# BASELINE REPORT

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SEURECA

EXPERT ADVISORY CALL DOWN SERVICE, LOT C

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**Conflicts of interest**

There were no conflict of interest in the writing of this report.

**Contributions**

Seureca

**Picture**

Tema New Town Beach, 2019

# ACRONYMS & ABBREVIATIONS

| Acronym | Full name |
|---|---|
| ACARP | Accra Compost and Recycling Plant |
| AGI | Association of Ghana Industries |
| AMA | Accra Metropolitan Assembly |
| APMP | Accra Plastics Management Pilot |
| CCC | Communal Container Collection |
| DFID | Department for International Development |
| EIA | Environmental Impact Assessment |
| EPA | Environmental Protection Agency |
| ESPA | Environmental Services Providers Association |
| FDA | Food and Drug Administration |
| GAMA | Greater Accra Metropolitan Area |
| GDP | Gross Domestic Product |
| GHS | Ghanaian cedi (currency) |
| GPAP | Global Plastic Action Partnership |
| GPMA | Ghana Plastic Manufacturers Association |
| GRA | Ghana Revenue Authority |
| GRIPE | Ghana Recycling Initiative by Private Enterprises |
| GSS | Ghana Statistical Services |
| HDPE | High Density Polyethylene |
| HH | House to House |
| IDA | International Development Association |
| ILO | International Labour Organisation |
| KG | Kilogramme |
| LDPE | Low Density Polyethylene |
| LLDPE | Linear Low-Density Polyethylene |
| MESTI | Ministry of Environment, Science, Technology and Innovation |
| MLGRD | Ministry of Local Government and Rural Development |
| MMDA | Metropolitan, Municipal, and District Assemblies |
| MoF | Ministry of Finance |
| MSW | Municipal Solid Waste |
| MSWM | Municipal Solid Waste Management |
| MSWR | Ministry of Sanitation and Water Resources |
| NASPAWAP | National Association of Sachet & Packaged Water Producers |
| NGO | Non-Governmental Organisation |
| NPAP | National Plastic Action Partnership |
| NPMP | National Plastics Management Policy |
| NRCD | National Redemption Council Decree |
| PA 6 | Polyamide 6 = Nylon |
| PET | Polyethylene Terephthalate |
| PNDCL | Provisional National Defence Council Law |

| | |
|---|---|
| PP | Polypropylene |
| PPE | Personal Protective Equipment |
| PPP | Public Private Partnership |
| PS | Polystyrene |
| PVC | Polyvinyl Chloride |
| SDG(s) | Sustainable Development Goal(s) |
| SMEs | Small and Medium Enterprises |
| SWM | Solid Waste Management |
| TEPZ | Tema Export Processing Zone |
| TMA | Tema Metropolitan Assembly |
| ToR | Terms of Reference |
| UK | United Kingdom |
| UN | United Nations |
| UNDP | United Nations Development Programme |
| UNEP | United Nations Environment Programme |
| UPPR | Universal Plastic Product and Recycling Ghana Ltd |
| WIEGO | Women in Informal Employment Globalizing and Organizing |
| WMD | Waste Management Department |

# EXECUTIVE SUMMARY

## The Accra Plastics Management Pilot

This Baseline study is completed under the Accra Plastics Management Pilot (APMP) which started in February 2019 and is funded by the Department for International Development (DFID) of the UK government. The APMP is an early action of the Global Plastic Action Partnership (GPAP) which is hosted by the World Economic Forum and was launched in August 2019.

The APMP's main objective is to tackle plastic pollution in Accra (Ghana) and its surroundings. The project therefore focuses on single-use plastics. It aims to be a catalyst to initiate, enhance and fund pilot projects; and act as an integrator to coordinate the efforts of the various initiatives, in order to have a structured and global approach towards plastic management in Accra.

The APMP is organised into the following four main areas of work that should be completed over the twelve (12) months of duration of the pilot:

1. Facilitation and Partnership Support;
2. Technical Support and Action-Innovation;
3. Investment; and
4. Replication and Scaling-up.

## The Baseline Study

The Baseline study falls under the second area of work, 'Technical Support and Action-Innovation'. It aims to provide a good understanding of the plastic sector through the analysis of all the relevant data. It includes the following:

- A presentation of the administrative and socio-economic context, an assessment of the current Solid Waste Management (SWM) system in Accra and Tema, stakeholder mapping, an overview of the regulatory framework related to plastics, environment and solid waste management, and the challenge of plastic pollution in Accra and its surroundings (Section 3);
- An analysis of the plastic chain (importation, production, manufacturing, collection, recycling) for each type of polymer (Section 4);

The conclusions of the Baseline study will inform the development of recommendations and proposed solutions for each type of polymer. These will be presented in the Strategic Road Map which will be submitted in October 2019.

## Key findings of the Baseline Study

### Presentation of the context (Section 3)

- **Administrative context**

Accra Metropolis is the capital of Ghana, the second most densely populated city in Ghana and part of the Greater Accra region. Accra is 30 kilometres away from Tema, Ghana's most important harbour. Numerous industries are located near the harbour and more generally in the surroundings of Accra that are part of the 'Greater Accra Metropolitan Area' (GAMA).

At the local level, the municipal services (such as waste management, drain cleaning etc.) are implemented by local authorities, referred to as 'assemblies'. The boundaries of the assemblies have

significantly evolved over recent years. For example, the Accra Metropolitan Assembly (AMA) used to manage the whole of Accra Metropolis (composed of 10 sub districts), but now manages a zone equivalent to three sub districts (whilst the seven others are each managed as an independent Municipal Assembly). This decentralisation enables the provision of local services by each assembly but will lead to a fragmented system unless the assemblies collaborate, coordinate their activities and centralise data.

- **Assessment of the SWM system in Accra and Tema**

The Baseline study does not aim to provide a full and deep analysis of the waste sector (out of the scope of the APMP), but rather to provide enough information to understand the SWM sector.

Mixed municipal solid waste (MSW) is collected by private service providers that have a contract with the competent authority (assemblies). The service providers are also responsible for fee collection - but often find being paid a challenge. Other stakeholders such as waste pickers or borla-taxis (tricycles) from the informal sector perform collection of MSW or recyclables (plastics, cardboard, metal etc.), but are not legally authorised to do so. Therefore, conflicts between authorised service providers and informal sector actors may arise as service providers are entitled to a monopoly in their zone for all types of waste (domestic, commercial, institutional and industrial). Recently, some cooperation between the authorised service providers and informal actors has been supported by the AMA for some low-income areas that cannot be accessed by the service providers.

In terms of waste generation, estimates indicate that household MSW reached 1,206 tons per day in 2016 for the AMA and 2,872 tons per day for the Greater Accra region. In term of composition, the average percentage of organics in MSW in Accra varies from 60% – 70% while plastics have gradually increased from 3% in the 1990s to over 10% in 2015 (Fobil et al., 2002; Miezah et al., 2015).

Waste is disposed of in various disposal sites and dumpsites, but only two are officially recognised by the assemblies: The Kpone disposal site is the official 'landfill' of the Greater Accra region. Nsumia was previously closed but later reopened due to the fact that Kpone site cannot receive all the waste..

The MSW system ensures a service for the collection and disposal of around 70 – 80% of the waste generated in AMA and Tema. However, this 'positive' number should not hide the fact that this system is fragile due to the following issues:

- the founding of the waste services is not secured: waste collectors are struggling to collect the fees for their services, both from the households and the municipalities,
- the zoning system with private waste collectors had initially made a positive change in the services, it should now be consolidated to ensure that the private collectors keep on improving their services and respect their contractual commitments,
- there are only two authorized disposal sites for AMA and Tema: they are both almost full and no replacement has been identified yet (identification of potential new sites is being supervised by the Ministry of Sanitation and Water Resources), and there are located far from the epicentre of waste generation, resulting in high cost of transport.
- the recent decentralisation at the AMA level may have weakened, for the moment, the supervision of waste management services by the public entities. A vision and planning effort is necessary for the entire Greater Accra Metropolitan Area along with associated

human, technical and financial resources both at the district level and at the regional level.

- Waste collection services are performed by formal but also informal collectors, with various level of services depending on the areas (high income areas are well serviced while the poorer neighbourhoods have low collection rates) – the coordination that AMA is trying to implement between the two sectors is a good step toward a better service for all the citizens.

    - **Stakeholders**

Numerous stakeholders are involved in the plastic 'chain': institutional stakeholders, private sector, informal sector, NGOs and civil society actors and international organisations. The stakeholders play different roles:

1. The institutional stakeholders play an important role in influencing this plastic chain via policies, regulations, taxes, standards, monitoring and evaluation, enforcement, or supervision of SWM. Plastic management is a key political commitment of the President of Ghana, as underlined in his State of the Nation Address in February 2019. There are numerous actors related to plastics management either because of the environmental impact of plastic, its health impact or its link to solid waste management. The main stakeholders are the Ministry of Environment, Science, Technology and Innovation (MESTI), the Ministry of Local Government and Rural Development (MLGRD), the Ministry of Sanitation and Water Resources (MSWR), the Ministry of Finance (MoF), the Environmental Protection Agency (EPA) and the Assemblies. Therefore, there is a need for coordination and clear definition of their roles as there is a potential overlap of functions between MLGRD and MSWR regarding MSW.
2. The private sector is involved at every stage of the plastic chain and is organised into numerous associations which represent their interests. The largest association is the Association of Ghana Industries under which falls many other associations such as the Ghana Recycling Initiative by Private Enterprises (GRIPE), the Ghana Plastic Manufacturers Association (GPMA) and the Environmental Service Providers Association (ESPA).
3. The informal sector is mostly involved in the collection and aggregation of plastic waste through the waste pickers, aggregators and middlemen. Some small-scale recycling and vending businesses are also part of the informal plastics management sector. Some NGOs are also involved in collection of plastics, and also in sensitisation and education of the population.
4. The international organisations lead projects to improve the management of plastics, mostly through stakeholders' coordination and support (conferences, workshops, etc.). One key initiative is the creation of the Waste Resource Platform implemented by the United Nations Development Programme (UNDP).

Overall, plastic management generates a lot of interest. Plastic pollution can be observed in the streets, drains, water streams and beaches. As a result, the private sector has seen opportunities for better plastics management and many recycling companies have been created recently.

Nevertheless, the different stakeholders (informal, formal companies, NGOs, international

organisations and institutional actors) tend to work independently of each other. The lack of transparency (little information about the key players of the informal sector, about the collected and recycled quantities, about the quantities of produced by large manufacturers mindful of their brand image, etc.) and coordination (diversity of actors, competitive plastic market) prevents the development of more efficient and effective management of plastics.

- **Regulatory framework**

Ghana is a unitary Republic which belongs to the Common Law Legal Tradition. Although the government appears committed to tackling plastic waste, there are to date no laws that holistically deal with plastic waste in Ghana. Only one Act (in relation to taxes) and one Directive (for the use of oxo-biodegradable additive) directly address plastics, as well as a Policy (the National Plastics Management Policy) that is yet to be passed by the Parliament. Therefore, the lack of laws and other legal instruments directly dealing with plastic waste could be one of the factors contributing to the high levels of plastic pollution in Ghana.

The analysis of the regulatory framework reveals that:

1. The import of finished plastic products is not subject to taxation under the existing Environment Tax (Act 863) which results in tariffs disadvantage for local manufacturers.
2. The Plastic Waste Recycling Fund created under Act 863 has not been functional and the NPMP aims at implementing it.
3. Some producers and manufacturers have expressed concern about the use of the oxo-biodegradable additive for plastics in contact with food and are not implementing the directive or are exempted.
4. The role of the judiciary system is crucial for waste management in Ghana and enforcement is an important challenge.
5. The Environmental Protection Agency (EPA) can use permits and EIA as an effective tool for dealing with the life cycle of plastics in Ghana and can have recourse to enforcement notices, where plastic waste poses a serious threat to the environment or public health.
6. Act 936 and L.I. 1961 confer enough powers on District Assemblies to tackle solid waste and plastics in Ghana. The District Assemblies have the power to pass Byelaws that could contribute to plastics management.
7. The Standards Authority is empowered to prohibit products to serve the national interest.

To expeditiously deal with plastic waste, a comprehensive law to consolidate and enhance the existing regulatory framework on solid waste in general and plastic waste in particular could be an interesting tool. In this regard, the National Plastic Policy could be the first step to pave the way for the much-needed regulatory reforms to holistically deal with plastics in Ghana. Resources dedicated to the implementation and enforcement of the existing and future laws related to plastic management will be crucial.

- **Plastic pollution**

A field assessment was conducted in over ten plastic 'hotspots' in Accra and Tema under the APMP. Plastic leakage was observed in the streets, in drains and in watercourses. PET bottles and plastic

bags were the most visible items. These were also identified in a waste characterisation conducted by I. Pokua Himans (2013). Plastics pollution was observed on beaches and close to water courses despite the high potential of these areas for tourism and other economic activities. As consequences of plastic pollution, Ghana has experienced: deadly floods due to drains clogged with plastics bags in Accra, loss in fishing activity, plastic litter in zones with high potential for tourism, high malaria prevalence.

## Analysis of the Plastic Chain (Section 4)

Six main activities are identified in the plastics chain: import, production, manufacturing, distribution, collection and recycling. These are introduced below:

- **Import**

No raw plastic material is produced from oil in Ghana. All plastics are imported as raw materials (pellets), semi-finished products (preforms) or finished products. Overall, the figures from the Customs Department for raw and semi-finished material show that there is an active plastic production market in Ghana. The import of raw plastics represents 73% of the total imports while semi-finished products represent 27% of total imports.

Despite an active production market, the analysis of MSW reveals that plastics are mostly imported as finished products (64%) while imported raw plastics account for 21%, semi-finished for 6% and finished packaging products for 9%. It is noticeable that the importation of finished plastic bags is quite important (over 32,000 tons imported in the last 3 years) despite an already large local production of plastic bags.

- **Production (semi-finished, finished packaging)**

There is no production of raw plastics from oil in Ghana. Nevertheless, there is a local production of semi-finished plastic products (e.g. preforms) and finished packaging products (e.g. films, plastic bags, containers) that are sold to the manufacturers and the distributors. Some of the producers include recycled pellets in their production but it is mostly to produce single-use black plastic bags.

- **Manufacturing**

Six main types of polymers are transformed into manufactured goods: low-density polyethylene (LDPE), high-density polyethylene (HDPE), polyethylene terephthalate (PET), polypropylene (PP), polystyrene (PS) and composite plastics.

1. LDPE is mostly used to produce single-use products such as water sachets.
2. HDPE is used to produce single-use or short-life products such as water sachets, bottles for cosmetics or detergent, large containers (e.g. HDPE gallons and barrels) but also of more durable products such as crates, pallets and pipes. Import figures reveal that HDPE pellets are used for the majority (68%) of production of short-life plastic products.
3. PET is used to produce single-use products such as bottles, and packaging blister.
4. PP is used to produce short-life products such as cosmetic boxes, blister and films, and for more durable products such as raffia bags, buckets, chairs, or garden furniture.
5. PS is used to produce single-use products such as take-away and delivery packaging, and for in-house durable products such as panels.
6. Laminate and composite films are co-extruded films. Each material has its own characteristics and properties and is developed by chemical industries to give to their clients some specific

advantages.

Most manufacturers are large-scale except for water sachet manufacturers and the recyclable processors (long-lasting recycled plastic products). The water sachets sector is extremely competitive, with over 400 manufacturers in the Greater Accra region.

- **Distribution**

The distribution of plastic products is mostly via two types of companies: large-scale distributors such as shopping malls, supermarkets; and middle and small-scale distributors (markets, street vendors, businesses) which are often informal.

- **Collection**

The collection of plastics[1] is performed by authorised service providers in charge of MSW according to a zoning system, informal actors (waste pickers, middlemen, aggregators) and NGOs or local initiatives.

The authorised MSW service providers face challenges that prevent them from developing source segregation and separation. These include: delayed payment from the households, debts of the government towards the service providers, high transportation costs due to low number of transfer stations or lack of equipment. In this context, the implementation of separated collection and specific educational campaigns is not a priority for the service providers. To date, only one service provider performs separate collection with four bins as a pilot programme at a very small scale in selected schools and with the support of the AMA. This service provider is not planning on scaling-up the pilot due to the financial costs that it would represent.

From the interviews conducted, it appears that the informal sector is quite organised and collects significant amount of plastic, especially polymers in higher demand (HDPE, LDPE and PP). One limit the informal collectors face is the current zoning system does not allow them to offer door-to-door collection to households. Another limit most of them face is their lack of financial capital that prevents them from investing in costly transportation equipment. As they are informal actors, their access to private investors and banks is limited.

There is a limited number of local collection initiatives (less than five were identified) and all operate at a small scale. These collection initiatives are led by NGOs or start-ups and perform collection through events (churches, marriages, etc.), waste pickers (in landfills, streets or communities) and collection points (plastic bins). They face the same zoning constraints as the informal sector. Some use plastic collection events to educate the population about plastics and waste management. Other are also recycling plastics (flakes, pellets) and have developed this collection system as a means of increasing the volume of plastics that they recycle.

Overall, all stakeholders involved in collection report that transportation costs are a major hindrance to the collection, recycling and selling of plastic waste. This is due to the insufficient number of transfer stations, limited road network resulting in traffic jams and therefore lengthy transportation, damaged roads resulting in high maintenance costs, lack of local production of trucks and high taxes on importation of trucks.

[1] Plastic is not collected separately, but as a component of the mixed MSW stream.

- **Recycling**

There are different processes and challenges and opportunities per type of polymer. Based on interviews and site visits of the main recyclers in Accra and its surroundings, it is estimated that around 3,000 tons per month (i.e. 35,000 tons per year) are recycled. However, there are no recycling plants that make food-grade recycled HDPE, LDPE or PET in Ghana. Existing plants require further investment, large quantities of plastic and specific industrial and chemical know-how. In addition, the different types of plastics are not recycled at the same level. LDPE accounts for 55.7% of all plastic recycled, PP for 25.2%, HDPE for 9.5%, PET for 7.7% and others for 2%. Recycling of PS and composite plastics is considered to be negligible.

The comparison of plastics generation and recycling reveals significant differences between the polymers. Rigid PP is the most recycled polymer (39% of generated PP is recycled), followed by LDPE (33%), PET and HDPE (around 6%). Less than 2% of the other plastics generated are recycled.

It should be noted that:

1. LDPE recycling mostly targets water sachets. Plastic bags are barely collected or recycled. PET collection is poor, due to the lack of a PET market. All 'recycled' PET consists of flakes that are exported.
2. Most of the recyclers declared that they are interested in scaling-up their activity but face challenges to find the required quantities for the expansion of their business. The collection of PET in particular was reported to be low, hence the development of a collection system (bins, tricycles) by some actors involved in PET.
3. Most of the recyclers are recycling small quantities of plastic (from 5 to 30 tons per month). The major recycling companies, who manage between 100 and 500 tons per month prefer to focus on the transformation of recycled pellets or flakes rather than to settle a collection system, which is expensive due to the transportation prices.
4. Several companies producing long-lasting plastic goods out of recycled plastics were identified but these companies mainly use rigid plastic that are not single-use plastics.

Therefore, plastic management, including collection, recycling and reuse varies from one polymer to another based on the actors, prices, collection, recyclability and characteristics of each polymer.

Lastly, it should be noted that the recycling sector has evolved significantly between the conduct of the interviews (February to May 2019) and the submission of this report (September 2019). The recycling sector is quite dynamic in Ghana and adjusts rapidly to the demand and to investments.

- **Synthesis**

The following table is a general synthesis of the current situation, for each plastic polymer.

*Table 1: General synthesis on main plastic polymers in Ghana*

| Plastic Polymers | Import of material | | Manufacturing (main products) | Waste Collection | Recycling | Export | Comments and recycling solutions |
|---|---|---|---|---|---|---|---|
| | Raw | Recycled | | | | | |
| LDPE | Yes | None | Plastic bags<br>Water sachets<br>Packaging films | Water sachets: ++<br>Plastic bags: - | Water sachets: ++<br>Plastic bags: + | None | Reused in process after recycling<br>LDPE management is already well developed<br>Local manufacturing of new recycled short-lived products only (plastic bags) |
| HDPE | Yes | Yes | Water sachets<br>Cosmetics and detergent containers<br>Large containers (gallons, barrels)<br>Crates, pallets<br>Pipes | All HDPE plastics: +++ | All HDPE plastics: +++ | None | HDPE management is already well developed<br>Manufacturing of new household products, pipes and bins in Ghana made of recycled HDPE |
| PET | Yes | None | Bottles<br>Packaging blisters | PET bottles: +<br>PET packaging: - | None but forecast | Export of PET flakes | PET bottles are the only PET plastic collected materials<br>They are shredded, washed and exported<br>Recycling process is technical and expensive but there is a rising interest in this polymer |
| PP | Yes | Yes | Cosmetics containers<br>Blister, films<br>Raffia bags<br>Buckets, chairs, garden furniture | Rigid PP: +++<br>Raffia PP: +<br>Wrapping PP: - | Rigid PP: +++<br>Raffia PP: ++<br>Wrapping PP: - | None | Rigid PP plastics are recycled in Ghana to manufacture new household products<br>Raffia PP plastics are recycled to make recycled raffia plastic bags<br>However, wrapping PP are not collected nor recycled |
| PS | Yes | None | Take-away containers | None | None | None | PS recycling concerns only the process losses in industries and their immediate reintegration |
| Composites | Yes | None | No main product can be identified. Each composites are different based on the companies' needs. | None | Limited | None | Only one company in Ghana can include composites in its process for the production of pavement bricks.<br>However, the amount taken are limited and marginal.<br>There is no dedicated system of collection for these products. |

Legend for collection and recycling: +++ well ++ correct + little - poor

## Conclusion and way forward

The analysis conducted in the Baseline study reveals that overall, the plastic market is quite dynamic in Ghana. Yet, there are various challenges along each process of the plastic chain, that vary from one polymer to another.

