together with imported PET bottles, a staggering 73 million kilos of PET bottle waste is released into the environment every year. Current recycling of PET bottle waste in Ghana is about 2% because there is virtually no difference between the cost of recycled PET and the cost of virgin material. The Environmental Service Providers Association ESPA has launched a project "Integrated Recycling and Compost Plant" with a component to recycle PET bottle waste. All in all, at this stage PET recycling (and possibly trade) appears to be a most promising field in Ghana.



Interestingly, there is an Environmental Excise Tax in place in Ghana. This 10% levy on semi-finished and raw plastic materials and also some plastic products can be considered a form of Extended Producer Responsibility (EPR). Together with its predecessor (a 20% Ad Valorem on Plastics) it has been in place since 2011 and has by now accrued some Ghc 912 million (about 157 million euro). The problem is, to date a fund secretariat has not been set up so the funds have been paid into the Consolidated Account of the Government. Efforts are underway to get the funds released so the plastics recycling industry can be supported as was originally the intention. On May 7, 2019 (during the stay of the Dutch Expert team) the Ghana Plastics Manufacturers Association issued a press release to this effect. However, it is doubtful whether these funds will ever be released as they have probably been used for other purposes. Further

demands included a ban on imports of flexible plastic bags and packaging and to pass a Legislative Instrument on rPET.



A noteworthy development is the Ghana Recycling Initiative by Private Enterprises (GRIPE), established in November 2017. According to the website (<https://thegripe.org>), this is a coalition formed under the Association of Ghana Industries (AGI) of eight multinational companies with a stake in the plastics sector to integrate sustainable waste management solutions, particularly around plastics. Member companies are Coca Cola, Voltic, Unilever, Nestlé, PZ Cussons, DOW, Guinness Ghana and Fan Milk. Activities include a public awareness campaign and education about plastic waste issues; placing waste containers in Accra and Tema; construction of a sorting center in Tema; and a pilot project around plastic modified concrete. Although these activities are laudable in themselves, the impression cannot be avoided that GRIPE was established partially to hold off a formal Ghanaian EPR system in packaging as long as possible.

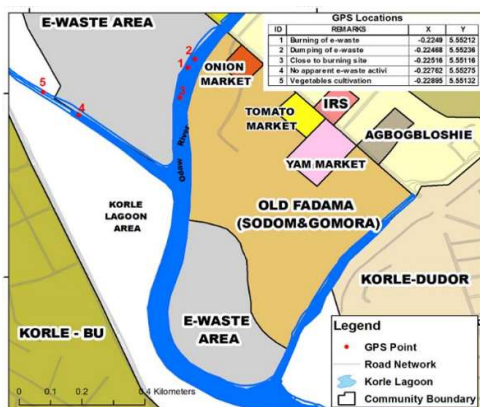
So, the situation in Ghana is: there is a 10% Environmental Excise Tax on plastics, the proceeds of which do not feed into the plastics recycling sector. The Government does not have a timetable for the introduction of a formal EPR system on packaging, and the big bottling companies appear to be holding off such system (although rumor has it that they have suggested to set up a voluntary EPR system, but they wanted the Government to oblige all companies (including SME's) to become part of it). A solution may be to replace the 10% Tax with an EPR system monitored by Government and managed by the private sector. In that case the funds could be channeled towards strengthening the plastics prevention and recycling sector.⁴

E-waste recycling

The situation regarding e-waste in Ghana is precarious. Ghana is the final destination of huge amounts of second-hand electronic equipment originating from industrialized countries including the Netherlands. According to a group of Ghanaian waste sector experts gathered at the Dutch Embassy on May 6, 2019, every week 45 containers loaded with at least 15 tons each of used electric and electronic equipment arrive in Ghana (total over 95 tons/day). Roughly 60% of this e-waste comes from Europe, 20% from the USA and 20% from Canada. In view of the Basel convention, this e-waste is shipped as “usable units” but in many cases it is actually e-waste. Currently there is no formal technically adequate e-waste processing facility in Ghana, so the e-waste is processed manually. Two members of the expert team visited the Agbogbloshie e-waste dump in the outskirts of Accra and described it as “*a poor man's circular economy under the most deplorable of circumstances*”⁵. Approximately 40,000 workers process the waste, most of them from the (Islamic) north of Ghana but also from surrounding countries such as Burkina Fasso, Ivory Coast, Mali and Nigeria. They make a few euros per day by selling the copper and other metals they get by taking apart equipment and burning wires.

⁴ Actually, Ghana used to have an effective glass bottle return system for beverages. Out of cost considerations the industry changed from glass to plastic packaging, however, without a return system in place for plastics.

⁵ In this context “A poor man's circular economy” is meant as an unregulated repair and (partial) recovery practice that recovers valuable materials and functionality from discarded products but also causes serious collateral impact on health and the environment.



Map of Agbogbloshie area



The Odaw river is heavily polluted⁶



Dangerous fumes from copper wire burning



Kitchen utensils are produced on-site



Goats feeding on organic waste



Selling fruit next to the dumpsite



Valuable parts are stored in old freezers



Sign next to the Agbogbloshie waste dump

FIGURE 2. IMAGES OF THE AGBOGBLOSHIE E-WASTE DUMP IN ACCRA.

⁶ Agbogbloshie photos 1 through 6 copyright Mr. Freek van Eijk Holland Circular Hotspot.

The Odaw river between the waste dump and the Old Faduma slum (a.k.a. Sodom & Gomorra) is full of lead, mercury, thallium, hydrogen cyanide, dioxin and brominated flame retardant that come from the fumes of the burning waste. On the internet, videos are available on the daily life on the Agbogbloshie dump. Freek van Eijk of Holland Circular Hotspot made his own photo impression, part of which is shown below.

There may be good news in the sense that several donors are starting to work with the Ghanaian Government to remediate the e-waste situation. The European Union is launching the program "E-waste Management in Ghana: From Grave to Cradle". The idea is to help formalize the currently informal workforce, improve the collection mechanism for e-waste, disseminating best practices and creating awareness. The German GIZ is planning to invest EUR 10 million in 1/ policy making regarding e-waste; 2/ developing new business models for e-waste; and 3/ involvement of the informal sector (a program of 1,5 years). A further EUR 20 million will be invested in an EPR scheme for e-waste; fee collection by the company SGS; and setting up a recycling factory for e-waste. This recycling factory is said to be constructed by the Swiss company Immark (<http://www.immark.ch>).

Organic waste and resources

As mentioned before, the market survey was carried out in the Accra-Tema area. Rural Ghana, where most of the agricultural residues originate from, was not included in the itinerary. This is why the information below is primarily based on existing publications (see also the literature list in the back).

If we look at residual organic materials as resources rather than waste, there is no doubt that Ghana is well endowed with a wide variety of organic materials that can be used to harvest valuable substances as well as energy. Table 2 below provides an overview.

Type of residual organic resources available in Ghana	
Municipal organic residues	Agri-industrial residues
Municipal solid waste	Oil palm processing
Municipal sewage sludge	Fruit processing
Food processing residues	Cocoa processing
Market residues	Starch production
	Breweries
	Cashew processing
	Livestock farming
	Slaughterhouses

TABLE 2. TYPES OF RESIDUAL ORGANIC RESOURCES AVAILABLE IN GHANA

Thomson (2014) argues that there are strong incentives for increased bioenergy production in Ghana, because it will foster self-sufficiency for farmers and communities, cleaner fuels, and the possibility of closing the nutrient-cycle. Although Ghana currently is still depending on food imports, the 2019 "Ghana beyond aid" strategy lays out a goal of increasing local food production. If this is successful, there will also be additional biomass residues in the future.

In 2014, Kemausuor et al. made an inventory of the main agricultural residues' potential in Ghana. Table 3 shows the results for the ten most cultivated crops in the country. The volume of the residual material takes into account the estimated recoverability and the residue-to-product ratio and therefore reflects the real usable portion of the biomass. Additional figures are available in the Partners for Innovation report (2014).

Type of crop	Type of residue	Mt/yr
Cocoa	Pods	0,67
Maize	Stalks, husks, cobs	3,03
Cassava	Stalk, peelings	1,43
Yam	Straw	2,82
Oil palm	EFB, kernel shells, fiber	0,74
Ground nut	Shells, straw	1,18
Plantain	Trunks and leaves	1,68
Sorghum	Straw	0,46
Cocoyam	Straw	0,61
Rice	Straw, husks	0,31

TABLE 3. ANNUAL VOLUME OF RESIDUAL BIOMASS FROM AGRICULTURE IN GHANA.