- The collection of plastics is performed mostly by the informal sector, followed by local initiatives led by NGOs and start-ups. As most of the plastic are collected by the informal sector, it is difficult to monitor this activity. Furthermore, waste pickers collecting plastic waste at the landfill and transfers stations work in poor condition.
- Transportation issues has been reported as one of the main challenges faced by the plastic collectors, preventing them to enhance their activities.
- The authorised service providers are facing already important challenges with mixed MSW collection that prevent them from organising source segregation and separate collection that would result in additional costs.
- The value of the material clearly influences its collection and recycling: the waste pickers and recycling companies tend to focus on the plastic stream with the highest value (LDPE, PP, HDPE) and most accessible recycling process (production of recycled chairs or basins from PP, of plastic bags from LDPE, or pellets from LDPE and HDPE). There is no production of recycled pellets in Ghana for PET - only flakes - as it would require high investments and specific know-how and this situation impacts the price of PET and therefore, its collection.
- A large part of the plastic is recycled into lower-value applications (plastic bags), that are, after use, not recycled.
- The analysis of the waste management sector reveals a complex organisation for a fragile system. A better MSW collection system would eventually improve plastics collection and result in reduced plastic leakage into the environment, if combined with the needed education and sensitisation of the population.
- The analysis of the regulatory and institutional framework shows that there are numerous stakeholders with sometimes potential overlaps in their mandate and that there is no law to holistically provide for the management of waste and plastics. A National Plastics Management Policy is currently under review by the Cabinet and two other instruments directly address the plastic challenge, but the existing regulatory and institutional framework would require to be enhanced.

**Recommendations**

Solving these challenges will require the development of solutions adapted to each type of polymer and the strengthening of the collection system and the waste management sector along with a supporting enabling regulatory framework.

Four main points of improvement have been:

1. *Creating more value in the plastic chain*
    - Identify and encourage the production of high value plastic products with recycled plastics (LDPE is currently recycled to produce plastic bags, that are a single-use item and have a low value)
    - Encourage the use of recycled plastics in the manufacturing industries
    - Support capacity building and training to increase the knowledge and know-how

in plastic recycling
- Limit the production/importation of plastics that cannot be recycled

*2. Improving infrastructure: development of physical (transfer station, sorting centre) and virtual infrastructure is needed to support the collection of plastic and enhance communication between the actors, especially for identifying buyers and seller of plastic material.*

*3. Regulatory framework /stakeholders' commitments*

*4. Awareness and communication*

Potential solutions and further recommendations will be developed and presented in the strategic Roadmap with the aim of achieving the following long-term objectives:

- To reduce permanently plastic waste leakage into the environment (zero plastic leakage objective)
- To increase circular material use
- To deliver socio-economic benefits for the local community by creating new jobs and ensuring social equity
- To improve the public's stake-hold in the environment

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# 1 INTRODUCTION

## 1.1 General Context

The Accra Plastics Management project emerges in a context of global concern about plastics pollution, especially in the oceans. This concern is part of a wider movement which tends to question the current mode of production and consumption which have led to a human impact on the environment that includes various aspects such as global warming, mass extinction, biodiversity loss, environmental degradation, pollution etc.

In September 2015, the world leaders adopted a new global agenda as the Millennium Development agenda reached its end. The agenda '*Transforming our world: the 2030 Agenda for Sustainable Development'* takes into account the importance of engaging sustainable development. In this perspective, the '*planet*' becomes a key component of the 2030 agenda. Therefore, this agenda addresses both developing and developed countries (Article 5[2]). It is composed of 17 Sustainable Development Goals (SDGs) out of which 10 pertain to the environment.

Among the different threats on the environment, the management of solid waste, and in particular of plastics, has become a growing concern. Indeed, in developing countries, the expansion of cities and population has led to increasing volumes of municipal solid waste (MSW) and change in composition. These challenges require an adequate MSW management system to maximise positive impacts through the job creation, resource value added and benefits for the community. Otherwise mismanagement may result in negative impacts on the environment (landfills, disposal sites, illegal dumpsites, indiscriminate littering, clogged drains, flooding etc.) and on human health (malaria, typhoid, cholera etc.) (Wang and Nie, 2001; Zhao et al., 2011).

In this context, the growing quantity of plastics in MSW has brought new challenges, in particular land and marine pollution. An estimated 8 million tonnes of plastic waste enters the oceans each year, which corresponds to one garbage truck every minute (Ellen MacArthur Foundation, 2018). Therefore, specific solutions and opportunities - such as source segregation, recycling, reuse etc. - need to be developed for plastics management in addition to the traditional systems for MSW management.

Despite the fact that plastics pollution is a global concern, the development of solutions depends on the local characteristics such as:

- System of MSW management - collection rate, disposal, zoning, etc.;
- Plastic production, importation, collection and recycling per type of polymer;
- Habits of the population, knowledge, education and sensitisation about plastics segregation and pollution; and
- Pollution related to plastics.

This Baseline Study aims at providing the required information about plastics and analysis of the current plastics and waste management systems in Ghana, and Accra in particular. These will serve the development of recommendations that will be presented in a second report of the APMP, the

[2]Article 5: "*This is an Agenda of unprecedented scope and significance. It is accepted by all countries and is applicable to all, taking into account different national realities, capacities and levels of development and respecting national policies and priorities. These are universal goals and targets which involve the entire world, developed and developing countries alike.*"

Strategic Road Map.

## 1.2 Presentation of the APMP

The APMP started in February 2019. It is funded by the Department for International Development (DFID) with the main objective of tackling plastic pollution in Accra, Ghana. The APMP is an early action of the GPAP which is hosted by the World Economic Forum and was launched in August 2019.

The project aims to be a catalyst to initiate, enhance and fund pilot projects; and act as an integrator to coordinate the efforts of the various initiatives, in order to have a structured and global approach towards plastic management.

The APMP focuses on Accra and its surroundings (including Tema and other nearby areas where industries, manufacturers and recyclers are based). It targets plastics management and in particular single-use plastics.

The APMP is organised into four main areas of work to be completed over the twelve (12) months of duration of the pilot. The four areas of work listed below will be tied up with actions, with the final objective of creating spin-off projects resulting in the implementation of viable solutions for a sustainable plastic management:

1. **Facilitation and Partnership Support**, which aims to strengthen stakeholders' collaboration, between five types of stakeholders - national governmental stakeholders, international organisations, private sector, informal sector and civil society organisations;
2. **Technical Support and Action-Innovation**, which aims to assess the current situation in Accra and define a strategy and a roadmap;
3. **Investment**, which aims to analyse investment needs and identify potential sources of financing; and
4. **Replication and Scaling-up**, which aims to develop best practices and a methodology in order to enable the replication and scaling-up of this approach in Ghana and other countries.

## 1.3 Definitions

Below are the explanations or definitions of terms used in the Baseline Study.

**Aggregators / Middlemen** (also used in this report to designate middle women) both refer to the people buying recyclables in order to gather larger volumes to make profit out of the selling of these volumes. The term **middleman** would refer to a person who does not have direct contact with a recycling company or large manufacturers and has no or little equipment. The term **aggregator** refers to a person who are in direct contact with manufacturers or recycling companies. For example, a middleman will buy from waste pickers or another middleman and sell to another middleman or an aggregator. An aggregator would buy from waste pickers and middlemen and sell to recycling companies or manufacturers.

**Borla-taxis** is the term used in Accra to designate the tricycles performing informal mixed or segregated solid waste collection, usually in areas that cannot be accessed by the equipment (large trucks) of the official municipal solid waste service providers.

**Disposal** means the final placement of solid waste in landfills or other disposal facilities, without intention of retrieval of unwanted residues. The term **disposal sites** include all the different sites where waste is disposed, whether these are disposal sites, sanitary engineered landfills, open

dumpsites, legal or illegal.

**Informal employment** refers "*to all employment arrangements that do not provide individuals with legal or social protection through their work, thereby leaving them more exposed to economic risk than the others, whether or not the economic units they work for or operate in are formal enterprises, informal enterprises or households*" (ILO, 2013, p3). Recyclables collectors working for or selling to registered companies do not benefit from any legal or social protection and don't have any contract signed with the companies. They do not work for a salary and do not have prescribed hours for work; and are paid solely on the basis of the materials collected. In this perspective, borla-taxis and waste pickers' work falls under the definition of informal employment.

**Municipal Solid Waste (MSW)** refers to all solid and semi-solid materials generated by residential, commercial, and institutional properties. It can be collected by the municipal assemblies (by the private service providers under their franchise agreement and by the assemblies themselves) or dumped indiscriminately on open lands, streets, and in drains. It does not include some types of waste that require specific treatment such as human waste, hazardous wastes or healthcare wastes.

**Municipal Solid Waste Services** include the handling, collection, transportation, transfer, disposal and treatment of MSW, as well as other activities such as prevention, sensitisation, recycling, composting etc. These can be performed by authorised service providers or unauthorised companies or individuals both from the formal and the informal sector.

**Plastics chain** is a term used to refer to all the processes involved in the plastic sector from production to disposal. In this report, it includes:

- **Plastic importation**, which refers to the importation of plastics under all its forms (flakes, pellets, preforms, films, finished products that include a packaging made of plastic etc.).
- **Plastic production**, which refers to the production of semi-finished plastic products such as preforms, films, caps, etc. that will be used for the manufacturing of finished products.
- **Plastic manufacturing**, which refers to the manufacturing of finished products made of plastics only (ex: straws) or partly (ex: bottle of water). Manufacturing companies may use **recycled plastics** (only or partly) to make their finished products.
- **Plastic distribution**, which refers to the distribution of the finished products made only or partly of plastic.
- **Plastic consumption**, which refers to the consumption of the plastic finished products by the consumers. In the case of **single-use plastics**, also referred to as 'disposal plastics', the product is intended to be used only once before being considered as waste (common application are grocery bags, food packaging, bottles, straws, cutlery).
- **Plastic segregation**, which refers to the separation of plastic waste from other types of waste (organic, paper, e-waste etc.). When this segregation is performed by the consumer of the product, it is referred as **source segregation**.
- **Plastic collection**, which refers to all the methods of collection of plastics, both formal by service providers and informal by borla-taxis, waste pickers or companies not accredited by the municipality, either segregated or mixed with other waste.
- **Plastic sorting**, which refers to the separation of the different types of plastic (HDPE, LDPE, PET etc.). It is usually performed at transfer stations, disposal sites or sorting centres.
- **Plastic recycling**, which refers in this report to the transformation of sorted plastics. In this report, recycling comprises both flakes and pellets. Recycled pellets can be used to

manufacture finished products made of plastic. When the plastics is processed into a finished product, it is referred as plastic manufacturing, even when recycled plastic is used.

- **Plastic disposal**, which refers to the disposal of plastic in disposal sites.
- **Plastic recovery**, which refers to the conversion of plastic into resources such as heat or fuel.

**Solid waste service providers** refer to the companies authorised and contracted by the municipality to provide solid waste services, or any component of such services within a zone.

**Tonnes** refer to metric tonnes in this report (1 tonne is 1,000 kilogrammes).

**Waste pickers**, according to the definition used by the International Labour Office (ILO, 2013) are "*those who do the primary collection and sorting of waste. […] Waste pickers extract and reclaim reusable and recyclable materials from mixed types of waste that others have cast aside. They may collect or sort household waste from the curb side, litter from streets and urban waterways, or commercial and industrial waste from dumpsters. Some work at municipal dumps or landfills, and some may also be involved in the processing of recyclable waste*" (ILO, 2013, p47). Based on this definition, the report distinguishes three types of waste pickers: unorganised or autonomous waste pickers, organised waste pickers – working through cooperatives and associations, and waste pickers with a contract – this third category is considered to be formally employed (ex: metallurgical industries, public sector). According to the ILO, waste picking is one of the four groups of work occupied by 'urban informal workers' (the other three are: domestic work, home-based work and street vending). These groups have low and erratic earnings, little security (most are not protected against loss of work and income), and operate "outside the reach of government regulations and protection", remaining "largely invisible in official statistics". (ILO, 2013, p39).

# 2 APPROACH AND METHODOLOGY

## 2.1 The Approach and Objectives

The Baseline Study falls under the second area of work of the APMP, “Technical Support and Innovation”. The aim of the Baseline Study is to provide an overview of the plastics management in Accra through data collection and analysis.

The Baseline Study considers both formal and informal sectors involved in plastics and waste management, and focuses in particular on:

1. The general context of Greater Accra including regulatory and institutional context, SWM and plastic pollution (Section 3);
2. The plastic chain, market and existing initiatives, including the informal sector (Section 4);

The results of the Baseline Study are key to inform future recommendations that will be included in the Strategic Road Map and for the development of Feasibility Studies which will precede the Investment Plan programmed under the third area of work of the APMP, 'Investment'.

## 2.2 The Methodology

In order to properly understand the management of plastic in Accra, a systematic approach was used by the APMP team. The team gathered and analysed the following data:

- **General data**
  - Accra Metropolis population
  - Proportion of high, middle and low income
- **Waste management data**
  - Generation, collection, disposal and illegal dumping/burning of municipal solid waste
  - Waste characterisation
  - MSW zoning and authorised service providers
  - Unauthorised systems of MSW management
- **Plastics management data**
  - Plastic importation and production in Ghana
  - Plastic quantities per polymer in Accra
  - Plastic recycling market (key actors, prices).

The data was gathered and obtained through the following methods:

- Literature review, in particular for waste characterisation;
- Meetings with institutional stakeholders that can provide official sources of data such as the EPA, the AMA, the Ghana Statistical Services (GSS) and the Ghana Revenue Authority (GRA) (to which the Customs Department reports);
- Meetings with private stakeholders that can provide information, and in particular with associations representing groups of stakeholders such as the Association of Ghana Industries (AGI), the Environmental Service Providers Association (ESPA), the Ghana Plastic Manufacturers Association (GPMA), the National Association of Sachet and Packaged Water Producers (NASPAWAP) and The Sachet Water Collectors Association;
- Hiring of local consultants: Environment 360 - an NGO involved with the informal sector,

Mrs. Annie Humu - a legal expert, Mr. Martin Oteng - an environment and waste management expert;

- Development of two questionnaires (Annexes G and H), one targeting large manufacturers and one targeting recycling companies;
- Conduct of a study on the informal study, during which 33 waste pickers, 3 aggregators and 2 middlemen were interviewed;
- On the field visits, in particular to visually assess plastic pollution; and
- Comparison and analysis of different data in order to estimate another type of data.

For all data presented in this Baseline Study, the area considered is clearly stated. Indeed, this Baseline Study focuses on Accra Metropolis for subjects related to SWM (generation, collection and disposal) and on GAMA for subjects related to plastics management (production, collection, recycling) as many industries and companies are located outside of Accra Metropolis.

# 3 GREATER ACCRA REGION CONTEXT

## 3.1 Presentation of the Accra Metropolis and the Greater Accra Region

**Population and administrative areas**

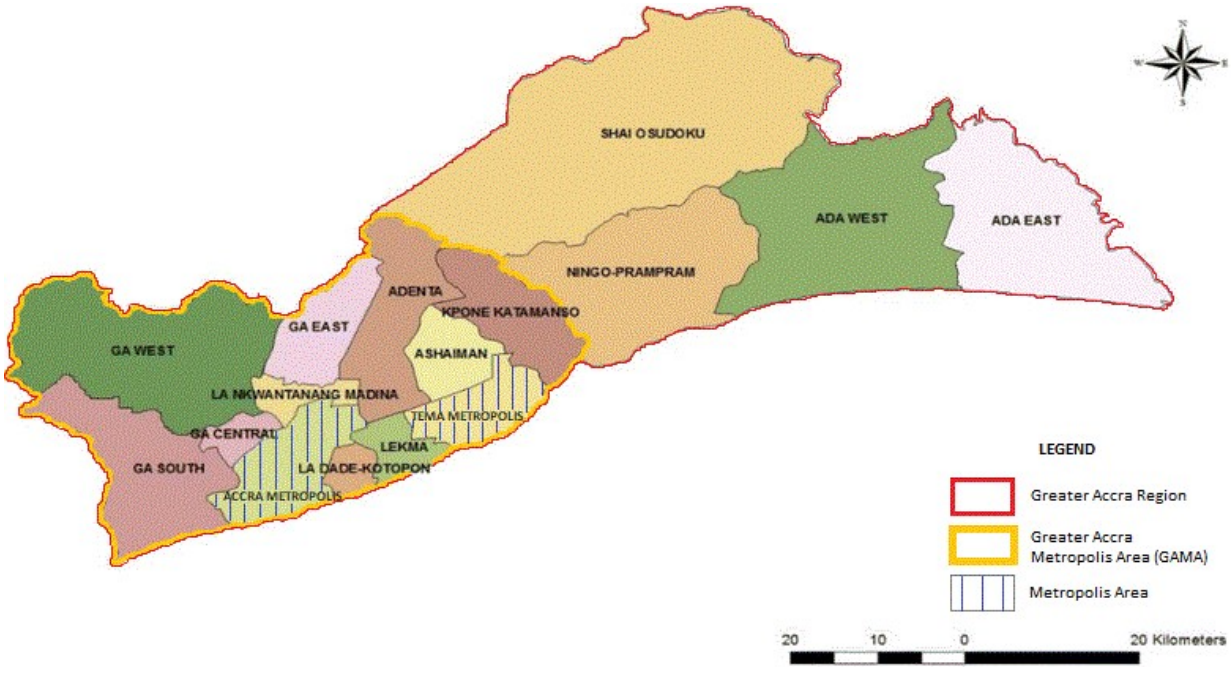
Accra Metropolis, located in the Greater Accra Region, is a fast-growing capital city with 25% population growth between 2010 and 2019. The metropolis, with a total of 2 million inhabitants in 2019, is one of the most densely populated cities of Ghana, along with Kumasi (2.1 million). .

The Greater Accra region is one of the ten administrative regions of Ghana. It is the second most densely populated region with 4,943,075 inhabitants in 2019. The Greater Accra Region is composed of 16 administrative districts. The Greater Accra Metropolitan Area (GAMA) is composed of 12 districts. The term GAMA was first used in 1993 by Benneh et al in the report *Environmental Problems and the Urban Household in the Greater Accra Metropolitan Area (GAMA)-Ghana* (1993) and has since been used by other researchers when working on Accra Metropolis and its surroundings.

Therefore, Greater Accra Region, GAMA and Accra Metropolis are three distinct areas as shown on the map below. This Baseline Study will focus mostly on the Accra and Tema Metropolises in relation to SWM (generation, collection and disposal) and on GAMA in relation to plastics management (production, collection, recycling) as many industries and companies are located outside of Accra Metropolis. For each data, the area considered will be clearly stated.

The map below illustrates the Greater Accra region and its 16 districts, the GAMA and Accra and Tema Metropolises.

*Figure 1: Map of the Greater Accra region and its 16 districts (edited from Ohene Adjei, 2014)*

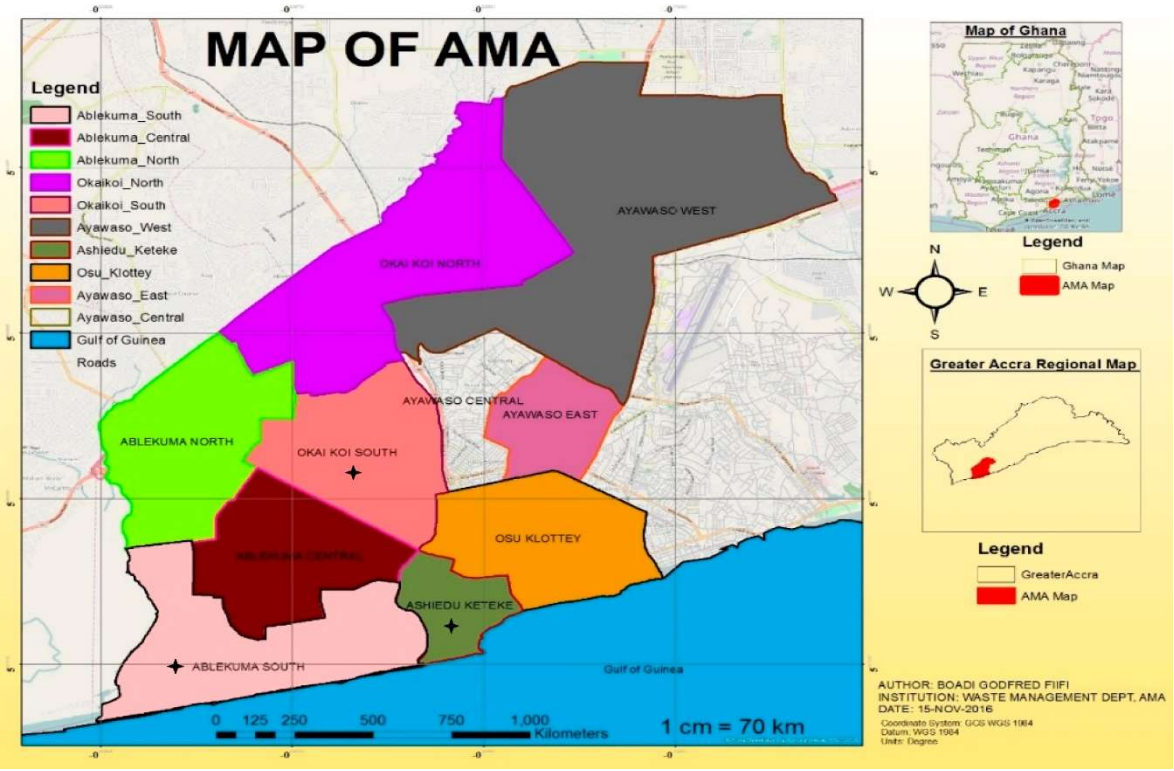



It should be noted that the AMA and Tema Metropolitan Assembly (TMA) are not districts of the Greater Accra Region. They are authorities in charge of the management of some defined areas, as prescribed by the Local Governance Act (Act 936).

Therefore, the zones managed by the AMA and TMA do not necessary correspond to Accra Metropolis and Tema Metropolis.

In the case of the AMA, the zone managed by the assembly has considerably reduced over the past three years. In 2016, the AMA was responsible for the management of a zone corresponding roughly to the Accra Metropolis shown on the maps below. The map below shows the sub-districts that were part of AMA in 2016. Nowadays, the AMA only comprises three sub-districts out of the ten composing Accra Metropolis: Ablekuma South, Ashiedu Keteke and Okai Koi South (marked with a star on the map). The other seven sub-districts are since 2019 managed by different district assemblies. Therefore, there has been a recent fragmentation for the management of all municipal services, including solid waste management.

*Figure 2: Map of Accra Metropolitan Assembly in 2016 (Oduro-Appiah et al., 2016)*




The recent change in the organisation at the local level has created some complexity regarding:

- Supervision of waste management: new smaller assemblies, with less resources, are now in charge of supervision waste management activities in their districts.
- Reporting on solid waste management: it is harder now to have a consolidated view of the SWM situation over the AMA, as it is managed by different district assemblies.

Knowing that data collection and analysis is crucial for decision-making and that coordination is important for waste and plastics management, this recent fragmentation could represent a new difficulty for these sectors if no specific collaboration between the assemblies is implemented.