For those considering to engage or even invest in biomass projects in Ghana, the publication "Bioenergy from agricultural residues in Ghana" by Thomson provides a sound introduction. It contains estimations of the bioenergy potentials of the main agriculture residues and identifies specific residues for future biorefinery applications. If it comes to residue-based ethanol production, it is recommended to focus on starchy residues such as peelings of yam, cassava and plantain. They hold the largest potentials per unit of mass and they require relatively simple processing steps. On top of this, they become available in large quantities at processing facilities, in other words, not scattered in the fields. This is a key factor in view of the inadequate and lengthy transport infrastructure in Ghana.

Thomson recommends increased application of Anaerobic Digestion (AD) as the first bioenergy option, since AD is more flexible compared to ethanol production when it comes to the feedstock and scale of production. Low tech systems can process available manure and municipal liquid waste. This input can be complemented with high biomethane potentials such as starchy peelings, cocoa husks, maize husks and maize cobs. All in all, it is estimated that biomethane on the basis of agricultural residues could replace some 20% of the current use of heat in households (situation 2014). In order to make this happen, small-scale AD solutions should be introduced, designed for utilizing agricultural residues under manure- and water shortage.

There is a potential for the increased use of compost in Ghana. However, bad quality (contaminated) compost has been offered in the market, so farmers and other types of clients tend to be hesitant to apply compost on their fields. A compost certification program could improve this situation.

In an assignment for the Royal Dutch Embassy, in 2017 the Agro Eco Louis Bolk Institute elaborated a report "Compost marketing and distribution study [in Ghana]" (see reference list in

the back). It was found that in 2016, in the Greater Accra Metropolitan Area (GAMA) 16,000 tonnes of compost was marketed made out of household waste. According to the report, by now the compost use in the GAMA should have grown to 60,000 ton/yr. An interesting characteristic of the market for compost is that the Ghanaian Government is subsidizing the use of compost. For those interested in entering the Ghanaian compost market one way or another, the 2017 report is highly recommended, although circumstances may have changed since then.

In the circular economy, the goal is to follow a “cascading approach”, optimizing the overall value of the residual biomass. The guiding principle is the so called “Biomass Value Pyramid”. First one seeks to find pharmaceutical applications for the biomass, then food and (animal) feed, then bioplastics and polymers, followed by bulk chemicals and fuels. The lowest value application of the biomass is energy and heat. As will be shown later in the “Circular Economy” section of this report, some Ghanaian initiatives can be categorized in the higher strata of the Biomass Value Pyramid, such as the use of Katemfe leaves for food packaging and the application of bamboo in bicycle frames. However, most initiatives are geared towards the use of the energy content of the biomass, for instance to provide energy in remote rural areas. This means that the higher end of the Biomass Value Pyramid is still wide open for Dutch entrepreneurial involvement.

3.2.5. Waste to Energy

Waste to energy can refer to a large spectrum of activities: from small scale digesters to large scale waste incinerators with energy recovery.

The Renewable Energy Act of 2011 (Act 832) has paved the way for Waste to Energy projects in Ghana. Some key provisions are the following:

1. a 10-year guaranteed feed-in rate for Waste-to-Energy of US\$ 17,5 to 18,5 cts/kWhr (after the initial period it is reviewed every two years);
2. a purchase obligation for priority off-take of renewable energy for the three distribution utilities and bulk customers in Ghana;
3. open access to transmission and distribution systems; and
4. The establishment of a Renewable Energy Fund, to support the promotion and development of renewable energy.

In spite of these more or less favorable arrangements, the reality today in Ghana is different. At the Ministry of Sanitation and Water Resources the expert team was informed that “incineration is at the far end” as an option for waste treatment. This may partially be due to the fact that currently there is no shortage of electricity in Ghana. The feed-in tariff for renewable energy has therefore been lowered to US\$ 12 cts/kWhr. The Energy Commission is not even selling Power Purchase Agreements (PPAs) for electricity.

The Netherlands is involved in a project on waste recycling, incineration and electricity generation. The Dutch company Spaans Babcock, together with the Tema Metropolitan Assembly and Global Communities, is planning to recycle approximately 20 tons/day of solid waste, incinerate about 180 tons/day and produce 5MW of electricity from the Tema Landfill site. However, this project has run into trouble because of the lower feed-in tariff and the fact that no PPA's are currently issued.

The same may be the case for a much bigger project that was launched in 2018. Armech Africa Ltd (www.armechafrica.com) announced that a 60MW Waste-to-Energy power plant was to be built in Tema. This plant is to serve six metropolitan and municipal assemblies in the Greater Accra region (Accra and Tema Metropolitan assemblies, Ga South, Ga East and the La-Dade Kotopon Municipal assemblies). It is supposed to be able to process the full 3,000 metric tons a day that is generated in the Accra area. Armech entered into a Public Private Partnership Agreement with the Electricity Company of Ghana. The financing is arranged through the Industrial and Commercial Bank of China, a Chinese Multinational Bank. Construction will be carried out by Energy China (<http://en.ceec.net.cn/>). Plans for a second plant in Kumasi were also announced. However, recently there haven't been updates about these projects.

From a technical point of view, as long as Ghana's residual waste has a 60% share of "wet" organic waste, incineration is not very attractive. Either source separation (aimed at extraction of unwanted hazardous waste, wanted valuable recyclables and organic waste) or post sorting is needed to create the right kind of fuel for incinerators or, alternatively, existing installations that can accept co-incineration of waste.

The upscaling and extension of smaller scale digestion projects may be a more realistic road to follow in the short term.

In this sense, the company Safi Sana is an interesting example. Safi Sana is a Dutch company that designs, constructs and operates waste-to-energy factories in developing countries. Ghana is a prime export country. On its website www.safisana.org the company explains how it works:



- Both fecal and organic waste from urban slums is collected (from toilets, food markets, industries and slaughterhouses)
- This is used as input to the factory
- In the factory, waste is treated in a digester to create organic fertilizer, irrigation water and biogas
- The biogas is subsequently used to produce electricity
- The irrigation water and part of the organic fertilizer are used to grow seedlings

In 2017, Safi Sana established a pilot project in Ashaiman, a settlement of 250,000 people between Accra and Tema. The investment costs were primarily contributed by donor agencies, whereas the operational costs are covered through the sale of electricity, biogas, organic fertilizer, and seedlings.

The Safi Sana experience with digestion is uplifting. In view of the fact that waste management and power generation in the long run both present enormous challenges to the country, anaerobic digestion technology can be a secondary source of power generation, in addition to reducing the waste that otherwise will be destined for the landfills.

3.2.6. Waste disposal

For its waste disposal, Ghana still depends heavily on landfills and waste dumps. Landfill operations often boil down to un-engineered open pit waste dumping with no leachate control, hardly any application of cover material, open access to scavenging animals, rodents and other

disease vectors. In the framework of this market study an attempt was made by two members of the expert team to visit the Kpone landfill site in Tema. However, as it turned out, the manager of the landfill Mr. Ernest Nlason did not feel sufficiently comfortable to show the team the waste disposal site without a formal request by his superiors.

The Kpone landfill is administered by the Ministry of Local Government and the Ministry of Sanitation and Water Resources, together with the Tema Municipality. It receives household waste as well as commercial and industrial waste. Originally designed for a capacity of 500 tons/day for the Tema area, it now serves as the main landfill for the Accra-Tema corridor and receives approximately 1,200 tons/day of waste. The landfill has four cells, each with a capacity of two years. Waste is piled up to a height of 25 meters.

A second phase to the landfill is currently planned. This is badly needed as in April 2019 it was reported that both the Kpone and the Nsumia landfill were turning away waste vehicles due to capacity problems and technical challenges. The Kpone landfill has also received complaints from local residents, who argued that the risk of a major outbreak of disease within the community was imminent due to the unbearable stench and poisonous sludge that flows from the site through the town's open drains into the sea during the rainy season.

In the framework of this market survey, other landfills were not visited. The impression is that the problems encountered at the Kpone landfill are exemplary for many similar sites in Ghana, and that in most of Ghana the situation is even worse.

3.2.7. Financial aspects

In Ghana, waste collectors in the door-to-door business do not only collect waste – they have to collect the waste fees as well. According to our contact at Zoomlion, the rate is 20 to 100 Cedis per month (EUR 3.30-16.50), depending on the area. No doubt these tariffs reflect the situation in some of the more affluent parts of urban Ghana. Currently the municipalities do not play a role in the fee collection. Households are not registered, and the payment discipline is low. If a household does not pay for the waste collection, the service stops and the waste generated by this household disappears under the radar. A further sign that the sector is highly underfinanced is that there are no tipping fees in Ghana.

The expert team paid a visit to Mr. Anthony Mensah (photo), the Director of Sanitation at the Ministry of Sanitation and Water Resources. Mr. Mensah turned out to be concerned about the malfunctioning waste fee collection system. He was very receptive to ideas on how to introduce a stratified 100% coverage fee collection system managed by the municipalities in Ghana. Stratified in the sense that all households pay, but affluent people pay more than average and poor people pay less. For the Netherlands, cooperating with the Ghanaian Government in this area is like laying the foundation for raising waste management in Ghana to the next level. An array of new business opportunities would open up for Dutch companies. One focus of such program would have to be how the fees are actually collected. Digital payment methods may be considered, same as collection through the water or electricity bill. A south-south cooperation facilitated by the Netherlands may be contemplated as many developing countries are facing the same problems and some have already come up with solutions (for example Colombia).



3.2.8. Circular economy approach

Circular economy is still a relatively unknown concept in Ghana. In that sense the 7-8 May EU seminar on “*Circular Economy Opportunities in Ghana*” was groundbreaking for many of the attendees. And yet, a lot is happening already in Ghana which perfectly fits the term circular economy. In order to get an impression of this, let’s break down the circular economy approach into ten so called “R-strategies” and then look how we can categorize a range of existing initiatives or businesses happening in Ghana.

The R-strategies are depicted in Table 4 (source: PBL, 2017). From a sustainability point of view the low R strategies are the preferred options (but all initiatives are laudable).

Type	R#	Name	Strategy
Smarter product use and manufacture	R0	Refuse	Make product redundant by abandoning its function or by offering the same function with a radically different product
	R1	Rethink	Make product use more intensive (e.g. through sharing products, or by putting multi-functional products on the market)
	R2	Reduce	Increase efficiency in product manufacture or use by consuming fewer natural resources and materials
Extend the lifespan of the product or its parts	R3	Re-use	Re-use by another consumer of discarded product which is still in good condition and fulfills its original function
	R4	Repair	Repair and maintenance of a defective product so it can be used with its original function
	R5	Refurbish	Restore an old product and bring it up to date
	R6	Remanufacture	Use parts of a discarded product in a new product with the same function
	R7	Repurpose	Use discarded product or its parts in a new product with a different function
Useful application of materials	R8	Recycle	Process materials to obtain the same (high grade) or lower (low grade) quality
	R9	Recover	Incineration of materials with energy recovery

TABLE 4. R-STRATEGIES IN THE CIRCULAR ECONOMY (SOURCE: PBL, 2017)

#		R0	R1	R2	R3	R4	R5	R6	R7	R8	R9
1	Suame Magazine in Kumasi					X	X				
2	Katemfe leaves as food packaging	X									
3	Bamboo bicycles initiative	X									
4	Closing the Loop	X								X	
5	City Waste Recycling									X	
6	Environment 360									X	
7	Safi Sana			X						X	X
8	GRIPE: Building from plastic modified concrete			X							
9	Switch Africa industrial symbiosis program				X						
10	COLIBA waste management app	X								X	
11	Agbogloboshie Makerspace Platform				X	X	X	X	X		
12	Nelplast from plastics to asphalt roads									X	

TABLE 5. R-RANKINGS OF SELECTED CIRCULAR ECONOMY INITIATIVES IN GHANA

With these strategies in hand we can categorize a range of current circular economy initiatives in Ghana and get an impression of the current state of affairs. The cases originate from the EU circular economy event, the Africa Circular Economy network and additional research. They are presented in random order. The list is by no means complete. Below Table 5 a brief explanation of the initiatives is provided.

1. **Suame Magazine in Kumasi** is the largest artisan engineering cluster in sub-Saharan Africa/West Africa. It has a working population of over 200,000 and approximately 12,000 shop-owners, mainly engaged in vehicle repairs and refurbishment and metal works. This places Suame Magazine in the R4, R5 and R6 category of the circular economy, although probably none of the 200,000 workers is aware of this.
2. In earlier days, large **Katemfe leaves** (*Thaumatococcus daniellii*; local name: "Ahaban") were often used in Ghana for food packaging and consumption. Now this habit is being re-introduced as a way to curb plastic packaging. Interestingly, the Katemfe leaves are reported to have medicinal properties in a sense that they reduce fats and cholesterol in the blood. They also enhance the flavor of food. This is a typical example of an R0 CE strategy: the Katemfe leaves offer the same function as plastic, and more!
3. The **bamboo bicycles initiative** scores an R0 for offering the same function with a different product. What is especially sustainable in this case is that use is made of bamboo, which replaces the metal frame and is abundantly available in Ghana. The company (<http://ghanabamboobikes.org/>) wants to diversify into e-bikes and solar bikes. It is a truly purpose-driven company – they have given away 500 bamboo bicycles to Ghanaian youngsters.
4. **Closing the Loop** (<http://www.closingtheloop.eu/>) is an ingenious business model (R0) for the recycling (R8) of discarded mobile phones in Ghana. The Dutch company has a mobile phone offset program, in which it strikes a deal with big Governmental organizations and private companies in the Netherlands. The moment these companies purchase new mobile phones for their employees, they pay Closing the Loop to collect an equal amount of discarded mobile phones in Ghana. The precious metals in the phones add to the business model. Closing the Loop aims to expand its operations in Africa. This business model could probably be applied to other products as well.
5. **City Waste Recycling** – Ghana-based CWR recycles waste (category R8) ranging from e-waste and batteries to sawdust and plastic. It sources its materials from local industries and waste collectors in the city of Ho. From this waste, CWR generates products such as plastic pellets, printed circuit boards and biogas (compost). It exports recycled e-waste products.
6. **Environment360** (www.environment360gh.org) creates community and corporate recycling programs in Ghana. This places the company in the R8 category. It collects the waste and sells of the recyclables. It further works on awareness-raising on waste recycling and sanitation issues.
7. **Safi Sana** – The Netherlands-based and previously mentioned company Safi Sana collects fecal and organic waste from urban slums (toilets, food markets, industries and slaughterhouses). This waste is treated in a digester to create organic fertilizer, irrigation



water and biogas. Thus, a reduction of the use of resources is achieved (R2), resources are recycled (R8) and energy is recovered (R9). The biogas is used to produce electricity and the irrigation water and part of the organic fertilizer are used to grow seedlings.

8. **GRIFE** is the Ghana Recycling Initiative by Private Enterprises, an industry coalition of eight major manufacturing companies. Its pilot of a five-seater toilet facility in Kumasi built from the first plastic modified concrete gains the coalition a spot in the R2 category.
9. **Switch Africa's** industrial symbiosis program for three regions in Ghana (Ashanti, Greater Accra and Western Region) is an activity in the R3 category, where waste of one company is used as a resource by another.
10. **COLIBA Waste management app**. The start-up company COLIBA is based in Ivory Coast. It has launched a mobile application and a messaging system to facilitate the collection of recyclables. To report waste, the user presses a single button on the app. It is then geo-located and picked up by associated recyclers. The user receives points which can be transformed into phone credit, vouchers, meal tickets etc. In 2016 COLIBA carried out a pilot in five Ghanaian schools⁷. The company is ranked R8 for promoting recycling and R0 for doing this through an innovative business model. A similar system called "Ecorewards" is being introduced on a pilot basis in Osu (Accra) by the company Chaint Afrique GH Ltd. A possible downside of these systems is that it may promote cherry picking from the waste, rendering the residual waste stream less valuable.
11. **Agbogloboshie Makerspace Platform**. AMP is a maker collective sited at and around the Agbogloboshie e-waste scrapyards in Accra. It serves as a regional hub for recycling and local manufacturing. Materials, parts and components are reclaimed from expired consumer goods, remade as feedstock for new manufacturing and repurposed with new use-value. Initiated by DK Osseo-Asare and Yasmine Abbas in 2012, AMP has engaged over 1500 youth from West Africa, Europe and USA. It ranks R3 to R7 on our CE scorecard.
12. **Nelplast** is turning plastic garbage into stone-like pavement blocks which can be used to build new roads. Nelplast can use just about any form of plastic waste to create their asphalt-like material. This technology can be categorized in the R8 section of the circular economy (recycling).