This decentralisation enables the provision of local services by each assembly but will lead to a fragmented system unless the assemblies strongly collaborate, coordinate their activities and centralise data. One way to enhance this collaboration could be through a more rigorous and centralised reporting at a regional level for example to the Regional Environmental Health Office

which falls under the Ministry of Sanitation and Water Resources, responsible for waste management. Key indicators for reporting could be determined so that these are similar from one assembly to another and the Regional Environmental Health Office could process to data gathering and analysis per assembly, city and region. Another way to have a centralised waste management system at a city level would require the creation of a dedicated entity. This could only be enabled through significant changes of the Ghanaian legislation.

**Role of the assemblies**

The functions of the District Assemblies (include Metropolitan and Municipal Assemblies) are defined in the Local Governance Act (Act 936). All District Assemblies have a District Health Department – and only Metropolitan Assemblies have a Waste Management Department. The table below summarises the functions of these two departments, which are the main one involved in the management of solid waste.

*Table 2: Roles of the health and waste management departments of the Assemblies*

| **District Health Department (Regulation 4 L.I 1961)** | **Waste Management Department (Regulation 5 L.I 1961)** |
|---|---|
| The functions of the Department of Health are to:<br>● Facilitate disease control and prevention<br>● Assist to educate and inform residents of the district on sanitation and personal hygiene<br>● Facilitate and assist in regular inspection of the district for detection of nuisance of any condition likely to be offensive or injurious to human health<br>● Assist to establish, maintain and carry out the removal and disposal of refuse, filth [...] from any public place<br>● Advise on the regulation and provision of services by the private sector licensed by the District Assembly for the removal, disposal and processing of refuse, filth [...]. | The Waste Management Department has been mandated to provide facilities, infrastructural services and programmes for effective and efficient waste management for the improvement in environmental sanitation, the protection of the environment and the promotion of public health.<br>Among other functions, the Waste Department shall:<br>● Receive and provide adequate treatment and effective disposal of both solid and liquid waste<br>● Treat and dispose of solid waste and provide compost manure<br>● Supervise the cleansing of drains, streets, markets, car parks and weeding of roadsides and open spaces<br>● Advise the Assembly on recycling and other uses of waste materials. |

AMA and Tema Metropolitan Assembly (TMA) have both a Waste Management department in charge of supervising this activity. However, this is not the case on the other districts within the Greater Accra Region.

**Employment and income**

According to the Ghana Labour Force Survey (GSS, 2015):

- The average annual gross income is 16,581[3] GHS per household, or 5,429[4] GHS per capita.
- 67.7% of the working age population of the Greater Accra region (15 years old and older) is employed.
    - The majority (67%) of those currently employed are in vulnerable employment (own account worker, family worker, domestic employee etc.),
    - Only 33% are 'paid employees', meaning they work for a public or private employer and receive remuneration. This employer can either be formal or informal. For

[3] Around 5,000 USD, using GHS/USD exchange rate in 2015
[4] Around 1,600 USD, using GHS/USD exchange rate in 2015

example, a driver can work for an informal or formal company and will receive a remuneration for the job while a domestic employee will be paid based on its performance.
    - Therefore, the waste pickers and borla-taxis may fall under the category 'paid employee' or under 'vulnerable employment' depending on their status (working independently, working for a company or sorting centre – formal or informal, or working as part of a cooperative or an association, etc.).
- The economy of Greater Accra region is led by the private sector.
    - 92% of the 67.7% currently employed population works in the private sector.
    - The public sector only represents 7% of currently employed population.
    - The remaining 1% work for international organisations or NGOs.
- The GSS Labour Force Survey (2015, p.83) differentiates the informal sector from the informal employment (GSS, 2015, p.83). The informal sector is part of the Non-Observed Economy, which "*contains three components: illegal activities, underground activities and informal employment activities*". Therefore, the informal employment's statistics does not include illegal and underground activities.
    - 84.1% of the 67.7% currently employed population in the Greater Accra region works in the informal sector. This striking figure shows the importance of the informal sector in Ghana. Informal employment is mostly composed of small-scale businesses in which labour relations are "*based mostly on casual employment, kinship or personal and social relations rather than contractual arrangements with formal guarantees*" (GSS, 2015, p.83). The informal employment is an opportunity for people to improve their livelihood when employment offers in the formal sector are scarce but people working informally remain vulnerable as their conditions of employment offer little or no protection. Informal employment is characterised by the lack of paid holidays or leave, lack of contract of work, lack of sick or maternity leave.
    - 15.9% of the 67.7% currently employed population in the Greater Accra region works in the formal sector.

For plastics management, the informal sector plays an important role in GAMA as the collection and aggregation of plastic waste is mostly performed by waste pickers, aggregators and middlemen working informally. In addition to these actors, some small-scale businesses are part of the informal plastics management sector either in recycling or in plastic selling (for ex: small shops, street and market vendors, water sachet vendors). On the contrary, plastic production and manufacturing is mostly performed by large-scale companies that are part of the formal sector.

## 3.2 Current SWM system in Accra

This section presents a description of the SWM sector in Accra, with the data available locally. It should be noted that little consolidated data exists on SWM in Greater Accra. Some of the available data is difficult to analyse because of its limited accuracy and reliability. Furthermore, the territories for which the data is presented have recently changed, which makes it harder to effectively compare and analyse the data available.

This section aims to provide an overview of the current waste management system in Accra. This

report does not, however, aim to provide a full and deep analysis of the waste sector as this is out of the scope of the project and would require a dedicated project in itself.

### 3.2.1 Waste Management Practices

The data summarised below are based is based on the best available comprehensive data: there are some data discrepancy and a study on SWM in Accra and Tema would be required to develop more accurate data. The lack of reliable data on MSW is a challenge as accurate data on the amount, source and type of solid waste within an environment is usually a prerequisite for sound planning and monitoring of services and infrastructure, and for the management of waste across the hierarchy.

The tables below present the available data for the Accra Metropolis and Tema Metropolis from the Ghana Statistical Services (GSS)[5] and from AMA Waste Department.

*Table 3: Key municipal SWM figures*

| Name of the place | Greater Accra | Accra Metropolis | Tema Metropolis |
|---|---|---|---|
| *Source of information* | *GSS, 2010** | *GSS, 2010** | *GSS, 2010** |
| Collected waste | 48.5% | *59.4%* | 48.8% |
| Public dump (container) | 25.7% | *31.2%* | 24.6% |
| Public dump (open space) | 8.4% | *4.7%* | 11.1% |
| Burnt | 13% | *2.7%* | 10.2% |
| Dumped indiscriminately | 2.1% | *1.1%* | 2.9% |
| Buried | 1.4% | *0.3%* | 0.6% |
| Other | 0.9% | 0.7% | 1.8% |

**GSS data is based on the old boundaries of Tema and Accra. These correspond for Accra to the current Accra Metropolis plus Dade Kotopon, and for Tema to the current Tema Metropolis plus Kpone Katamanso.*

The AMA published also some data, in 2017, as presented below:

*Table 4: Key municipal SWM figures for AMA*

| | ***AMA, 2017*** |
|---|---|
| **Collected waste** | 79,1% |
| **Public dump (container)** | Est. 25% containers** |
| **Public dump (open space)** | 8.3% |
| **Burnt** | 12.6% |
| **Dumped indiscriminately** | |
| **Buried** | |
| **Other** | |

[5] The census is conducted every 10 years, and the most recent data is from 2010.

***One of the objectives of the franchised collection is to reduce the number of communal containers in the system by making the service providers pay for disposal of waste (both door-to-door and containers). As at the end of 2015, it is estimated that over 75% of solid waste collection is through door-to-door collection.*

Those data, even with their flaws, provide a picture of the waste management system in Accra that is confirmed by the observation on the field:

- Waste is more collected in the metropolis than in the rest of the greater Accra region,
- Around 25% of the waste is not managed properly in the Greater Accra Region and around 20% in AMA.

The situation regarding SWM in the Greater Accra region is definitely not perfect, but the collection of waste has been organised in the area and is functioning. The increase in the collection ratio should be an objective for the local municipalities in charge of Waste Management.

### 3.2.2 Waste Management System

**History**

In 1985, the Accra City Council (now known as AMA) obtained funding from the Federal Republic of Germany through the Central Government, to institute policy reforms through the Accra Waste Management Improvement Project. The intent of the reforms included the search for the most appropriate collection and transportation system as well as the most cost-effective treatment and disposal mechanism, and this eventually led to the establishment of the Waste Management Department (WMD) in the same year (1985). Subsequently, collection of solid waste was the house-to-house (HH) system with compaction trucks in the high-income, low-density areas or communal container collection (CCC) within the low-income, high-density areas. The new institutional policy envisaged charging economic rates in the high-income areas (institution of cross-subsidisation) while the container service attracted an annual levy per household. Yet, this system was not sustainable for the AMA as low-income areas represented 60% of generated MSW but were barely contributing (5% were paying the annual levy).

In November 1990, in an attempt to improve revenue mobilisation and the quality of service, a privatisation policy was conceived which was also seen as a means to extend coverage to previously un-serviced areas. The policy took off in late 1992, with the appointment of private service providers. Two main arrangements (CCC and HH) were provided and run by registered private service providers depending on the characteristics and constraints of an area.

In 1999, the AMA entered in a Public-Private Partnership (PPP) with the service providers in an objective of increasing the collection efficiency. This system did not improve collection coverage nor revenue collection (Oduro-Appiah et al., 2019). Consequently, the AMA did not raise the expected revenues and incurred a debt to private service providers for the collection and disposal of waste between 2000 and 2010. In 2018, the debt owed by the government to the service providers reached around 700 million GHS for the whole of Ghana[6].

**Current MSW System: The Role of the Private Sector**

In 2011, the 'polluter pays principle' was introduced. The aim was to shift the cost of MSW collection

[6] https://www.myjoyonline.com/news/2018/april-19th/pay-us-gh700m-debt-to-deal-with-filth-epsa-tells-govt.php

to the users with the introduction of a fee and of performance-based contracts. Both AMA and TMA are serviced by private service providers who:

- Compete for a five-years franchise agreement;
- Are responsible for the collection of fees;
- Are assigned a specific zone for MSW collection (does not include the cleaning of streets and drains, which are part of a separate contract); and
- Collect from households (residential waste), small and medium enterprises (SMEs), institutions and large commercial companies and industries. Collection is either door-to-door (middle-class, high-income) or via public containers (low-income).

Under these agreements, the municipalities set the user charges (available in Annex F), enforce the law (through health inspectors) and manage the contracts of the service providers. The users are legally required to register for MSW collection only with the authorised service provider of their zone or to use public containers. With this system, the collection of fees remains a challenge and the service providers report that they have revenue collection of 60% or less.

The service providers are represented by the Environmental Service Providers Association (ESPA).

**Informal Sector Involvement**

A notable feature of the arrangement is the growing activity of individual waste pickers popularly called 'Kaya Borla', 'Borla Taxis' in AMA and 'Truck Boys' in TMA. These are porters who carry solid waste from residences, markets and offices, in sacks, baskets, on trucks, or tricycles ('Borla-Taxis') etc. to a container or dumping sites for a fee. They mostly collect in areas that are not served by the private service providers such as informal settlements that are not accessible by the service providers' trucks. WIEGO[7] estimates that around 5,000 waste pickers are working in GAMA. In addition, there are at least 1,500 borla-taxis in Accra.

The waste pickers play a crucial role in a country like Ghana where the private sector service providers are not able to collect all the MSW generated. The waste pickers either collect:

- Mixed MSW, out of which they generally sort out the valuable materials in the tricycle or at the transfer station; or
- Valuable waste only (metal, plastic, cardboard, electronic waste etc.).

Incorporating the informal sector into the waste management chain is a strong lever to increase the collection and recovery of plastics. It also can prevent competition between formal and informal systems. The AMA is encouraging the incorporation of the collection provided by the borla-taxis (in neighbourhoods that cannot be accessed by the truck of the service providers). The service providers are requested to include the borla-taxis in their collection activities, creating a formalisation of the informal sector.

The waste pickers are organised into numerous associations, often corresponding to an area (for example: The Waste Landfill Association at Kpone). The borla-taxis founded the Borla Taxi Association in 2015 and has 1,500 registered members. A study on the Informal Sector was conducted under the APMP and is available in Annex A (Technical Note #1).

[7] Stands for Women in Informal Employment: Globalizing and Organising

**Summary**

As described above, the collection of mixed municipal solid waste (MSW) is performed by private service providers that have a contract with the competent authority (assemblies). Other stakeholders such as waste pickers or borla-taxis (tricycles) from the informal sector perform either mixed MSW collection or collection of recyclables (plastics, cardboard, metal etc.).

Conflicts between authorised service providers and informal sector actors may arise as service providers are entitled to a monopoly in their zone. As the service providers are not able to access some low-income areas (narrow roads, lack of equipment), the cooperation between borla-taxis and service providers has recently been supported by the AMA. This cooperation should increase the MSW collection and control over this collection, especially the disposal of collected MSW by borla-taxis in landfills recognised by the assemblies instead of illegal dump sites.

This complex organisation (formal, informal, zoning, fees collection) should be taken into account during the development of improvements to the collection system.

### 3.2.3 Current Municipal Solid Waste Management (MSWM) Situation

The current performance figures for waste generation, collection, disposal and open burning in Accra vary depending on the sources. Unfortunately, there is not one single reliable (shared) system of data collection, because:

- There is no weighbridge at the Nsumia disposal site;
- Some service providers use their own disposal sites, and this waste is not recorded; and
- Service providers and disposal sites do not submit regular and reliable reports (e.g. quarterly, annually) for review and acceptance by the AMA or TMA.

**Waste Generation**

The current level of waste generation for the various districts of the Greater Accra region as estimated by the local municipalities:

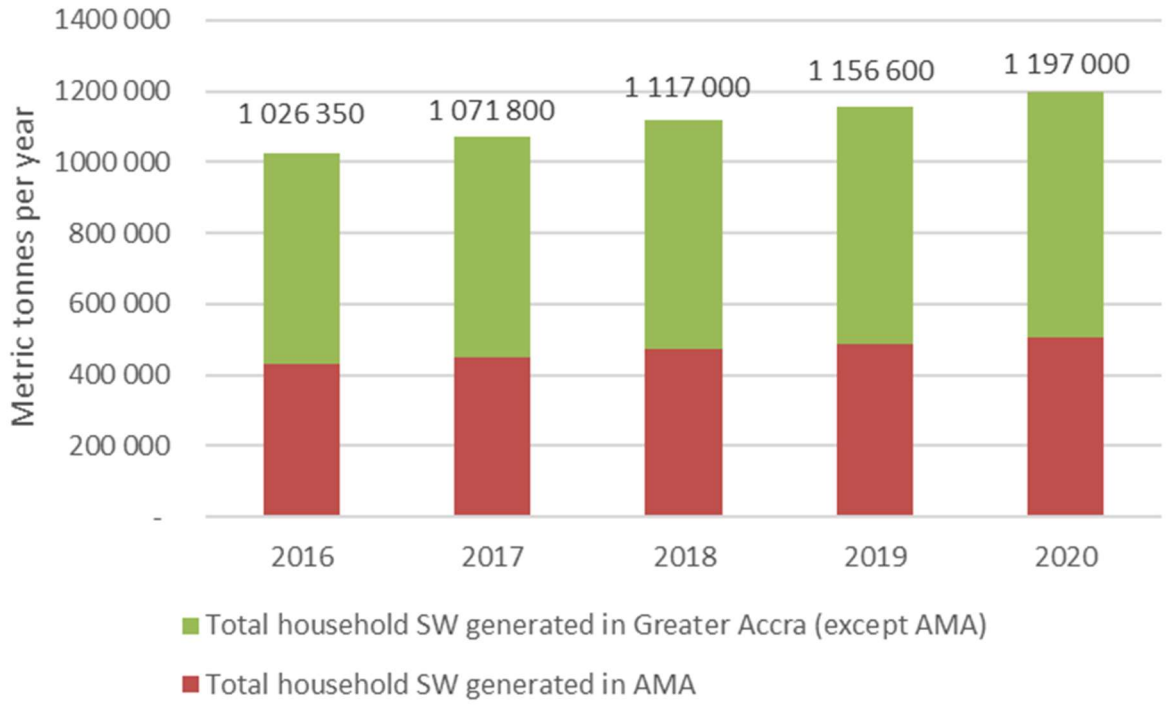
- In 2018, the AMA estimated that around 1,463 tonnes per day were generated in their territory. That corresponded at that time to six districts and a population of 1,083,180 inhabitants, plus an influx of 500,000 people commuting to the city (i.e. a waste generation ratio of 0.92 kg per person per day).
- In 2019, the TMA estimated that around 161 tonnes per day were generated in their territory, for a population of 269,162 inhabitants (i.e. a waste generation ratio of 0.6 kg per person per day).

In order to have an overall view for the Greater Accra region under the APMP, an estimation of generated waste was developed. It is based on the results of a study conducted in 2015 by Miezah et al.[8] (that provided an estimated waste generation ratio), data from the 2010 Census[9] and the forecast of population by the Ghana Statistical Services (GSS) [10]. An equation developed by the World

[8] Miezah, K., Obiri-Danso, K., Kádár, Z., Fei-Baffoe, B. and Mensah, M. (2015). Municipal solid waste characterization and quantification as a measure towards effective waste management in Ghana. Waste Management, 46, pp.15-27.
[9] Ghana Statistical Services, (2010). Census Survey.
[10] Ghana Statistical Services, (2010). Census Survey.

Bank experts[11] that correlates the GDP per capita with the household waste generation was also used to develop the estimations below. More information about the methodology is presented in the Technical Note #2 provided in Annex B. The estimates for 2016 to 2020 are illustrated below.

*Figure 3: Estimate of households' solid waste generation from 2016 to 2020 in AMA (in red) and the Greater Accra*




When calculated per day, it shows growth from 1,206 tonnes per day in 2016 to 1,398 tonnes per day in 2020 for the AMA and from 2,810 to 3,277 tonnes per day for the Greater Accra region. These figures are for household waste alone – they do not account for waste generated by the small shops and businesses or industries.

**Zoning System for MSW Collection in Accra and Tema Metropolises**

As of June 2010, metropolitan Accra had introduced a fee-based performance collection system, where each service contractor is 'zoned' in a specific area within a sub-metro through a tender process (see Oteng-Ababio et al., 2013). In terms of service provision, the city authorities in Accra in 2016 created 15 jurisdictional zones. It assigned these zones to 12 service providers in August on franchise basis, to collect solid waste and corresponding revenue from individual household premises for five years (September 2016 to August 2021).

The zones subcontracted to different service providers as of 2018 for the various zone in the Accra Metropolis are shown in the following table:

[11] Kaza, Silpa, Lisa Yao, Perinaz Bhada-Tata, and Frank Van Woerden. 2018. What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050. Urban Development Series. Washington, DC: World Bank.

*Table 5: Service providers operating in Accra Metropolis*

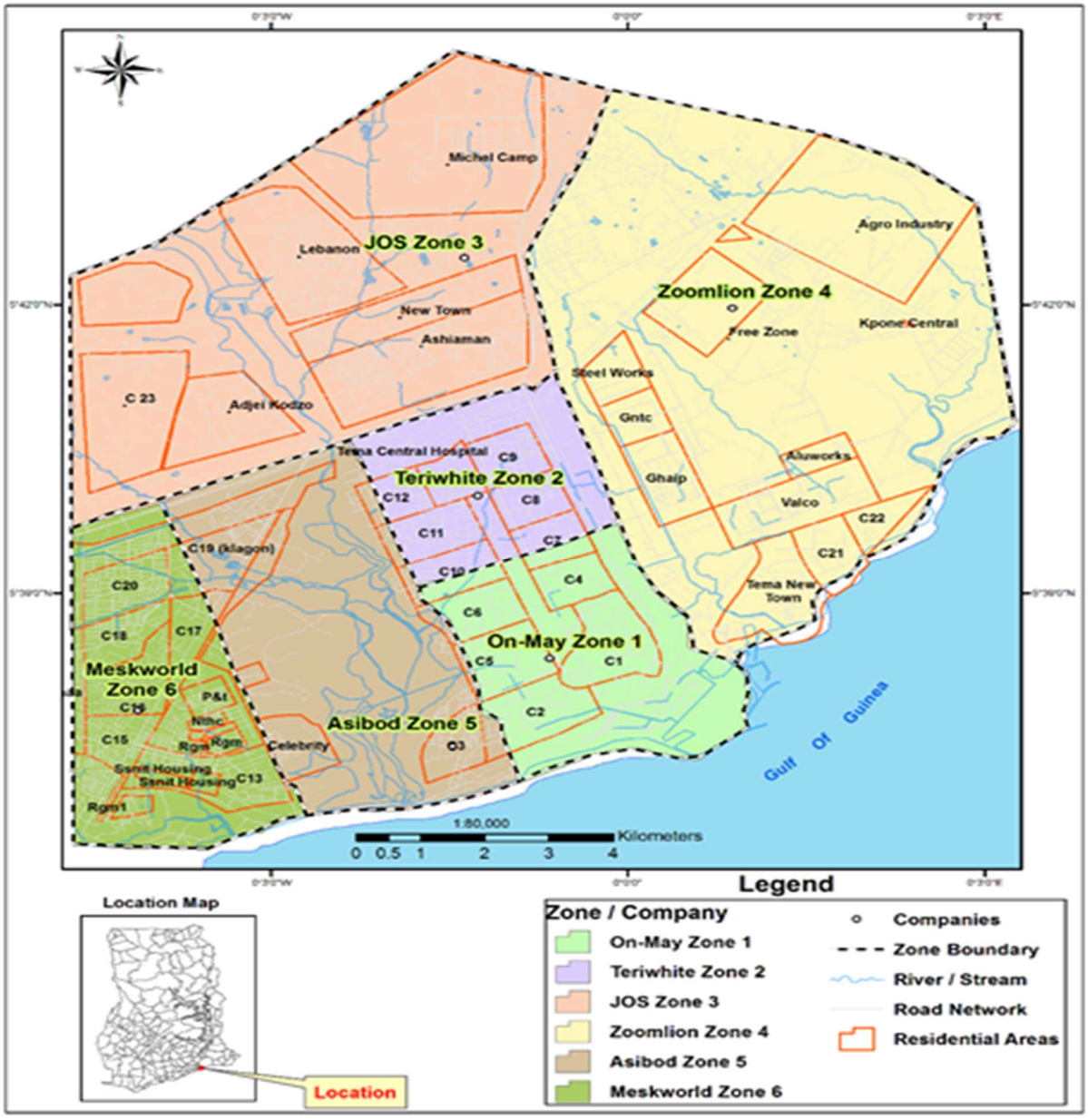
| Name of the district | Name of the service provider |
|---|---|
| Ablekuma Central 1 | Zoomlion Domestic Services |
| Ablekuma Central 2 | Metropolitan Waste and Allied Services |
| Ablekuma North | Asadu Royal |
| Ablekuma South | Metropolitan Waste and Allied Services |
| Ashiedu Keteke 1 | MeskWorld |
| Ashiedu Keteke 2 | Tropical Waste |
| Ayawaso Central | Zoomlion Domestic Services |
| Ayawaso East | ABC Waste Services (subcontracts to Metropolitan Waste and Allied Services) |
| Ayawaso West | Zoomlion Domestic Services |
| Okaikoi North | Metropolitan Waste and Allied Services |
| Okaikoi South | J. Stanley Owusu |
| Osu Klottey | Jekora Ventures |

In the case of TMA, there are 6 zones of collection serviced by 6 service providers.

*Table 6: Service providers operating in Tema Metropolis*

| Zone | Name of the service provider |
|---|---|
| Zone 1 | On-May |
| Zone 2 | TeriWhite |
| Zone 3 | J. Stanley Owusu (JSO) |
| Zone 4 | Zoomlion |
| Zone 5 | Asibod |
| Zone 6 | Meskworld |

*Figure 4: Map of the service providers operating in Tema*




It seems that the zones defined for waste services are correlated with administrative zones: this allows a follow up of the services in term of population serviced. The recent change in AMA boundaries has not impacted the zones and the contracts were transferred to the new districts created[12].

The zoning system in Accra and Tema areas allows a competition between the various operators in waste management. However, from the report published by AMA in 2018 on the performance of the solid waste collectors, it appears that they do not all give satisfaction to the AMA.

[12] In 2016, AMA was responsible for 15 zones and 12 services providers. In 2018, the number of service providers working in the Accra Metropolitan Assembly have been reduce to six (6) in eight (8) service zones as a result of creation of new municipal assemblies from the AMA. In 2019, the AMA is now only in charge of 4 zones

### 3.2.4 Municipal Solid Waste Disposal

Historically, the provision of appropriate and environmentally friendly waste disposal facilities has been a challenge in Ghana. As shown by the figures provided by the GSS (2010), alternative activities such as open burning was performed by 13% of the Greater Accra region population. Open-burning and open-dumping are low-cost solutions for population living in developing countries who cannot afford (or are not willing to pay for) MSW services.

Regarding Accra-Tema Metropolises, the cities have for years been practising land filling, primarily in the form of open dumps or abandoned quarry pits, without proper leachate or gas recovery systems (Oteng-Ababio, 2007). This has been attributed to lack of financial resources to invest in modern treatment systems. The same financial challenge has been cited for the limited budgetary allocations for the operation and maintenance of the existing dumping sites. The situation is aggravated by the rate at which dumpsites are being commissioned and decommissioned without regard to public health. Within the last two decades, the two cities have witnessed the commissioning of over eight dumping sites.

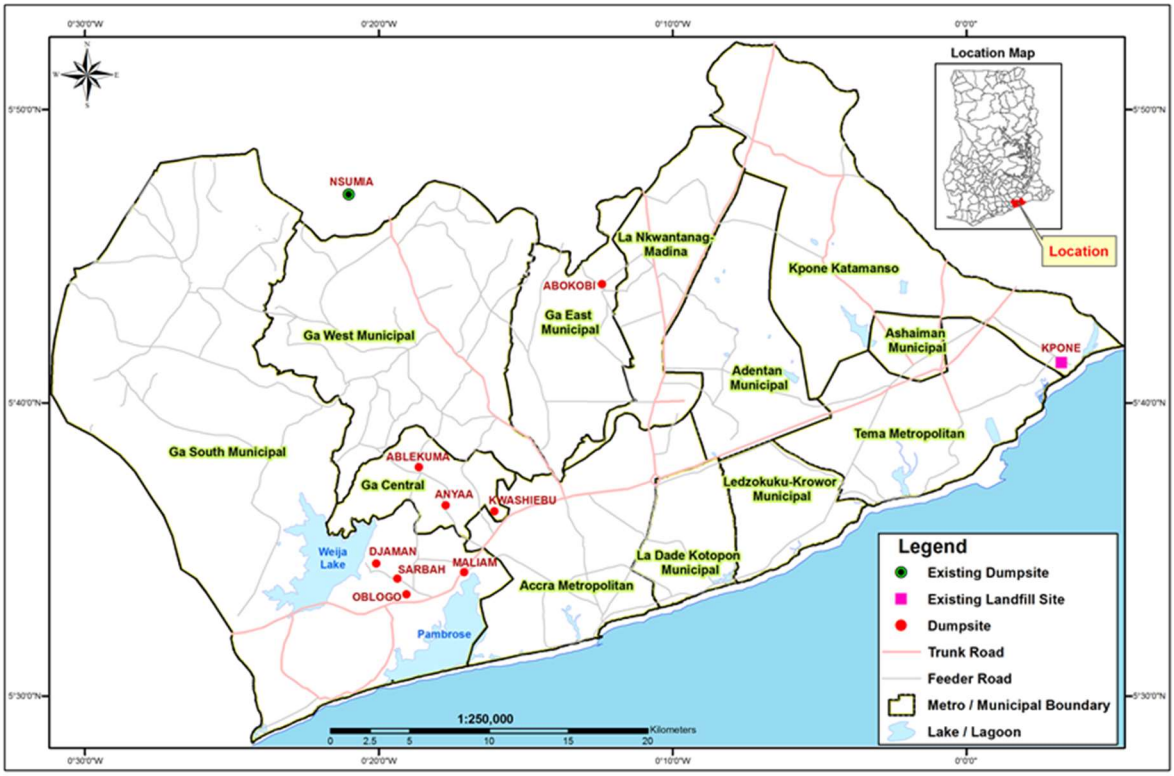
The following map illustrates the current dumpsites in the Greater Accra region: Kpone, Nsumia, Ablekuma, Anyaa, Kwashiebu, Djaman, Sarbah, Maliam and Oblogo.

Nsumia and Kpone are officially allowed and in activity:

- The Kpone disposal site is the official ‘landfill’ of the Greater Accra region
- The Nsumia disposal site was full and closed but reopened due to the fact that Kpone site cannot receive all the waste.

The others indicated should be closed but some may still receive waste from non-authorised collectors.

*Figure 5: Map of current (and including formally closed) disposal sites and dumpsites in Greater Accra region*




**Kpone: The Official Disposal Site**

The Kpone solid waste disposal facility is located northeast of the Port City of Tema, in the Kpone Katamanso Municipality. The landfill site was developed for the solid waste generated within the Tema Export Processing Zone (TEPZ) and other industrial and municipal sources located in and around the Tema Metropolis. It was funded through two main IDA/World Bank projects. The landfill was completed in 2012 and has been in use since January 2013.

The Kpone landfill has served a larger population and catchment area beyond the originally intended area (Tema Metropolis and its environs including the TEPZ). The disposal facility now receives solid waste from thirteen (13) of the sixteen (16) Metropolitan, Municipal, and District Assemblies (MMDAs) in the Greater Accra Region that are serviced by over 88 private operators including non-registered borla-taxis. This increase in catchment area has reduced the operational life of this facility from 8 -10 years to less than 8 years. In addition, although 13.5 hectares of land was earmarked for development of additional cells to increase waste disposal capacity (6 new cells were planned), over 75% of this area has been irreversibly encroached upon by private (real estate) developers.

As per the terms of the agreement, the TMA is responsible for the operation of the weighbridge and the billing and collection of tipping fees, and for the utility bills. The company Zoomlion Ghana Limited is responsible for the direct operation and maintenance (O&M) of the constructed landfill cells (i.e. in charge of waste placement and covering). In May 2014, Zoomlion sub-contracted its activities for managing the Kpone disposal site to its subsidiary company Waste Landfills Limited. In November 2014, Waste Landfills Limited proposed to TMA to allow it to manage all of the landfill operations. TMA consented to the request and authorised this with effect from 1 November 2014. This arrangement transferred the TMA's previous roles including maintenance of the weighbridge, billing and collection of fees and payment of utilities and other requirements as specified in the

existing Service Contract.

The landfill operator has personnel of various categories on-site. The on-site activities are supported by backstopping services from technical experts at their Head Office in Accra. The Waste Management Department (WMD) of TMA retains direct oversight responsibility of the Kpone landfill. The TMA currently has nine (9) employees stationed at the facility for monitoring the activities of the operator (sub-contractor).

The landfill is not equipped with collection and treatment for the landfill gas – the leachate is partially collected and stored in pond, but there is no leachate treatment on site (the operator relies on evaporation).

*Figure 6: Pictures of the Kpong landfill*

As of December 2018 a total of 1,787,394.906 tonnes of waste had been deposited at the Kpone disposal site according to the records. This information in the following table should be considered with caution as the maintenance and calibration of the weighbridge has been uneven.

*Table 7: Waste disposed in Kpone Landfill from 2013 to 2018 (Source: management of Kpone landfill, 2019)*

| Year | Waste Tonnage |
|---|---|
| 2013 | 393,018.79 |
| 2014 | 353,199.11 |
| 2015 | 300,566.91 |
| 2016 | 297,978.22 |
| 2017 | 372,084.86 |
| 2018 | 442,631.876 |
| **Total** | **1,787,394.906** |

It is noticeable that the amount of waste recorded at the Kpone disposal site is erratic despite a regular increase of the waste generation. The amount of recorded waste disposed at Kpone decreased from 2013 to 2016 and then increased in 2017 but is still less than the amount recorded in 2013. This could be explained by the management of the site (weighbridge maintenance, calibration, recording of the entering waste), by the effectiveness of MSW or other solid waste collection or by the existence of other disposal sites / dumpsites that can offer a lower disposal tariff.

The service providers (users of the landfill site) are requested to pay a disposal fee (40 GHS per tonne). Yet, as mentioned previously, the AMA has debts towards the service providers. Some of them reported that they do not pay the disposal fees as a response and that these should be paid by the AMA and deducted from the AMA's debts.

### 3.2.5 Conclusion and challenges identified

The MSW system ensures the collection and disposal of around 70 – 80% of the waste generated in AMA and Tema. However, this 'positive' number should not hide the fact that this system is fragile due to the following issues:

- The founding of the waste services is not secured: waste collectors are struggling to collect the fees for their services, both from the households and the municipalities.
- The zoning system with private waste collectors had initially made a positive change in the services, it should now be consolidated to ensure that the private collectors keep on improving their services and respect their contractual commitments.
- There are only two authorized disposal sites for AMA and Tema: they are both almost full and no replacement has been identified yet (identification of potential new sites is being supervised by the Ministry of Sanitation and Water Resources), and there are located far from the epicentre of waste generation, resulting in high cost of transport.
- The recent decentralisation that occurs at the AMA level may have weakened, for the moment, the supervision of waste management services by the public entities. A vision and planning effort is necessary for the entire Greater Accra Metropolitan Area, along with associated human, technical and financial resources both at the district level and at the regional level.
- Waste collection services are performed by formal but also informal collectors, with

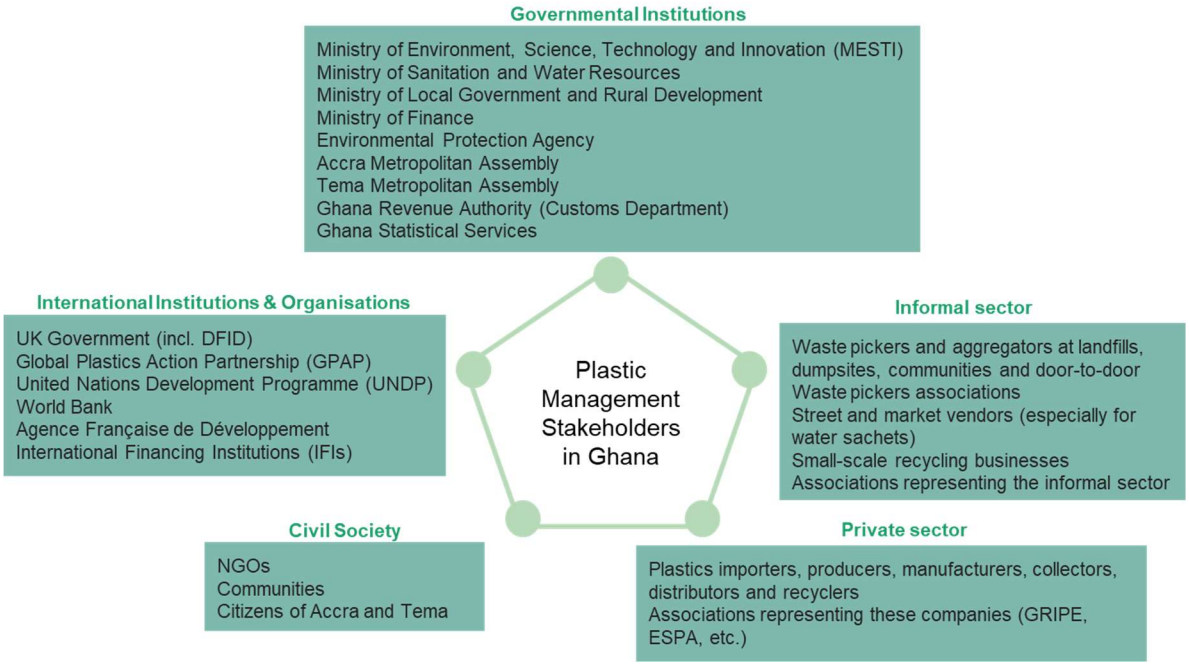
various level of services depending on the areas (high income areas are well serviced while the poorer neighbourhoods have low collection rates) – the coordination that AMA is trying to implement between the two sectors is a good step toward a better service for all the citizens.

In this context, even though municipalities and private collectors (both informal and formal) are interested in plastic management, the implementation of plastic collection cannot be simply incorporated in this fragile MSW system. A global approach on plastic management will be needed to identify how the MSW system and its actors could provide solutions for this specific stream.

## 3.3 Stakeholders Mapping

Numerous stakeholders are involved in plastics management from different organisations: institutions, private sector, informal sector, civil society, and international organisations. The diagram below summarises the key stakeholders for the implementation of the APMP project. A summary of all the actors involved in plastics management is presented in Annex E.

*Figure 7: Plastic management stakeholders in Ghana*




These different groups of stakeholders are presented in the following sub-sections.

### 3.3.1 Institutional Stakeholders

The institutional stakeholders play an important role in influencing this plastic chain via policies, regulations, taxes, funding, standards, monitoring and evaluation, enforcement, or supervision of SWM. It should be noted that plastic management is a key political commitment of the President of Ghana, as underlined in his State of the Nation Address in February 2019 and aligns to his commitment to make Accra *"the cleanest city in Africa*" by improving: solid waste management, sanitation, education and sensitisation, regulatory framework, law enforcement, plastics management and recycling.

The table below briefly presents some of the key institutional stakeholders for plastics management, particularly in relation to the National Plastics Management Policy (NPMP). Their role is defined by laws that are presented in the Regulatory Framework section. Full descriptions of the institutional stakeholders are available in Annex C (Technical Note #4).

*Table 8: Description of the key institutional stakeholders*

| |
|---|
| **Ministry of Environment, Science, Technology and Innovation (MESTI)**<br><br>The MESTI is responsible for national environmental policies formulation and implementation. MESTI is the governmental institution mandated to deal with the environment, science, technology and innovation in Ghana and is currently leading the preparation and future implementation of the National Plastics Management Policy (NPMP).<br><br>According to Section 4.1.1.1 of the NPMP its mandate includes the integration of environmental issues into the policy planning and national development process. The EPA, the Land Use and Spatial Planning Authority (LUSPA) and the Council for Scientific and Industrial Research (CSIR) are some of the agencies established under MESTI in furtherance of its mandate. Most importantly, MESTI will serve as the coordinating Ministry with direct responsibility over the Resource Recovery Secretariat created by the NPMP. |
| **Ministry of Local Government and Rural Development (MLGRD)**<br><br>The MLGRD is responsible for decentralisation through the 16 regional administrations in Ghana which are further subdivided into 260 Metropolitan, Municipal and District Assemblies (MMDAs).<br><br>Section 4.1.1.3 of the NPMP requires the MLGRD to mainstream the policy within the local government structure. Prior to the creation of MSWR, the MLGRD was a lead institution for waste management in Ghana, working through its waste Management and District Health Departments. Both were transferred to the MSWR. |
| **Ministry of Sanitation and Water Resources (MSWR)**<br><br>The MSWR is a relatively new government ministry established for the purpose of formulating and coordinating policies and programmes that will systematically lead to the development of Ghana's infrastructure requirements for sanitation, water and waste management.<br><br>Section 4.1.1.2 of the NPMP calls on MSWR to streamline issues of sustainable plastics management within its budget and medium-term Development Plans. Another key role the Policy urges MSWR to play is the adoption of ownership of the Policy's Strategic Actions pertaining to plastics waste management and water supply. |
| **Ministry of Finance (MoF)**<br>The MoF is responsible for the formulation and implementation of sound fiscal and financial policies and the improvement of public financial management.<br><br>Under Section 4.1.1.4 of the NPMP, the MoF is tasked with the effective mobilisation of funds from the public, private, domestic and foreign sources to support the implementation of the Policy. This Section of the Policy refers to a National Resource Mobilisation Strategy which provides details on MoF's task.<br><br>There is already a 10% tax on plastics and plastics products (Environmental Tax, 2013) but the MoF and the MLGRD are yet to agree on the modalities of use and disbursement of the revenues arising from this tax. Currently, the money is added to the consolidated fund, but it is one of the objectives of the National Plastics Management Policy to establish the Plastics Waste Recycling Fund. |
| **The Ministry of Education**<br>The Ministry of Education is listed under Section 4.1.1.5 of the NPMP. As the government Ministry responsible for research, apprenticeship, skills development and capacity building, it has been identified as a key actor for the purpose of behavioural change and research and development into innovative practices and technologies. It has been tasked to revise curricula to incorporate topics on sustainable plastics management among others. |
| **Environmental Protection Agency (EPA)**<br><br>All waste or plastic management activities require a permit from the EPA which is responsible for the issuance of guidelines and standards, permitting, licensing and enforcement. These activities are performed for waste management (collection, transport, disposal, treatment) and for plastics management (importation, production, recycling). |

| |
|---|
| Therefore, the plastics manufacturers and recyclers are required to register with the EPA which enforces the standards and other applicable regulations (e.g. the oxo-biodegradable directive) as well as the waste service providers or the AMA which require permits to operate collection, transport and disposal of municipal solid waste.<br><br>The functions of the EPA are provided in Section 2 of the EPA Act from 1994 (Act 490), and include:<br><br>● Securing [...] the control and prevention of discharge of waste into the environment and the protection and improvement of the quality of the environment<br>● Issuing environmental permits and pollution abatement notices [...]<br>● Prescribing standards and guidelines relating to the pollution of air, water, land and any other forms of environmental pollution, including the discharge of waste [...]<br>● Ensuring compliance with the laid down environmental impact assessment procedures [...]. |
| **Local authorities: AMA, Tema Metropolitan Assemblies (TMA) and other assemblies in Accra Metropolis**<br><br>The functions of the District Assemblies (include Metropolitan and Municipal Assemblies) are defined in the Local Government Commencement Instrument, 2009 (L.I 1961). The District Assemblies have a District Health Department and a Waste Management Department which are involved in the management of solid waste through disease control, prevention, inspection, nuisance control (the Health Department) and through MSW services provision or supervision (the Waste Management Department). In Accra and Tema metropolises, there are 2 Metropolitan Assemblies (AMA and TMA) over 10 Municipal Assemblies. All assemblies are supervised by the MLGRD which monitors and evaluates all their actions. In regards with MSW management, the assemblies also report to the MSWR under which fall the Waste Management Department that can provide technical support and supervision. As indicated above, the NPMP should be mainstreamed within the local government structures by the MLGRD. |
| **The Resource Recovery Secretariat** *(yet to be created, planned in the NPMP)*<br>In conjunction with the NPMP, MESTI has also a Resource Recovery Secretariat Document as a guide to the establishment of a Resource Recovery Secretariat. The Secretariat is projected to be responsible for the NPMP as "*a permanent operational independent organisation"*. Structurally, the Secretariat is expected to have a cross-sectoral Governing Board to represent the interests of the various stakeholders in the value chain and life cycle of plastics. Section 1 of the Resource Recovery Secretariat Document assigns the Resource Recovery Secretariat five (5) key strategic actions:<br>1. Encouraging behavioural change towards sustainable plastics management<br>2. Facilitating strategic planning and cross-sectoral collaboration<br>3. Accelerating innovation and transition towards a Circular Economy<br>4. Deploying means of resource mobilisation<br>Supporting good governance, inclusiveness and accountability. |
| **The Courts**<br>Although the various policies identify lack of enforcement of applicable laws as a major obstacle to waste management in Ghana, they omit the judiciary and other dispute resolution institutions as part of the institutional framework for waste management in Ghana. In 2001 the government introduced automated court systems for the speedy resolution of a certain category of disputes as part of measures to boost investor-confidence in Ghana. Environmental cases have since 2001 been initiated at the Fast Track Division of the High Court for the speedy resolution of disputes. |

The table above shows that different actors are related to plastics management either because of the environmental impact of plastics, its health impact or its link to solid waste management.

The following key points should be noted:

- There are a lot of different institutional stakeholder responsibilities related to plastics management and there is a need for coordination and clear definition of their roles. The different objectives, ambitions and priorities of the different ministries as well as local authority role need to be aligned in relation to plastic management. It is hoped that the creation of the Resource Recovery Secretariat, with the representatives from different ministries, should secure the needed coordination at the national level. Coordination between the districts assemblies at the local level is also needed, to have a coherent approach on the Greater Accra region.