The examples above show the variety of ways that the circular economy is already taking shape in Ghana (and there are many more). In some cases, it is a question of reaching back to old habits, such as wrapping foodstuff in Katemfe leaves, using baskets instead of plastic bags when going to the supermarket, or engage in home composting in the back yard. In Suame Magazine and at the Agbogloboshie Makerspace Platform one could speak of a "poor man's circular economy", well suited to the Ghanaian circumstances and with an occasional innovative twist. The bamboo bicycle initiative is vintage circular economy in a sense that it is a redesign of a well-known product to replace expensive parts (with a significant environmental footprint) with locally available material, in this case bamboo. Adding to the sustainability gain is the fact that the end product is a bike, which can replace the use of a car for short distances. Finally, the "Closing the Loop" initiative is an effort to achieve sustainability gains through a materials offset

⁷ This information originates from "Disrupt Africa" (<http://disrupt-africa.com/>), a most informative website with news, information and commentary pertaining to the continent's tech startup – and investment – ecosystem.

program in phones between the Netherlands and Ghana (and possibly more countries in the future).

An important aspect of the circular economy approach is the emergence of a so called "sharing economy". Here, business concepts are based on the replacement of ownership of equipment, tools, consumer goods etc. by a mechanism of sharing resources. In the market study no formal examples of the sharing economy were encountered, although no doubt at an informal level a lot of resources are shared in Ghana. One sector in which the sharing economy could be promising is agriculture. Ghana, surprisingly, depends on food imports. Sustainable and circular agriculture (including circular solutions for organic waste), possibly based on cooperative (sharing) models may answer a need, and could even play a role in ameliorating the challenging land ownership situation.

All examples can serve as inspiration for additional ideas to promote the circular economy in Ghana. This is the goal of the Ghana chapter of the African Circular Economy Network (ACEN, Mrs. Joanna Bingham, contact details in chapter 8). For Dutch internationally oriented entrepreneurs in circular economy it is recommended to get in contact with ACEN to fully explore the wide variety of opportunities in Ghana.



You are cordially invited to join the LinkedIn Group "
Holland - Ghana Business and Cooperation on Waste
Management and Circular Economy " at:

<https://www.linkedin.com/groups/12074594/>

4. Legal framework and authorities

Table 6 shows an overview of environmental legislation and regulations in Ghana. A distinct feature of the waste management sector in Ghana is the strong role of the private sector (companies and informal sector) relative to the role of the public authorities. As it turns out, this situation has been promoted actively by the Government of Ghana. In the National Environmental Sanitation Policy in 2010 the private sector was given a prominent role in the execution of waste management services. According to Mr. Anthony Mensah, the Director of Sanitation at the Ministry of Sanitation and Water Resources, 80% of the services in the Ghanaian waste sector are now delivered by the private sector.

Law / regulation	Year	Significance
Local Government Act (Act 462)	1993	Defines the structure and responsibilities of local governments (MMDA's) in Ghana. Decentralization of waste management responsibilities to MMDAs. Defines that MMDAs should have waste management departments (so far four cities have this, i.e. Accra)
EPA Act 490	1994	Establishment of the Environmental Protection Agency of Ghana (under MESTI)
Customs and Excise (Duties and Other Taxes) Act 512	1996	Introduction of Environmental Excise Tax on plastic and plastic products (on polythene bags and other plastic packaging materials – see also “Plastics recycling”).
Ghana Landfill Guidelines	2002	Issued by the Environmental Protection Agency of Ghana
National Environmental Sanitation Policy (ESP)	2010	Includes solid and liquid waste, industrial and hazardous wastes, storm water drainage, environmental and hygiene education, vectors of disease, and disposal of the dead. Among other measures, it was determined that a major portion of environmental sanitation services should be carried out by the private sector through contracts, franchise, concessions and other arrangements
National Environmental Sanitation Strategy and Action Plan (NESSAP)	2010	A set of strategies and action plans meant to guide implementation by MMDAs in their environmental sanitation strategies. Accompanied by a Strategic Environmental Sanitation Investment Plan (SESIP) for 2010-2015.
Renewable Energy Act (Act 832)	2011	To promote renewable energy. Regulatory framework to attract investments. Feed in tariff defined, PPA's, renewable purchase obligation, open access to transmission lines, renewable energy fund
Ghana National Climate Change Policy	2013	Issued by MESTI, this policy aims for (1) effective adaptation, (2) social development and (3) mitigation. Many of the policy measures refer to the need for sustainable landfills with proper methane extraction and the need to increase recycling and divert from landfill
Oxo-biodegradable directive for plastics by MESTI	2015	All plastic products should include an oxo-biodegradable component to allow for decomposition
Hazardous and Electronic Waste Control and Management Act 917	2016	This legislation refers to WEEE, spent batteries as well as tires. It establishes an Eco-Levy on new and used equipment (US\$ 0.15 - 15 per product, depending on the type).

TABLE 6. LEGISLATIVE FRAMEWORK CONCERNING WASTE MANAGEMENT IN GHANA

The general opinion is that in Ghana, there is no shortage of laws and regulations, it is the enforcement that is lacking.

Two types of waste have been addressed specifically: plastics and e-waste. These issues are very much in the forefront of public environmental action in Ghana. As early as in 1996 an Environmental Excise Tax was imposed on imported plastics and plastic products. It took until 2011 to actually start levying this tax and a proper management authority for the fund was never set up. This means that the proceeds of this tax have thus far not favored the plastics recycling sector in Ghana. For e-waste (and spent batteries and tires) a similar tax was set up in 2016.

The Ministry of Environment, Science, Technology and Innovation is working on a plastic waste management policy. This legislation is due to come out by 2020.

There is no specific legislation on the circular economy yet in Ghana. But this may change soon. At the May 7-8, 2019 EU seminar on Circular Economy Opportunities in Ghana, the Mayor of Accra Mr. Mohammed Adjei Sowah stressed the importance of the CE approach in areas such as waste recycling, farming (producing fertilizers out of solid and liquid waste), construction as well as manufacturing. The Deputy Minister of the Ministry of Environment, Science, Technology and Innovation (MESTI) Mrs. Patricia Appiagyei emphasized the need to manage waste as a resource in order to develop circular economy opportunities in Ghana. She mentioned some highly relevant examples of how the circular economy approach is already catching on in Ghana: the Ghana e-waste project, the plastic waste policies, the use of biogas technology (with EU support), industrial symbiosis initiatives and an efficient biomass food stoves project.

Organization	Website	Role
Ministry of Local Government and Rural Development	www.mlgrd.gov.gh	To promote the establishment and development of a vibrant and well-resourced decentralized system of local government
Ministry of Sanitation and Water Resources	http://mswr.gov.gh	Policies, plans and programs for sustainable management of water resources, affordable water; sanitation facilities, and sustainable management of liquid and solid waste
Ministry of Environment, Science, Technology and Innovation	http://mesti.gov.gh/	Supervise the activities of Environment, Science, Technology and Innovation while seeing to the economic benefits, as well as to ensure appropriate and efficient environmental direction and administration
Environmental Protection Agency of Ghana	www.epa.gov.gh	In charge of improving and conserving Ghana's environment with sound, efficient resource management. The EPA oversees the implementation of the National Environment Policy. It has 12 regional offices all over Ghana
Metropolitan/Municipal and District Assemblies		Responsible for the provision of facilities, infrastructure services and programs for effective and efficient waste management ⁸

TABLE 7. INSTITUTIONS INVOLVED IN WASTE MANAGEMENT ISSUES IN GHANA

⁸ As stated on the website of the Accra Metropolitan Assembly (AMA).

Table 7 shows the institutions which are responsible for waste management in Ghana. The Ministry of Sanitation and Water Resources (MSWR) was established as recently as in January, 2017 to act and support the sanitation and water sectors. Until its establishment the water sector was part of the Ministry of Water Resources, Works and Housing and the sanitation sector was part of the Ministry of Local Government and Rural Development.

The promotion of a circular economy has not yet been assigned specifically to one of the Ministries. But the fact that the Ministry of Environment is also in charge of Science, Technology and Innovation makes it a likely institute to take on this responsibility. The recent MESTI initiative to establish the Ghana Innovation and Research Commercialization Centre (GIRC, due to open in August 2019) may be a good inroad to promote the circular economy in Ghana. MESTI will further establish so called Strategic Technology Centers in eight key sectors. One of these centers will focus on environment, waste and circular economy. The first activity will a pilot in e-waste together with GIZ of Germany.

The Ghanaian authorities have set no clear targets related to Integrated Solid Waste Management or circular economy. With one major exception: in his State of the Nation address in early 2019, the President of Ghana Mr. Akufo-Addo (photo) pledged to make Accra the cleanest city in Africa by 2020. Although this has now been rescheduled to the end of his possible second term in 2024, the President is planning to launch a National Sanitation Brigade to speed up the process.



He further announced that he will be initiating a National E-waste Program to implement the Hazardous and Electronic Waste Control and Management Act. Collection will start of the advance recycle eco fee on all electrical and electronic equipment from all exporting countries. On top of this, a state-of-the-art e-waste recycling facility will be constructed at Agbogbloshie. To facilitate e-waste collection logistics, holding centers in each regional capital and collection centers in each district are to be established.

A lot of the actions proposed by the President will partially depend on international cooperation programs. In e-waste, for instance, the German Government will play an important role. As a middle-income country, Ghana aims to follow the path towards “Ghana beyond aid” but there is still a significant dependency on international cooperation, both in thinking and in practice.

5. The Ghanaian private sector in waste and CE

5.1. Private sector

Company	Line of business
Alliance Waste Ltd (part of the Josping Group)	Collection of household, commercial and industrial waste and disposal at approved waste disposal sites
Ashanti Waste and Environmental Services Ltd (Josping Group)	Integrated waste management company. Ashanti waste is a subsidiary of Zoomlion for the Ashanti region
Environment 360 (NGO) and Evolve Recycling (for profit)	Awareness raising, community and corporate recycling programs, sale of recyclables. Has a program with GIZ on PET bottle recycling
J. Stanley-Owusu @ Company Ltd (JSO)	Recycling services for e.g. glass, paper and metals, management of household waste recycling sites, management of hazardous waste and landfill disposal
Jekora Ventures	Household waste collection, management and recycling in and around Accra. Recycling of organics and plastics, compost production
rePATRN	Recycling and upcycling of PET bottles
Skyfox Services	Agri-business, water, renewable energy, sanitation and solid waste. Active in Ghana, Burkina Fasso, Sierra Leone and Guinea
Toahouse Company Limited	Construction of affordable housing using plastic waste (a.o. bottles). Also export of recyclable plastics (PET flakes)
Universal Plastic Products and Recycling (UPPR) (Josping Group)	Plastics recycling company (part of the Josping group) with plants across the ten regions of Ghana
Venital	Waste management and sanitation in Western Ghana
Waste Landfills Co Ltd (part of the Josping Group)	Waste disposal, treatment and related services, including plastics recycling
Winsbeaver Company Ltd	Environmental services, a.o. in plastic waste collection
Zoomlion Ghana Ltd (part of the Josping Group)	Ghana's largest waste management company, also active in five other African countries. Waste collection, public cleansing, e-waste, composting, recycling, liquid waste, etc.

TABLE 8. SOME PRIVATE SECTOR COMPANIES ACTIVE IN WASTE/CE IN GHANA.

Considering that the authorities in Ghana play a modest role in the waste and circular economy sector, the role of the private sector is relatively stronger. Table 8 shows a number of Ghanaian companies in the waste sector in alphabetical order.

As part of the preparations of the incoming study tour to the Netherlands in 2017 an inventory was made by the Dutch Embassy in Accra of the business interests of 14 Ghanaian private sector participating companies. Table 9 shows the results. Although the study tour took place 1,5 years ago, the market survey confirmed that the Table offers a good impression of current market opportunities in the waste sector in Ghana.

Obviously, plastic waste recycling is hot in Ghana and many companies are interested in upgrading their plastics processing technologies. There is interest in using recycled plastics for waste bins, plastic bags and building blocks, and one company has a long-term view of establishing the circular initiative of a bottle-to-bottle PET recycling facility. Other companies are interested in finding overseas buyers for the recycled plastics and other materials. Another field of interest is in waste collection (plus in one case: street sweeping) vehicles. Other market

opportunities include composting equipment and techniques as well as recycling equipment for e-waste.

Business / other interest	Number of times mentioned by company representatives
Business interests	
Plastic waste recycling technology	xxxxx
Waste collection / street sweeping vehicles	xxxxx
Composting equipment and techniques for agriculture	xxx
e-waste recycling equipment	xxx
Medical waste treatment and disposal technology	xx
Waste bins and containers	xx
Waste to Energy	xx
Paper recycling technology (e.g. balers)	x
Recycling technology for spent tires	x
IT Technology for effective waste and revenue collection	x
Biogas technologies	x
Landfill equipment	x
Hazardous waste management	x
Other interests	
Investors (and funding)	xxxxxxx
Potential business partners	xxxx
Buyers for recycled materials (plastics, paper, aluminum, etc.)	xxx
Training (e.g. in operations) and capacity building	xx

TABLE 9. BUSINESS INTERESTS OF GHANAIAN COMPANIES IN THE WASTE/CE SECTOR.

Dutch exporters should further be prepared that many Ghanaian company representatives will be interested in finding potential investors for their recycling projects. After all, local investors in the waste/CE sector are hard to find, it is hard to get a loan from the bank and interest rates in Ghana are in the order of 30%. In general, Dutch companies that arrive with a financial package will be on the fast track towards business.

5.2. Zoomlion / The Jospong Group

One particularity of the waste sector in Ghana is the predominant role of the company Zoomlion Ghana Limited. Established as recently as in 2006, Zoomlion is now part of 45 companies that together form the Jospong Group. According to the company's brochure, it has a core staff of 3,000 and a project staff of 85,000. Service coverage is truly nationwide, although the company has private sector competitors as well in different parts of Ghana. Zoomlion is also expanding to other countries in Africa, with activities in Angola, Liberia, Togo and Equatorial Guinea and plans to move into Nigeria, Benin, Guinea and Uganda.

Zoomlion was founded by Dr. Joseph Siaw Agyepong, who is still the Executive Chairman of the company. A visit to China inspired him to introduce tricycles as a means to collect rubbish in Ghana. The concept caught on and from that moment onward, quantitative and qualitative growth has been exponential. Sanitation services provided during sports tournaments such as the 2007 Four Nations Soccer Tournament and the 2008 African Cup of Nations helped the company to become well known. Nowadays, waste-related activities that Zoomlion is involved in include the following:

- Waste collection and processing services
- Waste separation, recycling and composting plants such as the Accra Compost and Recycling Plant (ACARP, <http://acarpghana.com/>) and IRECOP plant in Accra
- Plastics recycling through its subsidiary Universal Plastics Products and Recycling (UPPR)
- Waste transfer stations through its subsidiary Zoompak Ghana Limited
- Sanitation Improvement Packages (SIPs), where Zoomlion offers waste trucks and communal refuse containers to the MMDA's in Ghana
- Construction of sanitary landfills and waste dump remediation projects
- Oil waste management and processing in Takoradi and other locations
- Vector disinfection projects near waste dumps etc. in Ghanaian communities

The expert team got an impression of the level to which Zoomlion has grown when we were shown around at the newly commissioned Integrated Recycling and Compost Plant Ltd. (IRECOP), located within a stone's throw from the Agbogbloshie e-waste processing site in Accra. The contrast between the clean and modern IRECOP facility and the Agbogbloshie e-waste site could not have been starker. IRECOP is a Public Private Partnership between the Ghanaian Government and Zoomlion. The Government contributed the land, Zoomlion invested the US\$ 20 million to build the waste separation and composting facility. According to design, IRECOP can process 400 tons of waste per day into fractions such as paper/cardboard, RDF, different kinds of plastics, organics, etc. It can generate 60 tons of compost per day. During the visit the impression was that the plant is not yet operating at full capacity, but this may be due to the initial phase it is in.

The photos offer an impression of the IRECOP plant. The (mobile) equipment was supplied by Komptech Austria (www.komptech.com). Zoomlion appears to be very open to European waste processing technology.

For Dutch suppliers of products and services in waste/CE wishing to become active in Ghana and (possibly) other countries in Africa, Zoomlion and other companies of the Jospong Group should be high on the list of companies to contact. However, in order to be well prepared, it is recommended to contact some fellow Dutch companies which have done business with Zoomlion first. These can be found through the LinkedIn Group.



Waste delivery point of IRECOP



Primary sorting for paper and RDF



Mobile shredder



Mobile rotary screening machine



Sorting plastics out of the compost



The facility is largely open air

FIGURE 3. PHOTO IMPRESSION OF ZOOMLION'S IRECOP WASTE SORTING FACILITY IN ACCRA.

5.3. Some comments on the business environment

The 2016 report by the Royal Netherlands Embassy in Accra: "Business Opportunities for Water and Sanitation in Ghana" contains useful information on the business promotion arrangements put in place by the Ghanaian Government. These include tax exemptions and tax holidays, locational incentives and investment guarantees. For more information the aforementioned report is recommended.