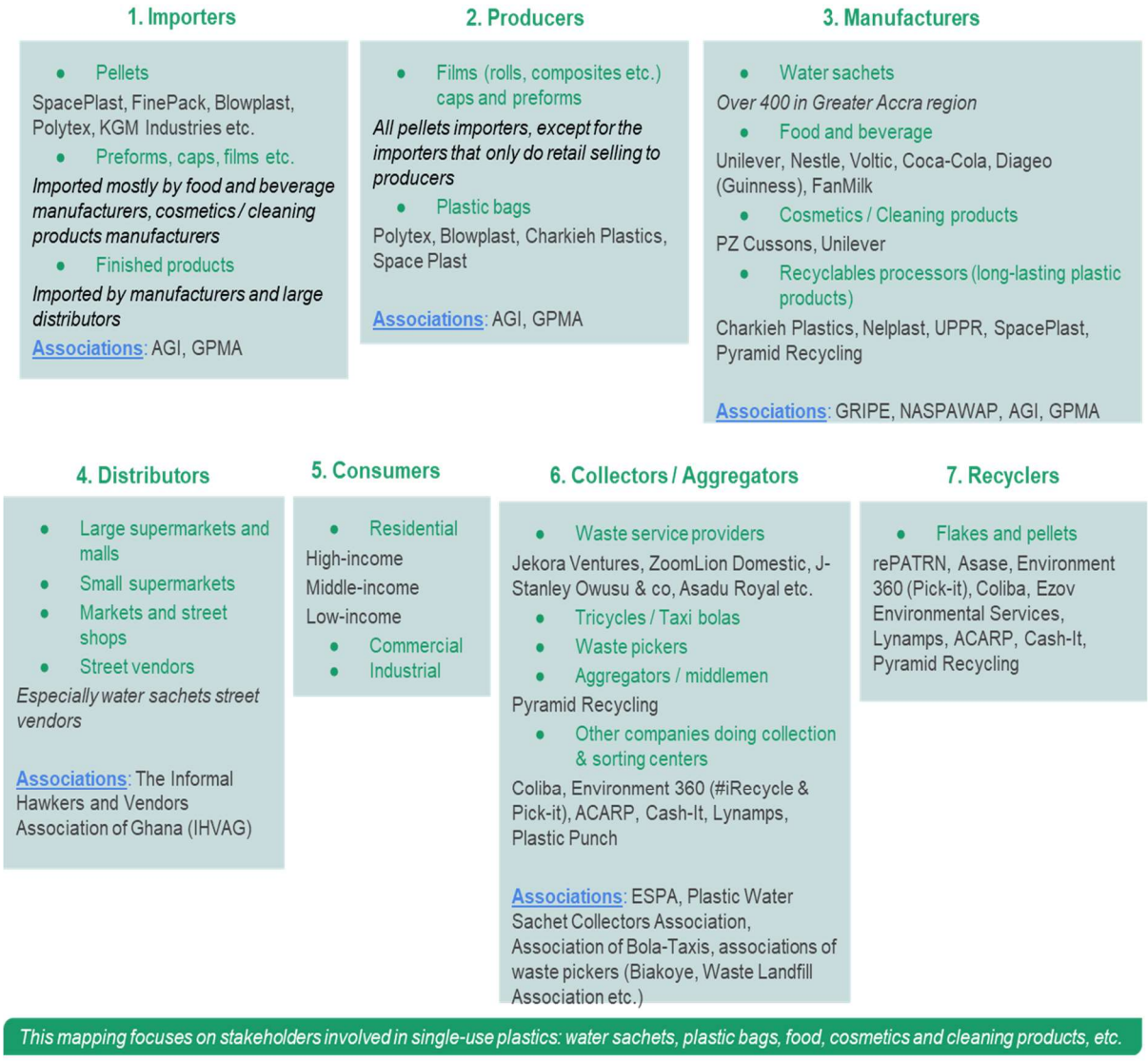
- There is a potential overlap of functions between MLGRD and MSWR. The MLGRD has a monitoring, evaluation and supervision role over the local authorities as part of its decentralisation powers. The MSWR, as part of its role of supervision for solid waste and health management is also responsible for monitoring, evaluating and supervising local authorities in respect to these sectors. The National Plastics Management Policy does not address this potential overlap. To ensure a smooth implementation of the NPMP, it is imperative for the Policy to take cognisance of the potential overlap in functions with respect to these two Ministries. A clear indication of the specific roles that each of these Ministries will play in the implementation of NPMP would obviate potential rivalries that could adversely affect its implementation.
- The role of the judiciary system is crucial for waste management in Ghana but is not further developed in the National Plastics Management Policy. The potential gaps in the judiciary system and need for a waste management and/or plastics management law would need to be assessed. (One service provider, for example, mentioned the fact that condemned offenders were requested to pay a fine reaching 50 GHS while MSW door-to-door collection fees range from 30 to 110 GHS per month depending on the residential area.)

### 3.3.2 Informal Sector and Private Sector Stakeholders

The informal sector and private sector stakeholders are involved at the operational level of the plastic chain: importation, production, manufacturing, distribution, consumption, collection and recycling. The following figure shows their involvement in the plastic chain.

Most of the informal stakeholders fall under the distribution (small-scale businesses, market and street vendors), collection (taxi-borlas, waste pickers, aggregators) and recycling (small-scale businesses) of plastics.

*Figure 8: Mapping of Plastic chain stakeholders*




There are numerous stakeholders involved in the plastic chain, as shown in the graph above.

- Most of the stakeholders (both formal and informal) are gathered into associations representing their interests. The largest association is the Association of Ghana Industries which comprises formal industrial companies (over 1,200 members). Smaller associations represent different actors such as the Ghana Recycling Initiative by Private Enterprises (GRIPE, 8 companies), the Ghana Plastic Manufacturers Association (GPMA, over 70 companies),the Environmental Service Providers Association (ESPA,.13 service providers members), the NASPAWAP (for water sector manufacturers) and the Water Sachet Collectors Association (for water sachets collectors). The waste pickers are also organised into numerous small-scale associations[13]. Yet, these small-scale associations are not

[13] The APMP team identified 4 associations of waste pickers and borla-taxis during field work and interviews. Interviewed stakeholders reported that there are many more associations of waste pickers because the waste pickers work at a small-scale (in a community for example). They tend to prefer being in an association with a limited number of members as they sometimes put in common their earnings. For example, if one gets sick, the person may still receive some money because other association members were working. The association is a mean to provide some protection. In the case of this association, the distribution of

gathered under a larger association. The fact that the stakeholders are organised into associations helps them to have a voice with the government. Nevertheless, there is little coordination from one association to another and the associations tend to work independently from one another with little coordination. Lastly, the recyclers made be part of an association as a manufacturer but are not gathered into a specific association related to their recycling activity.

- One key activity does not appear in the plastic chain stakeholder mapping: sensitisation and education of the population about waste and plastic management. At a local level, it is one of the responsibilities of the district assemblies to implement "environmental health education" (National Environmental Sanitation Policy, 2010). The service providers supervised by the assemblies are requested to conduct education campaigns and it is part of the indicators used to evaluate their work. Nevertheless, due to limited financial resources, the assemblies and the services providers are not conducting large public education campaigns. Sensitisation and education on plastic and MSW management is done mostly by NGOs (Environment 360, Plastic Punch, etc.) but some actions are also done sometimes by the service providers, with the support of local authorities (the district assemblies) or by the private sector (GRIPE and its members have launched various initiatives for public education[14]).
- Some of the large-scale manufacturing companies have expressed an interest for plastic recycling and formed the Ghana Recycling Initiative by Private Enterprises (GRIPE), reflecting their commitment for plastic recycling and growing commitment in the area of Corporate Social Responsibility. Most of the GRIPE members are part of multinational companies.
- Some recyclers or aggregators have developed their own collection system such as plastic collection points (bins) in public areas or sorting centres. Some would be interested in collecting recyclables door-to-door but are not legally allowed under the current zoning system. The list of recycling initiatives is available in Annex E.

### 3.3.3 International Institutions and Organisations

International institutions and organisations play a role in influencing the plastic chain with specific objectives usually related to the Sustainable Development Goals (SDGs) such as the protection of the environment or health, the fight against plastic pollution, etc. Their actions in the plastic sector consist in the financing or implementation of projects as well as the organisation of events and conferences. These can also be a key partner when looking for foreign investors. The following table presents some of the plastic-related initiatives of international organisations in Ghana.

money was discussed and agreed internally based on – working hours – performance – any other relevant topic.

[14] Examples: GRIPE is currently running a social media campaign about littering and plastics, Dow Chemical is supporting a school recycling programme in Tema.

*Table 9: Plastic initiatives led by international institutions and organisations*

| |
|---|
| **DFID - The Accra Plastics Management Pilot**<br>The APMP started in February 2019. It is funded by the Department for International Development (DFID) with the main objective of tackling plastic pollution in Accra, Ghana. The project should be a catalyst to initiate, enhance and fund pilot projects; and act as an integrator to coordinate the efforts of the various initiatives, in order to have a structured and global approach towards plastic management. As an early action of the GPAP, the APMP coordinates its actions with the GPAP in Ghana. |
| **UNDP - The Waste Recovery Platform**<br>In July 2018 the UNDP launched a platform where different stakeholders, donors, institutions, NGOs, private companies, associations, informal actors, and research groups can meet. The main goal of the platform is to enhance coordination between the stakeholders and enable all stakeholders of the sector to connect. The Waste Recovery Platform has five on-going activities:<br>1. National competitions (financing support to businesses and research)<br>2. Communication and advocacy<br>3. Finance and sustainability<br>4. Waste data and policy<br>5. Development of a mobile application and a website[15]. |
| **The Global Plastic Action Partnership**<br>The GPAP gathers businesses, international donors, national and local government, community groups and world-class experts. This private-public platform should enhance collaboration in order to translate political and corporate commitments into tangible strategies and investible action plans. Mainly active in Indonesia, the GPAP identified Ghana as a country to implement a plastics project in 2019. The GPAP project in Ghana will be officially launched in August 2019, while the APMP - an early action of the GPAP - started in Accra in February 2019. |
| **World Bank - Greater Accra Resilient and Integrated Development Project (GARID)**<br>The World Bank approved the six-year, $200 million GARID Project in May 2019. This project has four main components:<br>1. Drainage and flood management improvements (Odaw Drainage Basin)<br>2. Improvements in SWM capacity including minimising solid waste in waterways<br>3. Support to most vulnerable communities to improve living conditions<br>4. Strengthening capacity for planning, coordination, monitoring and evaluation.<br>As this project will target drainage, flood and solid waste management, it will most likely have an impact on solid waste and plastics management. |

In addition to the initiatives described in the table above the European Union (EU) organised on 7-8 May 2019 an event on Circular Economy that gathered numerous stakeholders involved in plastics and waste management. Yet, the EU does not seem to have specific plastics management initiatives besides the organisation of this event.

Lastly, some projects are currently under preparation and should start in 2020 and after. There are:

- An initiative led by the United Nations Industrial Development Organization (UNIDO) that will focus on plastic reduction and management in relation to fighting marine litter
- An initiative led by the Commonwealth Clean Ocean Alliance (CCOA) that will provide Technical Assistance
- An initiative by the Norway Agency for Development Cooperation (NORAD) ("*Marine litter and microplastics: Promoting the environmentally sound management of plastic wastes and achieving the prevention and minimization of the generation of plastic wastes"*).

Due to the large number of stakeholders involved in the plastics sector, all the projects currently being implemented in relation to plastics management (APMP, GPAP, Waste Recovery Platform) aim to build on the existing stakeholders' networks, to reinforce cooperation and coordination and to

[15] The website - http://ghanawasteplatform.org/ - was presented at panel discussions organised by the UNDP on 16 April 2019.

support the scaling-up of existing initiatives.

## 3.4 Regulatory Framework

Ghana is a unitary Republic which belongs to the Common Law Legal Tradition. Article 11 of the 1992 Constitution of the Republic of Ghana provides *inter alia* that the laws of Ghana include the 1992 Constitution, Enactments made by Parliament, Rules, Regulations and Orders made under a power conferred on the Constitution. Although the government appears committed to tackling plastic waste (Akufo-Ado, 2019), there are to date no laws that holistically deal with plastic waste in Ghana. Only one Act and one Directive directly address plastics, as well as a Policy that is yet to be passed by the Parliament:

1. The National Plastics Management Policy (on-going).
2. The Customs and Excise (Duties and Other Taxes) (Amendment) Act, 2013 (Act 863).
3. The directive issued by the MESTI requiring an oxo-biodegradable component in flexible plastics manufactured in or imported into Ghana (November 2015).

Therefore, the lack of laws and other legal instruments directly dealing with plastic waste could be one of the contributory factors to Ghana's plastic pollution. This weakness necessitates a review of other laws that impinge on solid waste which *mutatis mutandis* could also apply to plastic waste in Ghana. This Baseline Study will especially review the Acts, Regulations and Byelaws that relate to environmental management, solid waste management, health and sanitation.

The presentation of the regulatory framework in the following subsection does not follow the hierarchy of law but begins with the legal instruments that directly relate to plastic management, and is followed by the 1992 Constitution, Acts and subsidiary legislation that could apply to plastic waste in Ghana. Additional information is presented in Annexes C and D (Technical Notes #4 and #5).

### 3.4.1 The National Plastics Management Policy (NPMP)

The MESTI is the lead institution responsible for the National Plastic Management Policy (NPMP) of the Government of Ghana. In discussing the NPMP it is important to underline that this is a draft policy still under Cabinet review. Therefore, the recommendations made regarding the Policy should be reviewed once the NPMP is finalised and approved.

The NPMP aims at comprehensively addressing the enormous challenges associated with the management of plastics in Ghana. The policy likens plastics to a double-edged sword in view of the positive impacts of plastics on the economy, and paradoxically, their negative impacts on the environment and the economy. The main objectives of the policy are to:

- Improve the state of the environment and public health;
- Reduce pressure on the utilisation of the country's national resources;
- Minimise Ghana's dependence on imported finished products; and
- Contribute to the socio-economic development of Ghana by creating jobs particularly for vulnerable groups.

These objectives are completed by strategic actions (Section 3 of the NPMP). The NPMP is supported by an Implementation Plan and by the creation of a Resource Recovery Secretariat.

### 3.4.2 The Customs and Excise (Duties and Other Taxes) (Amendment) Act, 2013 (Act 863)

From 2010, the Government of Ghana started to impose taxes on the import of plastics, at a rate of 20% which over the years was reduced to 15%. *The Customs and Excise (Duties and Other Taxes) (Amendment) Act, 2013 (Act 863)* was promulgated among others for the purpose of reviewing the environmental excise tax on plastic and plastic products downwards to 10%.

Act 863 requires at least 50 % of the revenue accruing from plastics listed under chapters 39 and 63 of the Harmonised Systems and Customs Tariff Schedule 2012 to be paid into a designated Plastic Waste Recycling Fund. The Plastic Waste Recycling Fund should be used for the recycling of plastic waste, the production of plastic waste bins and bags and of oxo-biodegradable plastics (Section 3).

The Minister Responsible for Local Government and Rural Development is required to act in consultation with the Minister responsible for Finance to specify how the monies accruing from the fund should be used (Section 4 of Act 863).

It should be noted that:

- The import of finished plastic products is not subject to taxation under the existing Environment Tax (Act 863) which results in tariffs disadvantage for local manufacturers.
- The Plastic Waste Recycling Fund has not been functional. Two of the strategic actions of the National Plastics Management Policy (NPMP) directly related to this issue: to "*Establish an Extended Producer Responsibility scheme on consumer products*" (Strategic Action 3.12, NPMP Draft, p.27) and to "*Institute an Environmental Tax Regime*" (Strategic Action 3.13, idem).
    - Under Strategic Action 3.12, the NPMP (Draft) aims at establishing a Plastics Fee for domestic manufacturers and at creating accountability and transparency in the disbursement.
    - Under Strategic Action 3.13, the NPMP (Draft) aims at including the importation of finished plastics products, at managing - by a newly established Resource Recovery Secretariat as described in the NPMP - the defunct Plastics Management Fund, and at developing regulations for the use of the Fund.

Therefore, the challenges caused by the absence of an effective Plastics Waste Recycling Fund have been identified in the NPMP Draft which proposes solutions to address these – they are summarised in the NPMP strategic Action 13 (Institute the Environmental Tax Regime) developed in the Implementation Plan of the NPMP. According to the NPMP Draft, these changes will require an amendment of the Act 863 and the development of regulations. The Implementation Plan envisages the establishment of the Secretariat within 3months after the promulgation of the NPMP, and the amendment of the Act 863 within 3 months from the establishment of the secretariat.

### 3.4.3 The Oxo-Biodegradable Directive, November 2015

This Directive is a response to the 2015 flood which resulted in the death of 273 people (NPMP, 2019). In July 2015, the MESTI followed the recommendation of a Committee - commissioned in 2010 to advise the ministry on tackling plastic waste in Ghana - to issue several directives on flexible plastics. Until the 2015 flood, the recommendations of the 2010 report had remained idle.

Among others, the Directive states that:

- Stocks of flexible plastics should be cleared by October 2015;
- All flexible plastics produced in the country are required to have biodegradable components by November 2019; and
- All flexible plastics below 20 microns produced in the country (including water sachets and carrier bags) and these imported should be banned by November 2019 (MESTI, 2015).

It should be noted that:

- Despite this directive, the distribution of carrier bags below 20 microns continue;
- The National Standards for the use of the oxo-biodegradable additive were gazetted only in early 2018;
- Some producers and manufacturers have expressed concern about the use of the oxo-biodegradable additive for plastics in contact with food and are not implementing the directive or are exempted; and
- Some stakeholders have expressed concerns about the use of oxo-biodegradable additive, as there is a debate on whether the plastics biodegrade or fragment into micro and nano-plastics which are damageable for the environment (European Bioplastics, 2018).

These concerns are also expressed in the UNEP report about single-use plastics (UNEP, 2018, p.14) states that biodegradable plastics can have "*unintended consequences*":

*"Often 'biodegradable' plastic items (including single-use plastic bags and containers) break down completely only if exposed to prolonged high temperatures above 50°C (122°F). Such conditions are met in incineration plants, but very rarely in the environment. Therefore, even bioplastics derived from renewable sources (such as corn starch, cassava roots, or sugarcane) or from bacterial fermentation of sugar or lipids (PHA34) do not automatically degrade in the environment and especially not in the ocean."*

Despite the concerns expressed on this directive, there is no action / discussion on-going or planned related with this issue.

### 3.4.4 Acts, Regulations and Byelaws indirectly related to Plastics Management

The following table briefly presents Acts, Regulations and Byelaws indirectly related to plastics management. These are further described in the Annex D.

*Table 10: Acts, Regulations and Byelaws related to plastics management*

**The Environmental Protection Agency, Act, 1994 (Act 490)**

The EPA Act, 1994 (Act 490) was passed in 1994 to set up the EPA as the main statutory regulatory body, with the mandate to deal with environmental issues in Ghana. The Acts defines the functions of the EPA and its empowerment and control powers such as the Environmental Impact Assessments (EIAs).

It also empowers the MESTI to promulgate regulations to deal inter alia with subjects in relation to the environment (such as waste disposal, production and management of substances hazardous to the environment).

Therefore:

- The EPA could deal with plastics management through its procedures (EIA, permits, etc.).
- The EPA could also have recourse to enforcement notices, where plastic waste poses a serious threat to the environment or public health.
- The MESTI could invoke Section 62 of Act 490 to promulgate regulations to deal with plastic waste in Ghana.

**Environmental Assessment Regulations, 1999 (L.I.1652)**

One of the most important Regulations to have been passed to deal with environmental issues in Ghana is the Environmental Assessment Regulations, 1999 (L.I.1652). Pursuant to L.I. 1652, all undertakings likely to have an impact on the environment must be registered with the EPA and obtain a valid permit or conduct an environmental impact assessment (EIA) if the potential effect on the environment is high (Regulations 1 and 3).

EPA can use EIA as an effective tool for dealing with the life cycle of plastics in Ghana:

- Section 11 of the First Schedule to L.I. 1652 requires manufacturers of plastics and plastic products to register with and obtain an environmental permit from the environmental protection agency.
- Section 15 of the Second Schedule to L.I. 1652 requires an environmental impact assessment to be conducted for the construction of municipal solid waste treatment and waste disposal facilities including the construction of recycling facilities, landfill sites and waste depots among others.

**Local Governance Act, 2016 (Act 936)**

The 1992 Constitution of Ghana provides that a District Assembly[16] shall be the highest political authority in the district, and shall have deliberative, legislative and executive powers. The Local Governance, Act, 2016 (Act 936) provides for the establishment of the District Assemblies. The District Assemblies are, among other functions, responsible for:

- The provision of municipal works and services in the district (Section 12(3)(e))
- The development, improvement and management of the environment in their respective districts (Section 12(3)(f)).

In addition, Section 181 of Act 936 empowers District Assemblies to make Byelaws in furtherance of a function under Act 936 or any other enactment. The following Byelaws were passed by the AMA:

- AMA (Sanitation) Byelaws, 2017
- AMA (Environmental Protection) Byelaws, 2017.

**Local Government (Departments of District Assemblies) Commencement Instrument, 2009 (L.I 1961)**

The Local Government (Departments of District Assemblies) Commencement Instrument, 2009 (L.I 1961) was passed under the Local Government Act, 1993, (Act 462) which was repealed by Act 936. Regulation 1 of L.I. 1961 establishes a number of Departments under District Assemblies (Schedule 1), including a Waste Management Department and a District Health Department:

- Regulation 5 of L.I. 1961 mandates the Waste Management Department to provide facilities, infrastructural services and programmes for effective and efficient waste management for the improvement in environmental sanitation, protection of the environment and the promotion of public health.
- The District Health Department is responsible *inter alia* for promoting and encouraging good health and sanitation in the District (Regulation 4).