During the interviews with sector representatives the local business environment was regularly touched upon. Here are some highlights:

- Ghanaian companies lack access to finance, and market interest rates are at least 30%.
- Land rights can be a problem in Ghana. Apart from the official owner, the people who use the land can exercise rights over it and the local Chief can have a say as well.
- If you want to do business successfully in the waste sector in Ghana, you will need strategic partnerships. Of course, this is true for many overseas markets. In the case of Ghana, if you want to set up a local business, you have to register it, it has to be EPA approved and it has to be at least 51% Ghanaian owned. Then in the waste sector there is the dominant role of Zoomlion. The company describes competitors as "potential partners". Dutch companies will have to decide whether they wish to team up with Zoomlion or somehow make it on their own.
- The entrepreneurs were generally positive about Ghana being a peaceful and stable country, with a well-educated workforce. As an example, not long ago an analysis was made about the subjects of internet searches coming from Ghana. The first category turned out to be education, the second religion. After that the pattern was more in line with other countries.
- Corruption: completely straightforward companies cannot sustain themselves in Ghana.

These comments come from Ghanaian or Dutch businesspeople who generally are operating successfully in the Ghanaian business environment. But the general opinion is that the phrase "*Ghana is Africa for beginners*" paints too rosy a picture of the business environment in Ghana. In fact, some argue that doing business in e.g. Nigeria is more straightforward.

5.4. Sector organizations

Organization	Role
African Circular Economy Network – Ghana Chapter	ACEN is a network organization promoting the transition towards a circular economy in countries in Africa
Environmental Services Providers Association (ESPA)	Umbrella organization for the Environmental Service Providers in Ghana (especially in solid and liquid waste management)
Ghana Design Network	Objective is to create a livelier and inspirational design eco-system in Ghana. Members: over 700 professionals, 1,000 students, 350 corporates
Plastic Waste Management Program Ghana	Sector organizations for stakeholders in plastic waste management programs in Ghana (flexible and rigid waste)
United Nations Development Program	Among other activities, UNDP is setting up a database of information on waste management in Ghana (a national multi-stakeholder waste resource platform)

TABLE 10. SOME SECTOR ORGANIZATIONS CURRENTLY ACTIVE IN WASTE / CE IN GHANA

Table 10 shows some organizations which are currently active in the waste and circular economy sector in Ghana.

5.5. Trade events

Currently, there are no trade fairs dedicated specifically to waste management and/or circular economy in Ghana. Some events may still be worth considering:

- **GhanaPlast Accra**, 16-18 May 2018 (biannually) at the Ghana International Trade Fair Centre of Accra. Considering the strong interest in plastics recycling in Ghana, the next edition of this trade show is the place to be to meet representatives of the plastics processing industry in Ghana. More info at <https://www.tradefairdates.com/GHANA-PLAST-M7124/Accra.html>.
- **WACEE 19**: West African Clean Energy and Environment Trade Fair and Conference, 6-8 November 2019 at the Accra International Conference Center (<http://wacee.net/>). Circular Economy is mentioned specifically as one of the themes of the plenary sessions, apart from water and energy. WACEE 2019 announces that it will showcase innovations and products from 40 leading industry players from West Africa, Europe and elsewhere in renewable energy and environment. Germany appears to be well represented.
- **Ghana Trade Exhibition**, 30 January-1 February 2020 at the Accra International Conference Center (<http://www.growexh.com/ghanatradeshow>). This trade show is advertised as the main international event for all trades. Participation from over 20 countries and visitors from over 12 African countries.

6. Dutch support and bi/multilateral programs

6.1. Dutch network, projects and support instruments

A first port of call in Ghana is the Royal Netherlands Embassy. The Ambassador Mr. Ron Strikker and his staff, notably the Policy Officer in charge of Water and Sanitation Miss Janet Arthur will be most keen to assist Dutch entrepreneurs wishing to become active in Ghana.



Mr. Ron Strikker
Ambassador



Miss Janet Arthur
Policy Officer in charge of Water and Sanitation

Apart from the Embassy, the Ghana Netherlands Business and Culture Council (GNBCC) supports the business interests of companies from Ghana and the Netherlands. It has approximately 115 member companies and works together closely with the Royal Dutch Embassy in Ghana. The GNBCC offers four types of services: 1/ business development services; 2/ business support; 3/ trade mission and event services; and 4/ travel support.



It has been remarked before, but it is definitely worthwhile to consult with fellow Dutch entrepreneurs in waste and circular economy before booking a trip to Ghana. They will be most happy to share their experiences. Just post your plans on the LinkedIn Group.

Under the WASH Window of the Ghana- Netherlands Water, Sanitation and Hygiene Program (GNWP), the Netherlands is co-financing a number of projects that are relevant to the waste and circular economy sector. Table 11 on the next page provides an overview. Not all of these programs are running smoothly, but through these activities the Embassy has acquired a good starting position and quite some contacts in the waste sector.

Another very relevant ongoing program is the Dutch supported “Tax Revenue for Economic Enhancement” (TREE) program (<http://ghanatree.com.gh>). It was initiated as a response to the “Ghana beyond aid” strategy. Now that development aid is reduced, internally generated funds (IGFs) such as taxes gain importance. In the period 2017-2021 32 selected MMDAs from the Central, Ashanti and Western regions of Ghana will be supported to increase the sustainability of IGFs. In the future, the experiences obtained through this program could be most valuable for a program to introduce full cost coverage of waste management through public fee collection.

#	Waste related project in Ghana which the Netherlands is involved in
1	Recycling of waste, incineration of waste, electricity generation - Spaans Babcock B.V. in partnership with the Tema Metropolitan Assembly and Global Communities under the SWEEP project will recycle about 20 tons of solid waste per day, incinerate about 180 tons solid waste per day and produce an amount of 5MW electricity generated from Tema Landfill site.
2	Treatment of liquid waste, compost making and marketing - Slamson Ghana Ltd. in collaboration with the Accra Metropolitan Assembly (AMA) and Louis Bolk Institute will contribute to the Bola Bondeh project. This project will enhance the capacity of the "Lavender Hill" treatment plant by the treatment of 800 m3/day liquid waste, and improve the use of sludge for compost making; marketing and sale of compost to 1500 farmers.
3	Biogas and compost out of waste and construction of public toilets - Under the Special Treat Project, MDF Training and Consultancy B.V., Koajay Group limited and the Municipal assemblies of Nsawam, Ga Central and Ga West will treat the waste generated by the inmates of the Nsawam prison and three other assemblies and turn it into useful products like biogas and compost; also construction and operation of public toilets.
4	Hygiene promotion, management of community/private toilets, credit for household toilets - Under the Partnership for Advancing Sustainable Sanitation (PASS) project, implemented by WSUP (UK based NGO), Ga West, Unilever and HFC Bofo, the project seeks to enhance hygiene promotion such as hand washing with soap, management of community/private toilets, credit for household toilets. This project also will adopt innovative technologies that will add value to waste generated in Ga West. Capacities of the local assemblies are being built on improved property tax collection and maintenance as a means of supporting the assemblies manage waste in more sustainable ways.
5	Waste water for fish feed in aquaculture, for composting and for briquettes - Creating and Capturing Value from waste is a project implemented by the International Water Management Institute, RUAF Foundation, Jekora Ventures and Techiman municipality. Under this project, Innovative technologies are applied in using waste water for fish feed in aquaculture, for composting and for briquettes in efficient cooking stoves. This project is based on a business model that creates local jobs for women fish sellers and local restaurants.
6	Collection of market and household waste, use for bio-fertilizer, biogas and small-scale electricity production - The Ashiaman municipal, Wereldwaterwet, Royal HaskoningDHV in partnership with Safisana under the decentralized Business Model for Sanitation and Bio-fertilizer project are implementing developed strategies that address the waste problem in Ashiaman, by collecting market and household waste and using it for bio-fertilizer, biogas and small-scale electricity production

TABLE 11. WASTE RELATED PROJECTS IN GHANA WHICH THE NETHERLANDS IS INVOLVED IN

As stated in the April 2016 report on "Business opportunities for Water and Sanitation in Ghana", Ghana is eligible for most Dutch trade promotion instruments. Table 12 provides a list of the instruments considered most relevant for Dutch entrepreneurs wishing to become active in Ghana. More information about the programs can be found on the website of the Netherlands Enterprise Agency (RVO, www.rvo.nl). Note that there are more instruments available, administered by RVO but also e.g. by the European Union. A full list can be obtained from RVO.

One possibility would be to set up a Partners for International Business project in waste management and circular economy with a focus on Ghana. In such case, a group of at least five Dutch companies would join efforts to become active on the Ghanaian market. This effort would be complemented with a Government-to-Government support program and possibly cooperation in the academic field. However, the Ghanaian market may not be 100% ready for this. In that case, it may be better to aim for a so called "Impact Cluster", a similar program with at least five Dutch participating companies where the focus is more on local development and less on business.

A Partners for International Business program with a more regional approach may also be considered. A combination with e.g. Nigeria could be an approach that merits further development.

Instrument	Description
Small Business Innovation Research	In the SBIR program, the Government challenges the private sector to come up with a solution for a problem of society. The program works as a competition; in each phase the best solutions make it to the next round. The budgets are project specific (feasibility study EUR 50K; prototype EUR 150K.) The program will soon be expanded to Ghana.
FDW Sustainable Water Fund	Through the Sustainable Water Fund the Netherlands promotes public-private partnerships in the water sector in developing countries such as Ghana. The goal is to improve water safety and availability. Waste related projects are welcome in case they contribute to water safety. Typical subsidy amounts per project range from 0.5 to 3 million euros.
Develop 2 Build / DRIVE	With DRIVE the Netherlands facilitates investments in infrastructural projects that contribute to a good business climate and entrepreneurship in water, climate, food security and sexual and reproductive health (SRHR). Waste/CE related projects may qualify if they contribute to the goals. Through (45%) DRIVE support Dutch companies can come up with a more competitive offer in infrastructural tenders. Develop 2 Build supports preparatory studies for DRIVE.
DHI Program	The DHI scheme supports Dutch companies wishing to invest in or execute a project in emerging markets and in developing countries such as Ghana. There are three modules: 1/ Demonstration projects: presentation of a technology, capital goods or service in (in this case) Ghana; 2/ Feasibility studies: assessment of the profitability of a foreign investment in a product or service; and 3/ Investment preparation studies: assessment of the technical and commercial profitability of an investment in a company.
Private Sector Development (PSD) toolkit	PSD Instruments of the Dutch Embassy in Ghana are tools which add to local capacity building and simultaneously support Dutch organizations and companies in doing business in Ghana. Matchmaking, government to government assistance, trade missions from and to Ghana, transfer of knowledge between educational or knowledge institutes such as universities are some examples.
Dutch Good Growth Fund	The Dutch Good Growth Fund provides customized finance to Dutch and foreign SMEs (doing business) in a.o. Ghana. The DGGF supplements private investments through guarantees and direct financing with a repayment obligation, such as loans and equity investments in projects. It can also provide export credit insurance and export financing.
Partners for International Business / Impact Cluster	A PIB program is meant to create long-term positioning of Dutch companies in promising markets. A PIB program needs a consortium of at least five companies plus one knowledge institute. If a PIB program is a bridge too far for Ghana at this stage, a so called "Impact Cluster" approach, with more emphasis on the public sector, may be more appropriate.

TABLE 12. SOME DUTCH SUPPORT INSTRUMENTS APPLICABLE IN GHANA (RANDOM ORDER)

6.2. Bilateral and multilateral programs

During the visit of the expert team, information was obtained about a number of major bilateral and multilateral cooperation programs in waste and circular economy. The list below is by no means complete. Again, there is a focus on e-waste and plastics.

Organization	Type of cooperation project
Deutsche Gesellschaft für Internationale Zusammenarbeit	GIZ is planning to invest EUR 10 million in 1/ policy making regarding e-waste; 2/ developing new business models for e-waste; and 3/ involvement of the informal sector (1,5 years). A further EUR 20 million will be invested in an EPR scheme for e-waste; fee collection by SGS; and setting up a recycling factory for e-waste
European Union	E-waste Management in Ghana: From Grave to Cradle. Formalization of informal MSMEs, collection mechanism for e-waste, disseminating best practices and creating awareness. Budget EUR 1.3 million; implementing organization University of Cape Coast
Government of the United Kingdom	Accra Plastics Management Project. Workshops on plastics; scaling up of existing initiatives; improvement of prices and quantities.

United Nations Development Program	UNDP has launched a “Multi-Stakeholder Waste Resource Platform” initiative which will facilitate investment and access to market, fill data gaps, build capacity of local government operators, raise visibility of service providers in the private sector, and increase awareness across society on the importance of sustainable waste management.
World Bank	Greater Accra Resilient and Integrated Development Project (P164330) - Objective is to improve flood risk management and solid waste management in the Odaw River Basin of the Greater Accra Region and improve access to basic infrastructure and services in the targeted communities (with MSWR).
World Economic Forum (WEF)	The WEF is planning to launch a Ghana chapter of its Global Plastic Action Partnership GPAP. Focus areas: (1) engage at highest level; (2) establish science-based targets; and (3) connect strategic investments and pilot projects (2-3 yr project)

TABLE 13. BILATERAL AND MULTILATERAL PROGRAMS IN THE WASTE/CE SECTOR IN GHANA.

7. SWOT, conclusions, recommendations

7.1. SWOT analysis (random order)

In Table 14 an overview is provided of the current strengths, weaknesses, opportunities and threats related to doing business in waste and circular economy in Ghana.

Strengths	Weaknesses
<ul style="list-style-type: none"> • Stable country, stable and free democracy • Relatively young and educated population (English speaking) • Stable growth figures • Tax system for plastic imports in place • Strong player in the waste industry (Zoomlion) • Private sector initiatives such as the Plastics Recyclers Association and GRIPE • Some very talented young people active in the waste and CE sector (including foreigners) 	<ul style="list-style-type: none"> • Generally weak government and lack of enforcement of rules • Somewhat passive attitude due to “Donor disease” • Complicated investment climate for Ghanaians and foreigners alike • Waste/CE sector is underfinanced • Zoomlion is virtually a monopolist • Corruption • Information is not readily available or shared • Lack of sound entrepreneurialism • Lack of environmental awareness among the population and therefore poor cultural attitudes to waste handling • Land ownership is not transparent • Difficult to find qualified local partners
Opportunities	Threats
<ul style="list-style-type: none"> • Ambitions of the Government: 1/ by 2024 Accra should be Africa’s cleanest city; 2/ EPR systems planned for plastics and electronics • Concrete opportunities in WtE, PET Recycling, tires recycling, e-waste recycling, manure processing • Biorefinery applications of biomass and innovative circular economy strategies • Relatively high cost of electricity • Enthusiasm on the part of the Dutch Embassy for waste/CE • Ghana is in the process of a transition from aid to trade • Steady flow of business proposals from Ghanaian entrepreneurs • Combine exports promotion efforts, e.g. with Nigeria • UNDP recycling(/CE) collaborative platform with access to data 	<ul style="list-style-type: none"> • Foreign competition, especially from Germany in e-waste • To enter the market without proper preparation (use the experiences of fellow Dutch entrepreneurs)

TABLE 14. SWOT ANALYSIS WASTE AND CIRCULAR ECONOMY BUSINESS IN GHANA

7.2. Conclusions

- Ghana has a lot going for it: it is a **peaceful and stable country**, a democracy where people feel free to speak their minds. As far as the expert team could tell within the limited period of a week in Accra, Ghana is simply a pleasant place to be. However, the phrase “*Ghana is Africa for beginners*” paints too rosy a picture of the business environment in Ghana. In order to be successful, you need to invest quite some time and effort to overcome barriers.
- In spite of the “Ghana beyond aid” agenda formulated by the President Nana Akufo-Addo, the country is actually **still quite dependent on aid**, both in practice and in thinking
- The role of the **public authorities versus private enterprises** in the waste/CE sector is relatively weak in Ghana. In the Environmental Sanitation Policy in 2010 it has been stated explicitly that the private sector should play a very important role in the execution of waste management services. A legislative framework is in place but enforcement of the rules is weak. This is especially grave for the waste and circular economy sector, which depends on clear and well enforced legislation in order to function properly.
- The challenges and opportunities surrounding **residual plastics** are a hot topic in Ghana. Rightfully so, because the countryside and the beaches of Ghana are full of plastic litter. There is a 10% tax levy on plastic imports, new plastics legislation is planned in 2020, several donor agencies are active in the sector and last but not least: quite a few companies are active in plastics recycling. Dutch suppliers of technology, services and business models in plastic waste recycling are likely to find business opportunities in Ghana. The biannual GhanaPlast Accra Trade Fair may be a good way to cash in on this.
- The situation surrounding **e-waste** is precarious. This is another area that is very much on the mind of Ghanaians working in the waste and circular economy sector. The industrialized world, including Western Europe, is playing a most dubious role because of containerloads of second-hand electronic equipment that are shipped to Ghana on a daily basis. Much of this material is actually e-scrap that ends up being disassembled at the Agbogbloshie e-waste dump and similar sites. The Ghanaian Government recently adopted legislation to start levying a tax on imported electronic equipment and donor agencies are cooperating to alleviate the situation. Again, for Dutch suppliers of products, services and new business models in e-waste there will be good opportunities.
- Compared to plastics and e-waste, **organic residues** are receiving a lot less attention in Ghana, although this is the biggest chunk of the waste as it makes up approximately 60%. Add this to the large and varied biomass resources and a myriad of opportunities emerge. Efficient composting techniques and anaerobic digestion are promising technologies in Ghana. In the frame of a circular economy, it is worthwhile to explore business opportunities offered by the residual agricultural biomass, although the distances and the complicated logistics will somewhat limit the possibilities. More research will be needed to pinpoint the best opportunities in this area (e.g. biorefinery of different kinds of biomass).
- Currently mass burning or **incineration of waste** with energy recovery is not considered an option. If applied on a limited scale it might contribute to alleviate the pressure on the overall waste system in Ghana and especially on the waste dumps near big cities. However, for the moment it does not appear to be feasible due to low feed-in tariffs (in practice), the fact that no PPA’s are issued (and their limited time frame in case they

would be issued), as well as the fact that no or low tipping fees can be charged. From a technical point of view, the high organics content of the residual waste doesn't help the case for waste incineration either.