**AMA (Sanitation) Byelaws, 2017**

Under these Byelaws, AMA or its registered agent has the sole preserve of dealing with solid wastes within its area of authority. Section 11 of the AMA Sanitation Byelaws proscribes the indiscriminate dumping of solid waste in open spaces,

[16] Per Regulation 7. of the The Local Government (Departments of District Assemblies) Commencement Instrument, 2009 (L.I 1961) a "District Assembly" includes Metropolitan and Municipal Assemblies.

| |
|---|
| drains, etc.<br>Therefore, the District Assemblies have a major role to play in dealing with solid wastes and plastics in Ghana. They have the power to pass Byelaws which could contribute to plastics management. |
| **Standards Authority Act, 1973 (NRCD 173)**<br>The Standards Authority Act, 1973 (NRCD 173) was enacted for the purpose of promulgation standards to ensure high quality of goods and for related matters.<br>Section 1 of NRCD 173 establishes the Standards Authority. The aims and functions of the Standards Authority are inter alia to establish and promulgate standards with the object of ensuring high quality of goods produced in Ghana, whether for local consumption or for export; and to promote standards in public and industrial welfare, health and safety. The Standards Authority has the power to prohibit the sale or manufacture of goods in the national interest.<br>The Ghana Standards Authority, Catalogue of Ghana Standards, 2018 contains some standards on some plastics. |
| **Public Health Act, 2012 (Act 851)**<br>The purpose of the Public Health Act, 2012 (Act 851) is to "*revise and consolidate the law relating to public health to prevent disease, promote, safeguard, maintain and protect the health of humans and animals and to provide for related matters.*" Act 851 also establishes the Foods and Drugs Authority (FDA).<br>Section 56 of Act 851 deals with prohibitions related to illegal disposal of waste and public nuisance.<br>Section 80 establishes the FDA for the purpose of providing and enforcing standards for the sale of food and other products. Among others, the FDA is mandated to ensure adequate and effective standards for food, cosmetics, household chemicals and medical devices; monitor through the District Assemblies and any other agency of State compliance with the provisions of Part 7 of Act 851 (Section 82). |
| **The Renewable Energy Act, 2011 (Act 831)**<br>The purpose of the Renewable Energy Act, 2011 (Act 831) is to "*provide for the development, management, utilisation, sustainability and adequate supply of renewable energy for generation of heat and power and for related matters*."<br>Act 831 provides a legal basis for the use of waste as energy in Ghana. |

### 3.4.5 Conclusion

As shown in the table above, there are fragmented laws on waste management that fall under different agencies. The main laws that deal with solid waste in Ghana are the Environmental Protection Agency Act,1994 (Act 490) and the Local Governance Act, 2016 (Act 936) and subsidiary legislation passed under these respective laws. It appears that:

- Act 936 and L.I. 1961 already confer enough powers on District Assemblies to tackle solid waste and plastics in Ghana. The District Assemblies are in charge of dealing with solid wastes and plastics in their districts. They have the power to pass Byelaws that could improve plastics management.
- Plastics manufacturers are required to obtain an environmental permit from the EPA. An EIA must be conducted for the construction of municipal solid waste treatment and waste disposal facilities (e.g. landfill sites) as well as construction of recycling facilities and waste depots etc as part of the environmental permit procedure. The EPA could use permits and EIA as an effective tool for improving plastics management in Ghana. For now, there is not a specific monitoring done in regard to plastic issues.
- The EPA can have recourse to enforcement notices, where plastic waste poses a serious threat to the environment or public health.
- The MESTI is empowered by to promulgate regulations to deal with plastic waste in Ghana (Section 62 of Act 490), and in this regard is leading the preparation of the NPMP.
- The Standards Authority is empowered to prohibit products to serve the national interest. The Standards Authority can also collaborate with the EPA, local authorities and other

relevant stakeholders for the adoption of standards. These could form the basis of a life cycle approach to the management of plastics in Ghana.

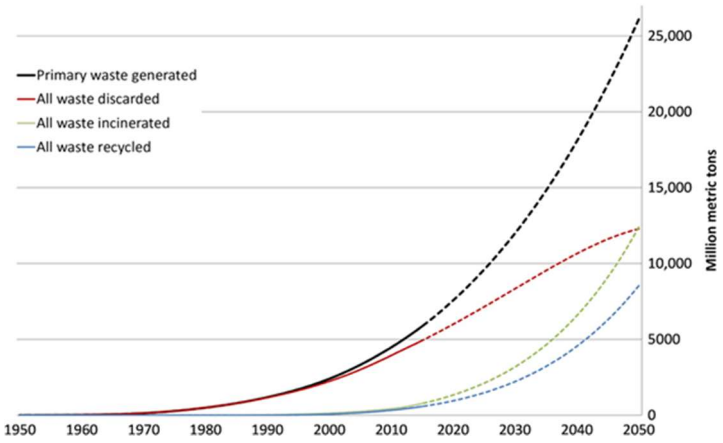
- Some directives were decided to answer specific issues (such as plastic clogging drains) and there is a need of a more global approach now on plastic pollution issues and challenges.

To expeditiously deal with plastic waste, a comprehensive law to consolidate and enhance the existing regulatory framework on solid waste in general and plastic waste in particular could be an interesting tool. In this regard, the National Plastic Policy could be the first step to pave the way for the much-needed regulatory reforms to holistically deal with plastics in Ghana. Resources dedicated to the implementation and enforcement of the existing and future laws related to plastic management will be crucial.

## 3.5 Plastic Pollution

### 3.5.1 Global Plastic Pollution

Some alarming figures about plastics were recently outlined in the article *Production, use, and fate of all plastics ever made* published in Science Advances (Gayer, Jambeck and Law, 2017). The article traces back the production of plastics in the 1950s to the present day, and takes into account future projections up to 2050. The production of plastics increased from 0 tonnes in 1950 to over 311 million tonnes in 2014. Over this time period:




- 9% were recycled
- 12% were incinerated
- 49% were disposed
- 30% are being used

(buildings etc.).

*Figure 9: Cumulative plastic waste generation and disposal (Gayer, Jambeck and Law, 2017, p.3)*

An estimated 8 million tonnes of plastic waste now enter the ocean each year, which corresponds to one garbage truck every minute as underlined in the report *The new plastics economy: rethinking the future of plastics and catalysing action* (Ellen MacArthur Foundation, 2018). Plastics leakage is due to solid waste mismanagement (collected but mismanaged, not collected) and to illegal dumping (illegal dumpsites, littering). Then, the plastics are likely to end up in drains and streams that are washed into the oceans. Dumping on the beaches also results in plastic leakage into the oceans. If no significant change is implemented, projections are alarming: by 2050, there will be more plastic than fish in the oceans (by weight). Therefore, plastic pollution is a global challenge which is not specific to Ghana only.

In Ghana, the waste management sector is characterised by poor waste collection systems and indiscriminate disposal of refuse. Therefore, the country was, in 2015, ranked by the World Health Organisation as the 7th dirtiest country in the world. Plastic leakage can be observed in the streets, drains and streams. These have consequences on the environment and on people's health and livelihoods.

One major challenge in Ghana is plastic leakage into the environment (streets, drains, illegal dumpsites, streams, beaches). Uncollected, littered and mismanaged solid waste will eventually accumulate in illegal dumpsites, be burnt or end up into the ocean due to the drainage system. In addition, there is limited water circulation (cyclonic gyre) in the Gulf of Guinea, therefore high plastic inputs from Ghana and surrounding countries have accumulated (A. Mountford, 2018). As a consequence, there is an estimated amount of 5 million tons of buoyant plastics in the Gulf of Guinea according to the model developed by the study. These plastics are regularly washed on to Ghana's beaches.

In 2013, a study was conducted at four beaches along the Accra-Tema coastline with a net system for a period of sixteen weeks (I. Pokua Himans, 2013). A total of 18,241 items of marine debris were collected (297 kg). Of these, 93% of items were found to have originated from the land. Plastics accounted for around 70% of the total debris (by number of items) and 36% by the total weight. Black plastic bags (13.24%), water sachets (8.3%), plastic cups, wrappers and containers (6.76%) and bottles (3.94%) represent the most significant items by weight.

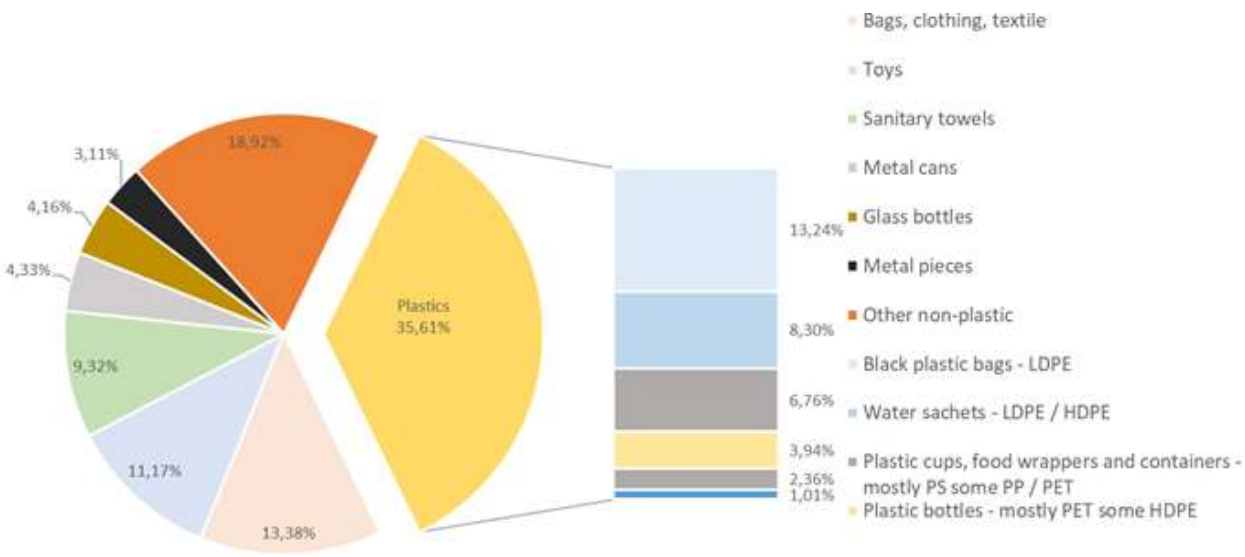
The table below (I. Pokua Himans, 2013) summarises the main items found during the study.

*Table 11: Characterisation of marine litter (2013)*

| Type of litter | Proportion by number of items | Proportion by weight |
|---|---|---|
| **Plastics** | | |
| Black plastic bags | 12.55% | 13.24% |
| Water sachets | 14.29% | 8.30% |
| Plastic cups, food wrappers and containers | 18.45% | 6,76% |
| Plastic bottles | 7.39% | 3.94% |
| Other plastic bags | 5.65% | 2.36% |
| Plastic plates and spoon | 4.22% | 0.92% |
| Caps, lids | 4.02% | 0.05% |
| Plastic straws | 3.18% | 0.04% |
| **Total plastic items** | **69.75%** | **35.61%** |
| **Other materials found in significant quantities (weight)** | | |
| Toys | 0.19% | 11.17% |
| Sanitary towels | 0.19% | 9.32% |
| Bags | 0.13% | 8.16% |
| Clothing/textile | 2.24% | 5.22% |
| Metal cans | 2.74% | 4.33% |
| Glass bottles | 1.15% | 4.16% |
| Metal pieces | 0.94% | 3.11% |

The following graph illustrates the results of the table (by weight).

*Figure 10: Marine litter characterisation (Himans, 2013)*

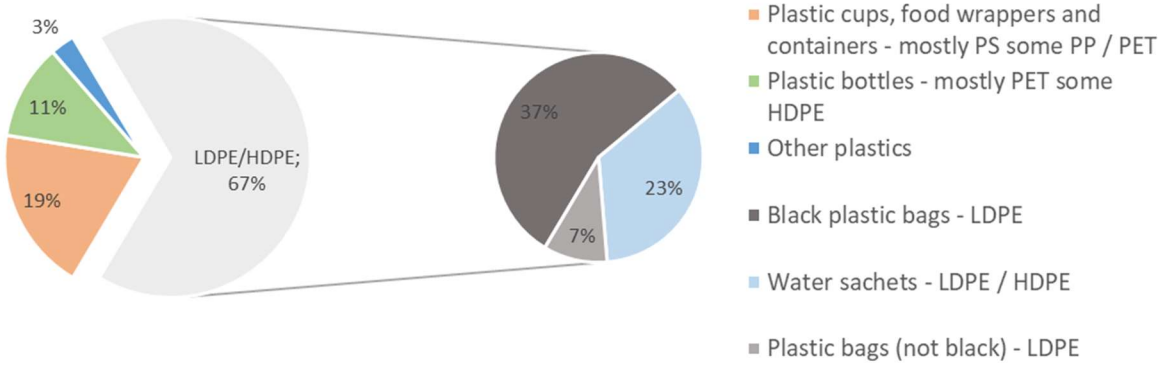



The study is not specifying the types of plastics. Nevertheless:

- Black plastic bags are known in Ghana to be made of recycled LDPE
- Water sachets are made of LDPE and/or HDPE
- Plastic bags (not black) are made of virgin LDPE
- Plastic cups, food wrappers and containers in Ghana are usually made of PS, some of them are in PP or PET (but it is less common)
- Plastic bottles are usually made of PET.

Therefore, the following rough estimations can be obtained:

*Figure 11: Plastics in Marine Litter (Himans, 2013)*




### 3.5.2 Impacts of the Plastic Pollution

According to the United Nations, due to weak policy enforcement, almost 80% of marine debris are plastics, and this directly and indirectly affects living organisms throughout the ecosystem, including an increasingly high impact on marine life at a macro and micro scale. The UNEP Report *Single-Use Plastics - A Roadmap for Sustainability* (2018), states that plastics cause the following problems when released into the environment:

1. *"Block waterways and exacerbate natural disasters.*
2. *Increase the transmission of vector-borne diseases like malaria*
3. *Block the airways and stomachs of hundreds of species. There is evidence that the toxic chemicals added during the manufacture of plastic transfer to animal tissue, eventually entering the human food chain.*
4. *Styrofoam products, which contain carcinogenic chemicals like styrene and benzene, are highly toxic if ingested, damaging the nervous system, lungs and reproductive organs. The toxins in Styrofoam containers can leach into food and drinks.*
5. *When burnt for heat or cooking, people are exposed to toxic emissions. Disposing of plastic waste by burning it in open-air pits releases harmful gases like furan and dioxin.*
6. *Economic damage*
    a. *Plastic litter in the Asia-Pacific region alone costs its tourism, fishing and shipping industries $1.3 billion per year.*
    b. *In Europe, cleaning plastic waste from coasts and beaches costs about €630 million per year.*
    c. *Studies suggest that the total economic damage to the world's marine ecosystem caused by plastic amounts to at least $13 billion every year."*

In Ghana, most of these consequences were experienced over the past years, as examples:

- In 2015, Accra experienced a flood disaster that resulted in the death of over 200 people, due to clogged drains by plastics
- According to the World Health Organisation (2018), Ghana accounts for 4% of the global malaria burden
- Fishermen reported the presence of plastics inside large fishes. Plastic litter is visible on the beaches with consequences on tourism, economic activities and also fishing.

### 3.5.3 Assessment of the Plastic Pollution in Accra and Tema Metropolises

A field assessment was conducted in 10 plastic hotspots in Accra and Tema as shown on the map below.

*Figure 12: Plastic Pollution Hotspots in Accra and Tema (Seureca, 2019)*

The table below presents pictures of some of the visited areas. Additional information is available in Annexes I and J (Technical Notes #7 and #8 respectively).

As shown on the pictures below, one common characteristic between the different sites is the presence of numerous plastic items. The PET bottles and plastic bags are the most visible items and were identified in the waste characterisation conducted by I. Pokua Himans (2013). Another striking element is the fact that plastics polluted areas were spotted on the beaches and close to water courses despite the economic importance of these areas, including for tourism. Some fishermen reported that they collect more plastics and other items than fish in their nets and that plastics have been found inside some large fish.

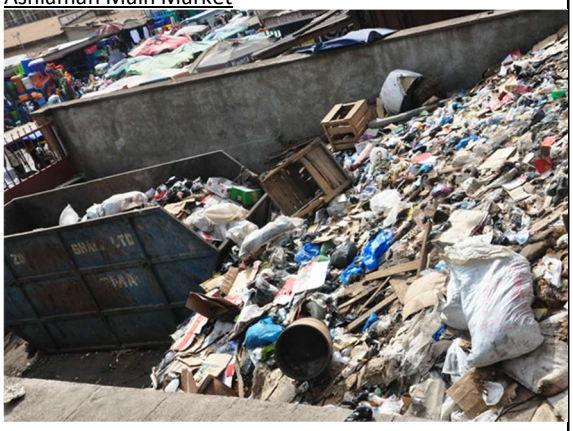
*Table 12: Pictures of various plastic hotspots in Accra and Tema*

| Tema | Accra |
|---|---|
| Tema New Town Beach   | Korle Lagoon  Korle Lagoon Beach  |

Manhean Communal Disposal Site

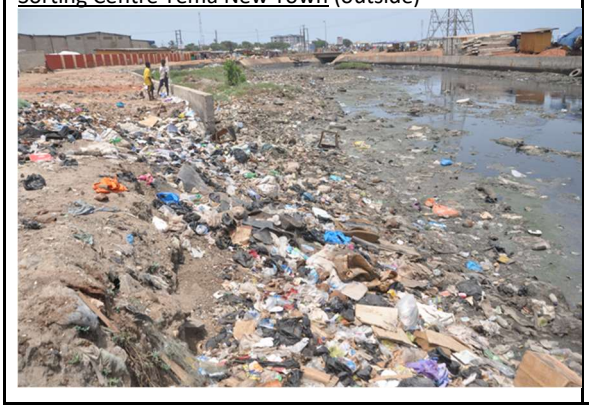
Abossey Okai Zongo Dumpsite

Ashiaman Main Market



Legon Dumpsite

Sorting Centre Tema New Town (outside)



Along the Odaw River

In the Odaw river and Korle Lagoon, an assessment of plastic waste pollution was conducted (more details available in Annex K). The field study was undertaken in the low tide of the lagoon, as shown on the map.

*Figure 13: Map of the observed sites in the upper and lower sections of the Korle Lagoon*


At site A, a count of floating plastics was made for a period of 30 minutes and 23 counts was made within the cross section. It was observed that most floating objects were stagnated on the surface of the water along the silted edges of the lagoon. At site B, the count yielded 138 pieces of floating plastics within the period of 30 minutes. Dredging activities in the Korle Lagoon was going on between the two bridges, i.e. between site A and site B during the field study by Dredge Masters. Dredged materials were heaped at the banks between the two sites. Flow at the observation sites was very low. Most plastics get stacked upstream at the interceptor weir.

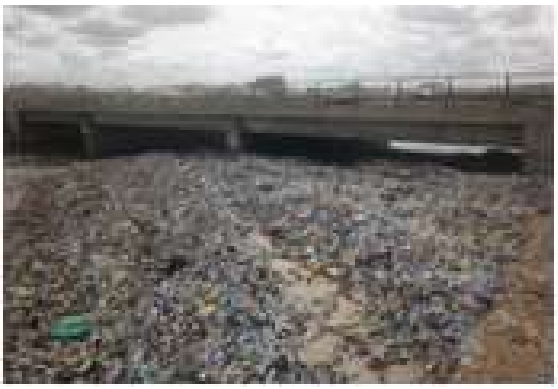
During the rainy season when the water level in the lagoon rises due to floods some of the plastics overflow the interceptor weir and enter the lagoon as shown on the picture below.

*Figure 14: Floating plastic waste overtopping the Lagoon interceptor weir*

Generally, it can be concluded that poor drainage is a major problem, which affects many parts of the urban areas in the respective MMDAs especially in the Metropolis (AMA). Natural features such as the underlying geology, soil conditions and localized topographic features create some drainage problems. Moreover, poor control over physical development has given rise to urban land encroachment especially in areas demarcate for flood control. The inadequate drainage and poorly designed channels in many parts of the Odaw basin have given rise to serious flood problems. These problems are compounded by choked drains, mainly by plastic waste. Indeed, due to the poor waste

management in the city, large quantities of plastic waste are trapped within the Odaw, and the Korle Lagoon. The presence of an intercepting weir built between the upper lagoon and the lower Odaw canal aggravates the collection of the plastic waste in the lagoon. The pictures below show the presence of plastic waste on the Odaw at the intercepting weir.

*Figure 15: Floating plastic waste trapped at the lower Odaw channel at the intercepting weir*



# 4 THE PLASTIC CHAIN

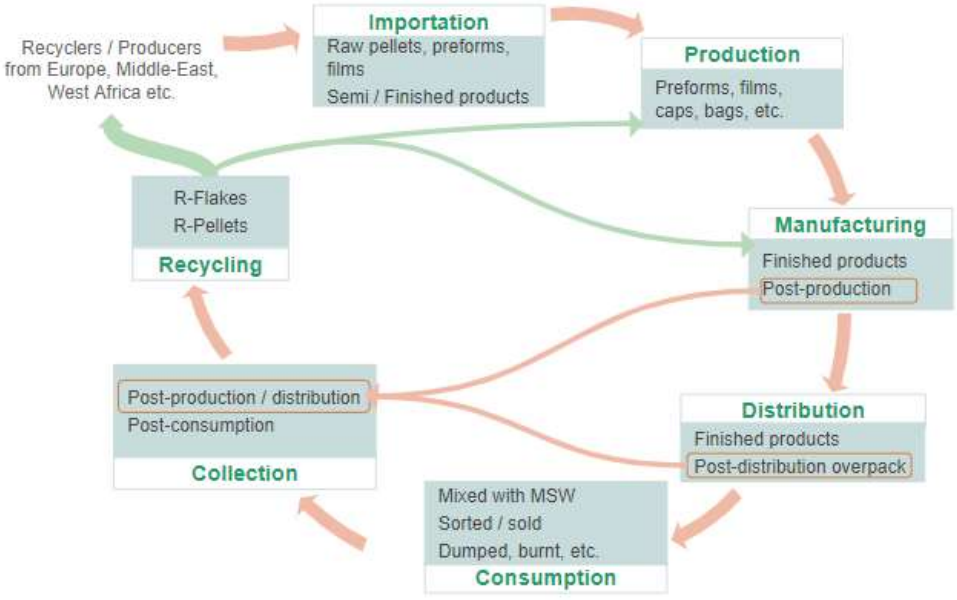
## 4.1 Introduction

Plastic is a lightweight, hygienic and resistant material which can be moulded in a variety of ways and utilised in a wide range of applications. Single-use plastics, often also referred as disposable plastics, are commonly used for plastic packaging and include items intended to be used only once before they are thrown away or recycled. These include, among other items, grocery bags, food packaging, bottles, straws, containers, cups and cutlery. The graph below introduces the main polymers used to manufacture single-use plastic items and indicates their most common applications.

*Figure 16: Plastic Polymers and Main Applications (Seureca), 2019)*


The main actors (from the importers to the recyclers) of the plastic chain are represented in the graph below. Many actors appear in more than one category. The definitions are provided in Section 1.3 of this report.

*Figure 17: Plastic chain mapping*



## 4.2 Ghana's Plastic Imports

There is no raw plastic production from oil in Ghana, so all plastics are imported. Plastics are imported as:

- Raw materials (pellets);
- Semi-finished products (forms); and
- Or finished products.

A database of primary plastic pellet importation was obtained from the Ghanaian Customs Department for the years 2016, 2017 and 2018. After data refining and analysis, the main key lessons are presented below. These data exclude any plastics/plastic products potentially imported illegally and any errors in the customs register regarding the quality (type of polymer) of the plastics. It has not been possible to estimate the volume of plastic imports in the form of finished products as there are too many product types being imported and the proportion of plastic varies for each. Therefore, only the data for raw (pellets) and semi-finished products is analysed below.