- The upscaling and extension of **smaller scale digestion projects** may be a more realistic road in the short term.
- In the Ghanaian waste sector, the position of the Jospong Group and the company **Zoomlion** is dominant. For exporters of technology and services for the waste sector, Zoomlion and other subsidiaries of the Jospong Group are important contacts. At the time of this market assessment, Zoomlion expressed concrete interest in equipment for the processing of waste tires, e-waste recycling installations and waste collection trucks. The company is also planning to establish more waste recycling facilities such as IRECAP (described in this report), which will generate additional opportunities for sorting and recycling equipment. Before contacting Zoomlion it is recommended to consult with fellow Dutch entrepreneurs to learn from their experiences.
- The May 7-8 European Union event on “**Circular Economy Opportunities in Ghana**” has generated a lot of enthusiasm among Ghanaians, especially the young generation. This can be an inspirational new angle to work on waste as a resource and the circular economy in Ghana.
- In the course of this market survey, a range of Ghanaian initiatives which can perfectly categorized as “circular economy” were identified. These **circular economy initiatives** have been categorized into so called “R-strategies”, from the useful application of materials all the way to smarter product use and manufacture. A few examples of materials substitution (e.g. the bamboo bicycle) and innovative business models (e.g. Closing the Loop) were found.
- In principle, the **Dutch private sector** in waste management and circular economy is interested in exploring business opportunities in Ghana. The “Holland meets Ghana @ Recycling Fair” in October 2017 attracted a good crowd of Dutch company representatives. The LinkedIn Group “Holland - Ghana Business and Cooperation on Waste Management and Circular Economy” now has 70 members (including companies and organizations from Ghana).

7.3. Recommendations

- A logical next step will be to organize a **business mission to Ghana** in waste management, agri-food, biomass and circular economy. Specific topics may be e-waste, plastics and organic waste, circular agri-concepts, higher-end applications of biomass processing (e.g. bio-refineries) and smarter product use and manufacturing. The upcoming “WACEE 19” Trade Fair and Conference (6-8 November 2019 at the Accra International Conference Center) can be a good opportunity for such business mission. Specific Dutch side events are recommended. This trade mission will allow to test the interest on the part of the Dutch private sector in doing business with Ghana. The existing network (a.o. the LinkedIn Group) will provide a head start.
- In case the business mission is a success and the participating companies wish to move forward, it may be considered to set up a **Partners for International Business** program or an **Impact Cluster**. Both options are mentioned at this stage, due to the fact that Ghana is somewhere on the path from aid towards trade, and the waste and circular economy sector still needs a lot of institutional support. The choice will depend very

much on the preferences of the interested Dutch companies. A regional PIB program (e.g. together with Nigeria) may also be considered.

- The new **Small Business Innovation and Research** (SBIR) program by the Netherlands Enterprise Agency (RVO) offers opportunities for projects concerning bioplastics, circular/sustainable housing/infrastructure and litter/plastics.
- The mobile phone offset program introduced by the Dutch company Closing the Loop is one way to curb the negative impact of the Western world on the e-waste problem in Ghana. More can be done, both by the public and the private sector. In Nigeria, the E-Waste Solutions Alliance for Africa (a cooperative effort by Dell, HP, Microsoft Mobile and Philips) is actively promoting the set-up of a system of Extended Producer Responsibility in e-waste. In order to create a similar sense of commitment on the part of the big electronics companies for the situation in Ghana, a sort of "**Spitsbergen expedition**" could be organized⁹. In this case it would be an "**Agbogbloshie expedition**". The effect on CEO commitment is expected to be just as powerful. Clear goals will have to be set as to the desired follow-up to the expedition. It could be tied to Closing the Loop's goal to establish a mobile phone smelter in Ghana. Other types of e-waste could be targeted as well. Coordination with other cooperation programs in Ghana (especially with the Germans) is essential.
- **Circular Economy** still appears to be a relatively virgin field in Ghana. Judging by the turnout at the EU event there is a lot of interest, but few activities so far that are labelled as CE. In fact, the informal sector engaged in repairs and refurbishments is a vivid example of a "poor man's circular economy" that addresses the needs of a growing population that cannot afford new products. However, these practices will have to be significantly professionalized and scaled up. The Netherlands could (help) fill this gap by somehow establishing or supporting a Circular Economy Incubator. Supporting a local CE hub, possibly emerging from the UNDP recycling platform, with support from the EU, UNDP, HCH and the Dutch Embassy could be an investment that provides access to future opportunities. This can be connected with the work of the Africa Circular Economy Network (ACEN) and also with the Orange Corners program of the Dutch Embassy.
- When it comes to the more **innovative applications of the circular economy**, including new business models based e.g. on shared responsibilities in the product chain or on the idea of a sharing economy, the feeling is that this field is still wide open in Ghana and deserves additional research. This certainly applies for the biomass sector, where initiatives higher up in the Biomass Value Pyramid (e.g. production of pharmaceuticals and food additives out of biomass) are yet to be explored. In most cases, it will not simply be a question of exporting circular ideas from the Netherlands to Ghana. Rather, circular business ideas will have to be developed specifically for the Ghana situation. This calls for a cooperative approach by mixed Dutch-Ghana teams of product, service and business developers.
- On the other hand, it should be recognized that the waste management sector in Ghana is far from sustainable at this point and is actually posing an increasing threat to the health and well-being of a large part of the Ghanaian population. There appears to be a need to work on the very **backbone of a sustainable management system**: a well-

⁹ In 2017, journalist Bernice Notenboom took a group of Dutch CEO's to see the melting polar ice and make them think about possible measures their companies could implement to help curb climate change.

functioning collection system of the waste, efficient transport and storage and adequate treatment and disposal.

- A mild form of **source separation** may be considered: biodegradable waste, recyclables and residual waste. In this respect, the example of the Develop2Build/DRIVE proposal for an integral upgrade of the waste system in Dar es Salaam (Tanzania) attracted positive interest from the Director of Sanitation of the Ministry of Sanitation and Water Resources Mr. Anthony Mensah. As a parallel activity to the business promotion program, it would be worthwhile to explore whether a similar project could be proposed for the Accra-Tema corridor in Ghana. In the light of the ambition of the President of Ghana Mr. Nana Akufo-Addo to make Accra the cleanest city in Africa in 2024, such proposal may be very well received.
- One element of the Dar es Salaam project that was considered especially promising by Mr. Anthony Mensah was a **stratified system of waste fee collection**. Such system will be indispensable to the long-term feasibility of an Integrated Solid Waste Management System in Ghana. The system may be introduced through the existing program “Tax Revenue for Economic Enhancement” (TREE). Or, if this proves impossible, it may be proposed as a challenge in the new SBIR program: *“Develop a future proof stratified waste fee collection program for Ghana, including a locally applicable fee collection mechanism”*.



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8.1. Sources

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8.2. List of interviewed companies and organizations

- Accra Plastics Management Project
- Dutch & Co
- Emergent Technology Holdings
- Footprints Africa
- Ghana Netherlands Business and Cultural Council
- Global Plastic Action Partnership
- Jospong Group
- JSO Group
- MESTI Electronic Waste Programme
- Ministry of Environment, Science Technology and Innovation of Ghana
- Ministry of Sanitation and Water Resources of Ghana
- Orange Corners

- rePATRN LTD. Ghana
- Royal Netherlands Embassy in Ghana
- Tema Metropolitan Assembly
- United Nations Development Program

8.3. List of participating organizations in Embassy event 6 May 2019

Organization
Alliance Waste Ltd.
Environmental Service Providers Association
Ghana Plastic Waste Manufacturers Association
Jekora Ventures
JSO Group
Mapel Consult
SNV
Toahouse
Venital