### 4.2.1 Raw Plastics

The data for five main streams of plastics was analysed:

1. Polystyrene, in primary forms (PS);
2. Polyethylene having a specific gravity <0.94, in primary forms (LDPE);
3. Polyethylene having a specific gravity >=0.94, in primary forms (HDPE);
4. Polyethylene terephthalate, in primary forms (PET); and
5. Polypropylene, in primary forms (PP).

The results were obtained for years 2016, 2017 and 2018. The following table presents the estimated average over the last 3 years of packaging materials produced from imported primary plastic pellets for Greater Accra.

*Table 13: Estimated packaging waste produced from imported primary plastic pellets for Greater Accra region*

| Type of plastic | Range for 2016-2018 (metrics tonnes) | Proportion (%) |
|---|---|---|
| PS | 1,100 - 1,400 | 3% |
| LDPE | 8,800 - 11,000 | 26% |
| HDPE | 15,400 -19,300 | 45% |
| PET | 7,200 - 9,000 | 21% |
| PP | 1,800 - 2,300 | 5% |
| **TOTAL** | **34,300 - 43,000** | **100%** |

It is noticeable that:

- LDPE and HDPE represent the largest volumes of raw material imported (around 26% for LDPE and 45% for the HDPE) of the total, principally for packaging and single use applications. HDPE is used to produce water sachets and cosmetic and food packaging. LDPE is also used to make water sachets and plastic bags
- PET represents around 21% of the total raw plastics imported. PET is mainly used for making

plastic bottles. To make bottles the raw PET is first transformed in preform, then blown into a bottle. PET preforms are also imported in Ghana (around 6,000 tonnes per year)

- The quantity of PS imported into Ghana is low. This plastic is mainly used to produce expanded polystyrene, a very light material, which is used for food packaging in restaurants and take-away.

### 4.2.2 Semi-finished Plastics and Finished Plastic Packaging Products

Import of semi-finished products into Ghana mainly comprises:

- PET preforms (that are widely used to produce PET bottles);
- Plastic films in rolls that are used to manufacture sachet and other packaging;
- Plastic sacks and bags; and
- Empty plastic packaging (boxes, cases, jars...).

The following table presents the estimated average for the last 3 years of imported semi-finished and plastic finished products for Greater Accra.

*Table 14: Estimated semi-finished and finished packaging and single use products imported to Greater Accra region*

| Type of plastic | Average (tonnes) | Proportion |
|---|---|---|
| PS | 150 | 1% |
| LDPE | 9,600 - 12,000 | 75% |
| HDPE | 0 | 0% |
| PET | 1,400 - 1,700 | 11% |
| PP | 1,600 - 2,000 | 13% |
| **TOTAL** | **12,750 - 15,850** | **100%** |

LDPE the largest plastic type, represents 75% of the imported goods. Of this LDPE, 60% (on average) are plastic bags, i.e. between 5,000 and 7,000 tonnes per year of single used plastic.

### 4.2.3 Summary of Plastic Imports

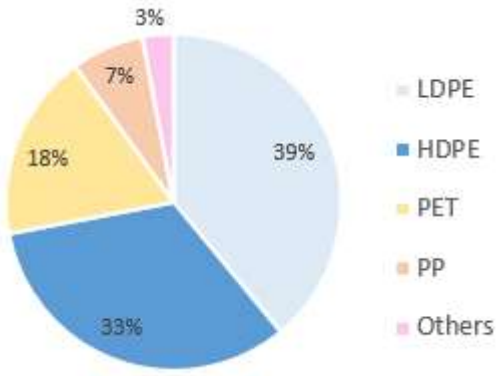
The table below summarises the analysis on plastics importation in Greater Accra Region.

*Table 15: Plastic importations in Greater Accra Region - Proportions of each Polymer*

| Type of plastic | Average (tonnes) | Proportion of raw (%) | Proportion of semi-finished (%) | Proportion of total (%) |
|---|---|---|---|---|
| PS | 1,250 - 1,650 | 88%-91% | 12%-9% | 3% |
| LDPE | 18,400 - 23,000 | 50% | 50% | 39% |
| HDPE | 15,400 -19,300 | 100% | 0% | 33% |
| PET | 8,600 - 10,700 | 84% | 16% | 18% |
| PP | 3,400 - 4,300 | 53% | 47% | 7% |
| **TOTAL** | **47,050 - 58,850** | **73%** | **27%** | **100%** |

The graph below illustrates the results of the table for plastics importation in Greater Accra Region.

*Figure 18: Plastic importations in Greater Accra Region - Proportions of each Polymer*




Overall LDPE (39%), HDPE (33%) are the most commonly imported plastics into Ghana, followed by PET (18%). However, these are not imported in the same forms. HDPE is only imported as pellets which are transformed locally in Ghana. In contrast, LDPE is either imported in the form of pellets (50%) to be transformed locally or imported in the form of films, bags or other products (50%) that are used for packaging. PET is mainly imported in the form of pellets (84%) which are then locally transformed into preforms.

Overall, the figures show that there is an active plastic production market in Ghana as the import of raw material represent 73% of the total imports while semi-finished products represent 27% of the total importation (not counting plastics imported as finished products).

## 4.3 Production and Use of Plastic in Ghana

Large producers and manufacturers were interviewed under the APMP (Annex G). The results from eight major companies are presented in the table below.

*Table 16: Results from eight major companies*

| | PET | HDPE | LDPE | PP | Composites | Total |
|---|---|---|---|---|---|---|
| Plastic quantities manufactured by the largest companies (2018) | 33,000 | 9,000 | 8,500 | 1,700 | 2,800 | 55,250 |
| Raw plastic quantities imported for single used products (2018) | 52,700* **includes preforms* | 69,700 | 50,000 | 7,725 | - | 186,425 |
| % of plastic imported used by the presented companies | 63% | 13% | 17% | 22% | - | 30%* **does not include composites* |

It is striking to see that, in 2018, these eight companies account roughly for 30% of the total raw plastics quantities that are imported in Ghana. In the case of PET, they represent over 60% of the total imports of raw pellets in 2018. If all plastic stakeholders should be mobilised to address the plastic challenge in Ghana, these figures reveal that these companies in particular need to be engaged as they represent a significant share of the plastic sector. Targeted actions that include these companies are likely to have significant impacts on the plastic sector.

Their commitment could be financial (for example the development of a voluntary system of Extended Producer Responsibility or through an initiative such as the GRIPE that supports / runs

projects for plastics management), operational (for example a modification of their packaging design to increase their recyclability (upstream design) or the use of recycled pellets in their production), academic (for example supporting research in plastics management, design, etc.).

The tables[17] below define the different plastics streams and present their use and production in Ghana for LDPE, HDPE, PET, PP, PS and composite plastics.

*Table 17: Production and use of LDPE in Ghana*

<table>
<tr><td colspan="2">Low density polyethylene (LDPE) DEFINITION<br>Low density polyethylene is a thermoplastic polymer belonging to the polyolefin family and has a density of 0.910 to 0.925, its melting point is low and reaches 113°C. This category also includes Linear LDPE (LLDPE) plastic, which is tougher than ordinary LDPE, due to a specificity in its chemical formula.<br>  </td></tr>
<tr><td colspan="2">LDPE USE</td></tr>
<tr><td>Water sachets<br>  </td><td>In Ghana, the water sachets’ market has grown in the past years, due to the problems faced by the water conveyance services. They are mainly composed of LDPE plastics and made from raw material.</td></tr>
<tr><td>Plastic bags<br>  </td><td>Distributed in shops, plastic bags come from two sources, according to their colour:<br>Light colours bags are made of raw material, pure LDPE plastic;<br>Dark colours such as black bags are most of the time made of recycled LDPE.</td></tr>
<tr><td>Films for packaging<br>  </td><td>Plastic films are mainly used for product packaging (water bottle packs) and for the storage on pallets.<br>Both of them are made from raw material.</td></tr>
<tr><td colspan="2">LDPE PRODUCTION<br>LDPE pellets from raw material are imported and melted to produce bags, sachets or films. 1250 producers of water sachets have been registered by the Food and Drug Administration of Ghana. They represent a major actor of this plastic sector, and their need for a food-grade pure material oblige their suppliers to import large quantities of LDPE pellets to produce these packaging.<br>Concerning the LDPE plastic films, some companies import plastic rolls already manufactured, to be printed, or to be sold for wrapping, or any types of packaging.<br>More than 100 companies are importing raw LDPE in Ghana. It may be pellets, films, bags or other final product.</td></tr>
</table>

[17] All the pictograms used are from the UNEP Report (2018) and the pictures used were taken by the APMP team.

*Table 18: Production and use of HDPE in Ghana*

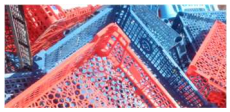
<table>
<tr><td colspan="2">High density polyethylene (HDPE) DEFINITION<br>High density polyethylene is a thermoplastic polymer belonging to the polyolefin family and has a density of 0.941 to 0.965. Its melting point is 138°C.<br>  </td></tr>
<tr><td colspan="2">HDPE USE</td></tr>
<tr><td>Water sachets<br>  </td><td>In Ghana, the 'water sachet' market has grown in the past years, due to the problems faced by the water conveyance services. They are mainly composed of LDPE plastic, but they also might include HDPE.</td></tr>
<tr><td>Bottles and gallons<br>  <br>  </td><td>Bottle packaging used for shampoo, cosmetic products, condiments or milk bottles.<br>Gallons for consumer and industrial use.</td></tr>
<tr><td>Crates<br>  </td><td>Crates used by private individuals and in several activities: agriculture, shops, storage.</td></tr>
<tr><td>Pipes<br>  </td><td>Use of HDPE pipes in the water supply, wastewater management but also electrical wires and their sheathing.</td></tr>
<tr><td>Pallets<br>  </td><td>Plastic pallets, mostly used by industries for loading and storage activities.</td></tr>
<tr><td colspan="2">HDPE PRODUCTION<br>Out of the total figures of HDPE granules imported in Ghana for the past 3 years, 68 % of these granules are used for short-lived products and 32 % for long-termed ones.<br>More than 100 companies are importing raw HDPE in Ghana. Imported HDPE may be in the form of pellets, films or other final product.</td></tr>
</table>

*Table 19: Production and use of PET in Ghana*

<table>
<tr><td colspan="2">Polyethylene Terephthalate (PET) DEFINITION<br>PET is a linear thermoplastic that has widespread commercial use as a synthetic fibre, as well as being a film and moulding material and has a density of 1.38. A major application is for carbonated drink bottles because PET's excellent gas barrier properties. Besides, its melting point is high: 260 – 265 °C.<br>  </td></tr>
<tr><td colspan="2">PET USE</td></tr>
<tr><td>PET bottles<br>  </td><td>The PET plastic is mainly used for the plastic bottles: water, soda or some domestic cleaning products like dishwashing liquids.</td></tr>
<tr><td>PET packaging</td><td>With different characteristics than the PET plastic bottle ones, there also are PET packaging, such as PET blister packaging.</td></tr>
<tr><td colspan="2">PET PRODUCTION<br>PET is mainly used for bottle packaging and for this application, the raw PET is first transformed in preform, then blow into a bottle. These preforms are either:<br>● Produced in Ghana with raw PET pellets<br>○ The global importation of raw pellets of PET is made by 58 companies in Ghana and reaches around 45,000 tons per year,<br>○ There are three main producers of preforms – they use 100% of raw material.<br>● Imported directly.<br>○ Between 6,000 and 8,000 tons of PET Preforms are imported each year on the Ghanaian market to supply the bottling companies.<br>  <br>PET Preforms</td></tr>
</table>

*Table 20: Production and use of PP in Ghana*

<table>
<tr><td colspan="2">Polypropylene (PP) DEFINITION<br>Polypropylene is the second most common linear thermoplastic of the polyolefin family. In comparison to low- and high-density polyethylene (LDPE and HDPE), PP has a lower impact strength, but superior working temperature and tensile strength. His density is often < 0.9, so it’s floating in oil, and water, as HDPE is sinking in oil, but floating in water. Its melting point is higher than HDPE, at 186°C.<br>  </td></tr>
<tr><td colspan="2">PP USE</td></tr>
<tr><td>Single-use products</td><td>There are several single-use products made of PP: cosmetic boxes, blister packaging, food-packaging and wrapping film.<br>They represent 28.2 % of raw PP material importations in Ghana.</td></tr>
<tr><td>Raffia bags<br>  </td><td>These bags are reused several times to store rice, sugar and maize before going to waste.<br>Raffia plastics are included in the 28.2% of raw PP material importations in Ghana.</td></tr>
<tr><td>Other products<br>  </td><td>Buckets, chairs, basins, kitchenware, garden furniture, trays for kitchen, jugs…<br>These longer-term items represent 71.8 % of the raw PP material importations in Ghana.</td></tr>
<tr><td colspan="2">PP PRODUCTION<br>Importation of raw PP pellets from oil production; once imported, the PP granules are melted to produce the bags, sachets or films. Final products can be coloured and printed.<br>Importation of 1,000 tons a year of recycled PP pellets for long-lasting goods production.</td></tr>
</table>

*Table 21: Production and use of PS in Ghana*

| | |
|---|---|
| **Polystyrene (PS) DEFINITION**<br>Polystyrene is a synthetic aromatic hydrocarbon polymer made from the monomer styrene. Polystyrene can be solid or foamed. General-purpose polystyrene is clear, hard, and rather brittle. It is a rather poor barrier to oxygen and water vapour and has a relatively low melting point. Polystyrene can be naturally transparent but can be coloured with master batches. Uses include protective packaging (such as CD and DVD cases), containers, lids, trays, tumblers, disposable cutlery and in the making of models.<br>  | |
| **PS USE** | |
| Single-use products | The single-use polystyrene is mainly employed in the food (take-away packaging mainly) and delivery packaging.<br>Also, in the fishing industry, polystyrene is a very present plastic polymer, it can be reused several times before going to waste according to its dirtiness. |
| Polystyrene panels | Polystyrene is also used as an insulation material for houses, buildings and also in fridges. |
| **PS PRODUCTION**<br>Three companies dominate the PS production in Ghana and import 100% of the raw polystyrene | |

*Table 22: Production and use of composite plastics in Ghana*

| |
|---|
| **COMPOSITE PLASTICS DEFINITION**<br>Laminate and composite films are co-extruded films which have some marketing specifications, for industries.<br>Each material has his own characteristics and properties and has been developed by chemical industries to give to their clients some specific advantages.<br>For instance, one polymer is a very good barrier to microbes, but cannot be printed properly, so co-extrusion will fulfil both advantages of building a barrier against microbes and enabling printing. |
| **COMPOSITE PLASTICS USE**<br>There are many types of laminates and every company will have their own plastic laminate products. For example, aluminium-LDPE can be used to produce stickers containing coffee powder. PET-PA-LDPE is used to package meat, and prepared dishes. PE-PA, PP-PA are also used to package food. Composite plastics are mostly single use, only some items (multilayer bags) can be reused. |
| **COMPOSITE PLASTICS PRODUCTION**<br>Several companies process these materials in Ghana (the production is dominated by one that produces over 7,000 tonnes per year of composite films). |

## 4.4 Post-Consumption Plastics

As part of the baseline study, an estimation of the plastic waste quantity in Accra was carried out. The detailed methodology and results are presented in Annexes A and B.

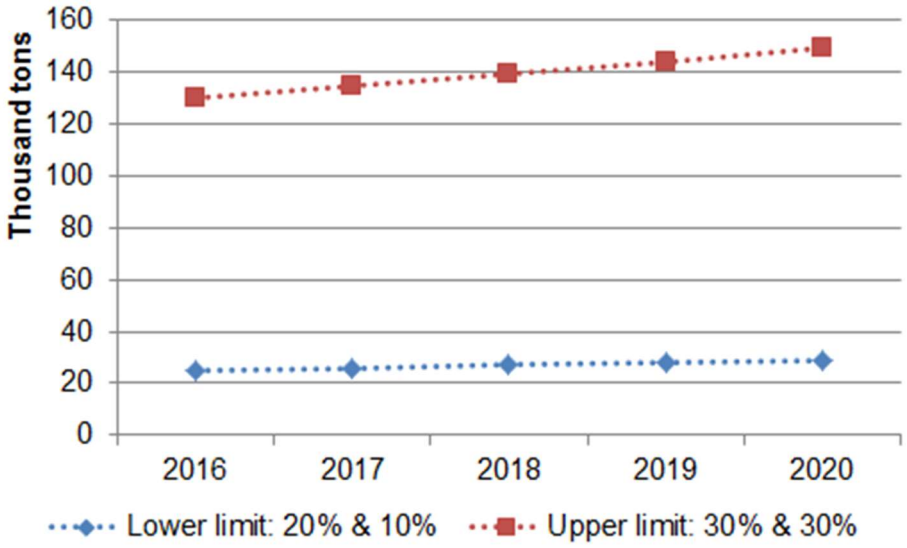
The quantities of plastic waste generated from households were calculated based on the waste characterisation and waste quantities forecasts as detailed in Annex B. The results are presented in the following table for the Greater Accra region.

*Table 23: Plastic waste generated by households in Greater Accra Region from 2016 to 2020*

| Type of plastic | Unit | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|
| Plastic Film/LDPE | tonnes | 24,314 | 25,197 | 26,102 | 27,027 | 27,972 |
| PET | tonnes | 24,107 | 24,983 | 25,880 | 26,797 | 27,734 |
| HDPE | tonnes | 23,326 | 24,174 | 25,041 | 25,929 | 26,836 |
| PP Rigid | tonnes | 11,406 | 11,820 | 12,244 | 12,678 | 13,121 |
| PS | tonnes | 4,474 | 4,637 | 4,803 | 4,973 | 5,147 |
| PVC | tonnes | 4,083 | 4,231 | 4,383 | 4,539 | 4,697 |
| Other Plastics | tonnes | 17,132 | 17,755 | 18,392 | 19,044 | 19,710 |
| **Total plastic waste from households in Greater Accra** | **tonnes** | **108,843** | **112,796** | **116,846** | **120,988** | **125,217** |

The waste generation data for small shops and offices does not exist to date in Accra. Therefore, several assumptions were made to estimate quantity of plastic contains this sub-stream. The results are presented below for the Greater Accra region.

*Figure 19: Plastic waste generated by shops and offices in Greater Accra Region from 2016 to 2020*



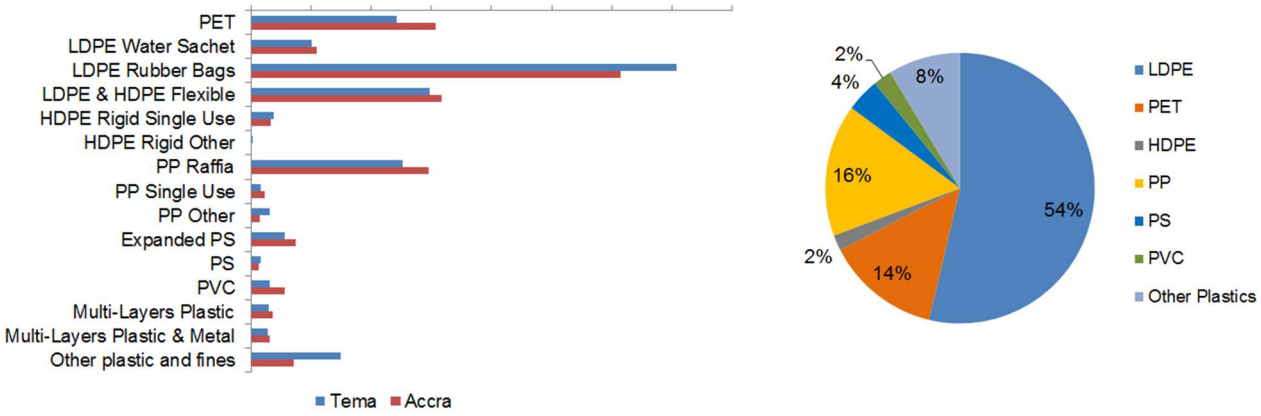

The total plastic waste tonnage generated by households, shops and offices between 2016 and 2020 is summarised in the following figure.

*Figure 20: Estimated plastic waste generation in Greater Accra Region by households and small shops and offices*


The results are based on the methodology and assumptions presented in Annex B. These results roughly correspond to the waste generation by households and small shops and offices but should be treated as estimates.

In addition, a plastic waste characterisation study funded by the Plastic Revolution Foundation was conducted in July 2019 in Accra and Tema, focusing on the various types of plastic in the waste stream (Annex L). The key results are summarised in the graphs below.

*Figure 21: Results of waste characterisation in Accra and Tema (Seureca, 2019)*




The figures are roughly consistent between Tema and Accra, with the same top five:

- The LDPE Plastic Bags and the PP Raffia are mainly used for solid waste storage and transportation purposes.
- LDPE & HDPE Flexible comes in third position. It is mainly composed of packaging waste, as films.
- PET comes in fourth position. It is mainly composed of bottles of water and other drinks.
- LDPE Water Sachets comes in fifth position. Based on previous surveys, the Consultant is aware that a significant part of the initial generated tonnage of water sachets is already collected by the waste pickers before the collection. However, the significant figure after

collection is explained by a high consumption of water sachets in the study area, and by the fact that the waste pickers do not open all the plastic bags and other raffia bags.

The other plastic waste streams are in minority. PET, LDPE, HDPE (flexible) and PP (raffia bags) count for more than 80% of the total of the plastic waste collected.

## 4.5 Comparative Analysis of Imports and Post-Consumer Waste

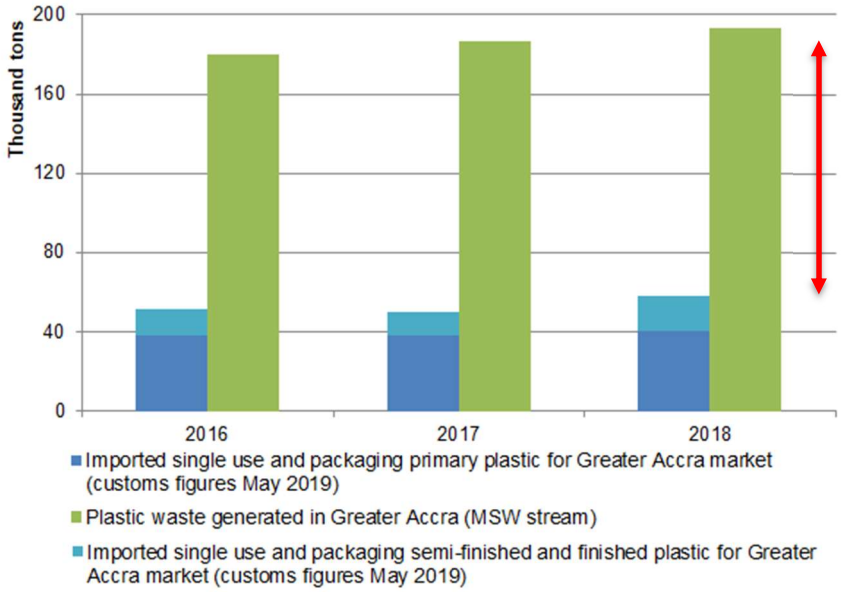
As presented at the beginning of this chapter, there is no raw plastic production from oil in Ghana, so all plastics waste comes from goods/packaging that were:

- manufactured in Ghana with imported plastic pellets (for example: water sachet),
- refine in Ghana from semi-finished products (for example: PET bottle that are manufactured in Ghana with imported preforms),
- directly imported (for example, PET bottles containing dishwashing detergent manufactured in Asia or HDPE bottles containing a shampoo manufactured in another African country).

The comparison of imports and post-consumer waste figures reveals that the imported raw plastics in Ghana represents around 21% of the origin of the plastic waste tonnage that is found in the MSW stream and that semi-finished and finished goods represent approximately between 6% and 9% of plastic waste tonnage from MSW stream. Therefore, the quantity of plastic directly imported with finished products can be estimated very roughly at around 70 %.

These are illustrated in the figure below:

*Figure 22: Plastic importation and waste figures from 2016 to 2018*




Those figures should be seen as a general trend rather than absolute results as:

- Plastic waste tonnages are based on assumptions including a margin of error
- Plastic waste tonnages include all kinds of plastic waste generated at a municipal scale, when importation figures are focus on single use and packaging plastic only. Even if single use and packaging plastic is globally predominant in the municipal stream, additional tonnes of plastic come from long lasting plastic products

- When the figures for primary plastic are expected to be quite exhaustive, the ones for semi-finished and finished products made of plastic focus only on some specific streams, as plastic bags.

As a conclusion, it appears that plastic waste found in the MSW stream comes in a large portion from finished imported goods. This finding is of significant importance for the next phase of the project as the relevant levers for plastic waste reduction/optimization/upstream design are different for plastic manufactured/transformed in Ghana and for plastic imported with finished products

The comparative analysis also reveals that the importation of plastic bags is quite important (over 32,000 tons imported in the last 3 years for the entire country) while there is already a large local production of plastic bags.

## 4.6 Collection of Plastics

The collection of plastics in Accra and Tema is performed through three channels:

- Informal sectors providers, which include borla-taxis, waste pickers, aggregators and middle-men; and
- Authorised waste service providers, their activities are described in further detail in the Section 3;
- NGOs and other local initiatives.

The quantities collected by each stakeholder are difficult to assess because:

- The informal sector is involved at every stage and is composed of numerous actors (over 5,000 waste pickers, middlemen, aggregators, borla-taxis). Therefore, it is not possible to estimate the quantities collected by the informal sector. Nevertheless, expect for two initiatives led by service providers, all the recyclers met (Annex E) declared that they are buying plastic from waste pickers, aggregators or middlemen. Therefore, the informal sector is the main channel of plastic collection.
- The service providers reportedly collect more than 70% of MSW. Yet, MSW is mixed waste therefore this rough percentage does not enable to estimate the amount of plastics captured by the formal service providers. Once transported, transferred or disposed, MSW is sorted by the waste pickers who take out the valuable materials, including plastics. One service provider performs separate collection in some schools and institutions (around 2t/month of plastic collected)
- The NGOs and local initiatives collect limited amount of plastics through plastic collection bins and for some beaches cleaning. These initiatives increase their plastic volumes by buying from informal actors.

This subsection does not focus on post-production waste (remaining plastics from production such as non-conform preforms) as these are either re-used in the production or directly collected on demand by aggregators or recyclers.

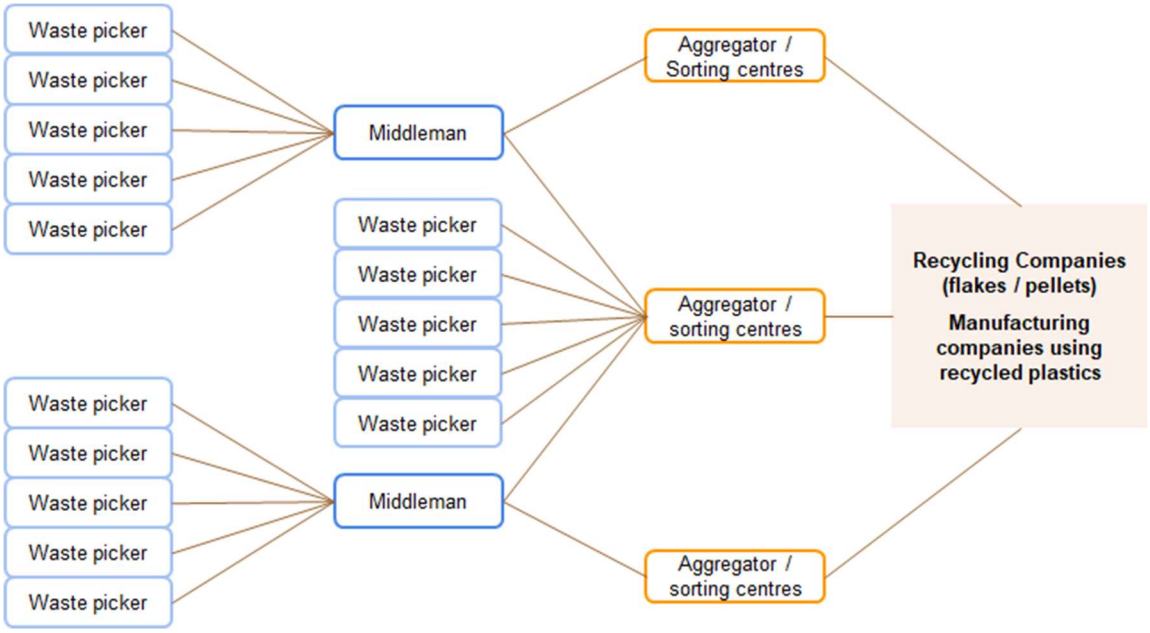
The following table summarises information about the informal collection of plastics in Accra and Tema. Technical Note #1 presented in the Annexes (Annex A) provides a full review of the role of the informal sector in plastic management in Ghana.

*Table 24: Plastic collection by the informal sector*

| Zones of collection | Means of collection |
|---|---|
| There are three types of areas from which the plastics are collected:<br>1. Communities / neighbourhoods (streets, drains, bins etc.),<br>2. Households or small and medium enterprises (SMEs) or organisations (door-to-door collection for households, events, churches etc.)<br>3. Disposal sites / transfer stations. | Hand-picking (waste pickers)<br>Tricycles (borla-taxis)<br>Collection points such as bins (waste-pickers and borla-taxis)<br>Aggregations and/or sorting in spaces (aggregators, middlemen) |

**Organisation**

The collection is organised in 3 or 4 stages as presented below:




Aggregators and middlemen mostly differentiate themselves from waste pickers by the capacity they have to buy recyclables (capital) and by their knowledge of the sector (prices, contacts with recycling and manufacturing companies, capacity to buy and know-how on plastic).

The actual organisation differs from one situation to another. Most of the recycling companies interviewed buy plastics from aggregators and middlemen because of the quantities they are able to gather. Some waste pickers directly sell to recycling and manufacturing companies without going to an aggregator or a middleman. Some middlemen also directly sell to recycling and manufacturing companies.

**Analysis**

From the various interviews carried out, it appears that the informal sector has relatively organised structures and that they manage to collect very significant amount of plastic, especially the plastic for which buyers are well identified.

**Focus on the water sachets collection**

The Water Sachet Collector Association has around 350 members in Accra. Each member works with waste pickers[18] (between 30 and 300) for the collection – the members are middlemen or aggregators. The Association reports to collect around 60 tonnes per day of plastic. They focus mostly on the collection of water sachets.

The following table summarises information about the collection of plastics in Accra and Tema by NGOs and other local initiatives.

[18] The waste pickers in this case can be part-time waste pickers (women that sell goods in markets often collect water sachet at the same time)

*Table 25: Plastic collection by the NGOs and other local initiatives*

| Descriptions | Zones and means of collection |
|---|---|
| A few initiatives in Accra were implemented recently to enhance plastic collection. These include the following types of initiative:<br>1. NGOs (e.g. Environment 360, Plastic Punch);<br>2. Initiatives supported by major companies (e.g. Pick-it); and<br>3. Start-ups (e.g. Coliba). | These initiatives collect from the same zones as the informal sector:<br>1. Communities / neighbourhoods (streets, drains, bins etc.);<br>2. Households or small and medium enterprises (SMEs) or organisations (door-to-door collection for households, events, churches etc.); and<br>3. Disposal sites and transfer stations.<br><br>Collection of plastic is done mainly by Hand-picking (waste pickers) and tricycles. Collection points and sorting centres are established to process the plastic. |

**Initiatives**

Most of these initiatives in Accra and Tema are still operating at a small scale and are looking at how to scale up. The collection projects identified focus mainly on the plastic not otherwise targeted by the informal sector (PET).

- **#iRecycle and Coliba.** The **#iRecycle** project is funded by members of the GRIPE. Collection bins for PET bottles are provided at Total fuel stations. These are emptied by waste pickers living near the bins. The waste pickers accumulate these materials at their home and once they have sufficient quantities, they call a tricycle driver working for the start-up **Coliba** (borla-taxi) to pick up the plastics. Coliba also collect PET through aggregators, waste pickers, middlemen using a mobile app to facilitate the collection system. The PET are transformed into flakes and exported.
- **Pick-It Sorting Centre.** This sorting centre is operated in Tema by the NGO Environment 360 with support from members of the GRIPE. Some waste pickers work at the sorting centre while other receive training and collect plastics from residential areas. The sorting centre buys from the waste pickers and sells the sorted materials.
- **Environment 360.** The NGO also carries out education and sensitisation of waste pickers and develops plastics residential collection in Tema, Jamestown and Old Fadama (Accra). The NGO also collects plastics via collection points (bins) in Accra. It produces and sells flakes.
- **Plastic Punch.** This NGO organises monthly beach clean-ups. It mobilises communities and volunteers through its communication channels (social media, website) and organises transportation and lunch for vulnerable children. Whilst the beach clean-ups have educational value (as well as clearing away marine plastic waste) they are not currently developed into an active collection channel of plastic. Some actors are considering organizing beach clean-up as a way of collecting plastic to limit marine pollution.

The table below focuses on the plastic collection by authorised service providers. The MSW collection system is described in further detail in the Section 3.2 on Current SWM system in Accra.

*Table 26: Plastic collection by the authorised waste service providers*

| Zones of collection | Means of collection |
|---|---|
| MSW is collected from the zones assigned by contract to the service providers. | Plastic is mixed inside the MSW stream collected by compactor trucks or skip trucks. Most of the service providers do not use source segregation because of the additional capital investment required. |

**Initiatives**

The authorised services providers do not really collect plastic as an activity business – plastic is only a component of the mixed waste stream collected. However, some small-scale plastic collection initiatives exist.

- One service provider (Jekora Venture) performs source segregation in 83 schools and institutions, as a pilot project with the support of the local authority (AMA). It produces compost out of organic waste and sells recyclates (plastics, metal and paper) to recycling companies. Plastics represent around 2 tonnes per month.
- Another service provider (Zoomlion) has set up a subsidiary, the Accra Compost and Recycling Plant to produce compost, and aggregate and sell PET (in bales) and HDPE and LDPE pellets. The plant receives mixed MSW from the zones serviced by Zoomlion and sorts mainly manually the different materials and transforms them. Plastics represent roughly 10% of the sorted waste and totals about 50 tonnes per month. Zoomlion has also just started the operation of a new sorting site with mechanical and manual sorting that aims at producing compost and at extracting recyclables: IRECOP. This new plant opened in April and aims at sorting 800t/day of mixed waste (currently, 200t/day are received). As for ACARP, the main objective is to produce compost from the mixed stream of waste. At the IRECOP, a mixed stream of plastic is extracted and identified as Refuse Derive Fuel and the operator is looking for a valorisation as a fuel in cement plants. As for now, the quality of this stream is not enough for recycling.

**Analysis**

The authorised service providers focus mainly on the MSW stream and have not really developed plastic collection services yet except for the initiative mentioned above. The development of plastic segregation at source is not a priority for now for the waste collectors, as they are facing already numerous challenges in their main activity i.e. waste collection: transportation issues, fees collection from the users and the municipalities, optimisation of their operation… However, when questioned on this topic, they expressed their interest in developing these activities, if they receive the necessary support.

The extraction of plastic from the MSW that is done by the 2 sorting plants operated by Zoomlion might provide a mean to extract and then valorise plastic, however, as the 2 centres were not design in this perspective, it would require some changes in the operations and equipment.

### 4.6.1 Plastics Collection Synthesis

The quantity of plastic collected provided by the actors involved in this activity are to be taken with caution, as they are based on voluntary declarations, they reflect a trend rather than provide accurate figures.

Overall, from the research and interviews, it seems that a large part of the plastics collection is performed by the informal sector and by the NGOs and companies working with the informal sector. While the informal sector is the main actor in plastic collection, its efficiency and structuration could be improved. For example, the NGOs and the enterprises working with the informal actors have developed models to structure the collection and improve the working conditions of waste pickers by creating value in the recycling chain.

The authorised waste service providers are not really involved for now in the plastic collection. They

would be interested in developing initiatives for recyclables collection (such as illustrated by the two pilot projects described above) but this is not currently a priority, especially as source segregation would require additional capital expenditure. This need for investment financing is a major constraint on plastics recycling by these service providers.

## 4.7 Plastic Recycling

The tables below present the recycling characteristics, actors, challenges and opportunities for the recycling of LDPE, HDPE, PET, PP, PS and composite plastics in Ghana.

*Table 27: LDPE Recycling*

<table>
<tr><td colspan="2">LDPE RECYCLABILITY<br>The recycling process of LDPE has 5 main steps:<br>● Shredding<br>● Washing<br>● Drying<br>● Agglomerating<br>● Extruding<br>The final product obtained is a LDPE pellet. These recycled pellets are mainly transformed into LDPE plastic bags, according to the know-how and the technologies used in Ghana. However, they could be manufactured into a wider range of recycled products, such as LDPE pipes for agriculture or sanitation uses.</td></tr>
<tr><td colspan="2">MAIN ACTORS<br>A collection network for the LDPE plastics already exists and is managed by the 'Sachet Water Collectors' association. According to the Association, 60 tonnes of water sachets are collected daily in Greater Accra.<br>As for the recycling, four main actors have been identified (SpacePlast, BlowPlast, Asondwey Rubber and Zenith Plastic). These companies produce LDPE pellets from the recyclate purchased and incorporates the recycled LDPE pellets with raw LDPE pellets to produce mainly plastic bags.<br>Additional smaller actors that produce LDPE pellets from plastic waste were identified totalling around 100 tonnes per month. A total of around 20 thousand tonnes per year of LDPE plastics are recycled in Greater Accra based on oral information obtained from the recyclers. Furthermore, informal players in the Darkuman area are also engaged in recycling and it has been estimated that they produce between 10t to 20t/ day.</td></tr>
<tr><td>OPPORTUNITIES</td><td>CHALLENGES</td></tr>
<tr><td>• Water sachet collection by the 'Sachet Water Collectors' association is already organised.<br>• Industrial companies, wholesalers and commercial centres are currently sorting themselves the LDPE flows from other types of waste.<br>• Dumpsites contain LDPE waste that can be recycled (mainly plastic bags).<br>• Plastic manufacturing companies expressed interest in a steady partnership model with their current suppliers. Also, they would appreciate if their suppliers could develop new skills such as a laboratory test of the product and the standardisation of plastic pellet production.</td><td>• LDPE products are very light which impacts their collection for recycling. Transportation impacts on the profitability of recycling LDPE.<br>• The small informal companies which recycle LDPE waste in the Darkuman district are not fully legal entities and have poor working conditions. Those recyclers have a risky business model[19] and lack a guaranteed cash-flow. Also, it was reported that some of them have illegal electricity and water connection.<br>• The costs of cleaning LDPE recyclate is high compared to their value.<br>• Both high- and low-quality LDPE are turned into lower-value applications (especially new plastic-bags).<br>• Plastic bag recycling presents significant challenges: Collection is complicated due to the low density of this waste and the fact that plastic bags are used for packing garbage. The value of this material is significantly lower than water sachets market value (lower quality and dirtiness of the material). Collection of water sachets is enough to fulfil the demand of recycling companies.</td></tr>
</table>

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The following diagram summarises the current flow of LDPE in Ghana from its import and production to its recycling and transformation in new products.

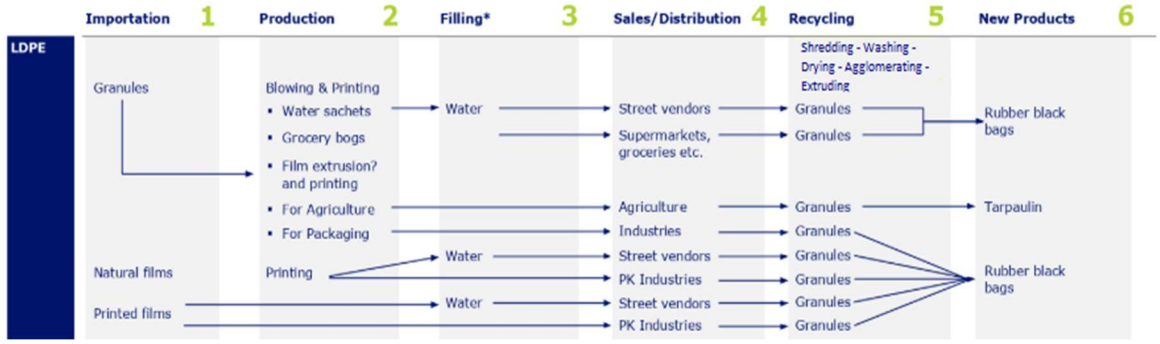



*Table 28: HDPE Recycling*

**HDPE RECYCLABILITY**

The recycling of HDPE is very similar to the LDPE's process. It has 4 main steps:

- Shredding
- Washing
- Drying
- Extruding

HDPE material does not need to be densified in the process. The recycled pellets can be used in several applications, depending on their characteristics. In European countries, recycled HDPE pellets are often used in car manufacturing companies (oil tanks and other hidden parts of vehicles). In African countries including Ghana, HDPE pellets are usually turned into new household products or pipes.

**MAIN ACTORS**

Waste pickers are aware of the value of these HDPE materials, collecting them on landfills, disposal sites, transfer stations and from household waste. They obtain a good price for these recyclates.

In the current situation, the small of informal recyclers in the Darkuman district which recycle LDPE plastics also recycle HDPE plastic wastes. They manage the whole process from waste to production of plastic pellets: the total production of recycled HDPE pellets of these companies is higher than that for LDPE, assessed at around 40-45 tonnes a day. Another operator recycles around 6 tonnes per day of HDPE recyclate.

These recycled pellets are sold to industrial companies for the manufacturing of pipes, pallets and even bin containers. The main actors in Accra are Cherkieh industry, UPPR company, KGM company, QualiPlast and Mavis Industry.

Finally, SpacePlast and Hiesh's Plastic Recycling have a different business model. In addition to buying a part of the recycled HDPE plastics they use from informal recyclers; they also obtain HDPE plastic wastes from aggregators and turn them into plastic pellets to feed directly their production process.

| OPPORTUNITIES | CHALLENGES |
|---|---|
| • The market is already established. The collection is done for almost all of HDPE plastics.<br>• Part-exchange prices of HDPE plastic wastes are interesting.<br>• Many actors are able to recycle this polymer.<br>• Plastic product manufacturers are looking for a steady partnership model with their current suppliers. Also, they would appreciate if its suppliers could develop new skills such as laboratory testing and a standardisation of plastic pellet production. | • The small informal companies which recycle LDPE waste in the Darkuman district are not fully legal entities and have poor working conditions. Those recyclers have a risky business model and lack a guaranteed cash-flow. Also, it was reported that some of them have illegal electricity and water connection. |

The following diagram summarises the flow of HDPE from its importation and production to its recycling and transformation in new products.


*Table 29: PET Recycling*

**PET RECYCLABILITY**

The only PET products that are currently recycled are bottles. This is because PET blisters and other PET packaging have significantly different characteristics (viscosity) to bottles so would pollute the flux if they are incorporated in the extrusion process with PET from bottles, so cannot be recycled together. The overall process to recycle PET is broken down into a number of different steps, as set out below.

**PET plastic wastes to PET recycled flakes**

The initial recycling process of PET has 4 main steps:

- Shredding
- Washing in a sink float tank to sort low density plastics (D<1)
- Separating the impurities by sieving and zigzag classification
- Drying

**PET plastic flakes to PET recycled pellets**

The PET flakes pass through a double screw extruder with a higher temperature than the PE and an effective degassing system. Furthermore, the parameters of the recycled PET pellets (e.g. viscosity and crystallinity) need to be controlled and the necessary equipment is very expensive. The PET pellets finally created can be reused in non-food packaging and textile industry.

**PET plastic flakes to food-grade PET recycled pellets**

The process is very similar to the one presented above but requires additional steps and the agreement of the FDA (Food Drug Administration) to validate its reuse in food contact.

In conclusion, PET recycling requires more technicity and more investments, especially to reach the food grade standards. Non-food grade recycled PET is mainly used in the textile industry, but the demand is low especially in Africa. There is no food grade PET recycling plant in Western Africa as for today.

**MAIN ACTORS**

Currently only three companies are interested in PET recycling in Greater Accra: rePATRN, Coliba, and Lynamps. They are already involved in the primary steps of the recycling: shredding and washing the material and separating the PET from other plastics which remain on bottles (labels and caps).

These companies buy PET from industries (plastic waste from production), aggregators, middlemen and waste pickers. Collection of PET is typically organised at a small-scale for the moment – however, these companies want to increase their capacities in order to reach the break-even point. Once this primary recycling step is done, they have no other solution except to ship the material to abroad (Canada, India, Europe, etc.) since no company in Ghana can recycle PET. Currently 60 tonnes of PET plastic waste are collected each month by these three companies. This is far less than the total in the waste stream, which explains the presence of numerous PET wastes in streets and dumpsites.

Some of the main recycling actors in Accra (e.g. BlowPlast, Mohinani and the KGM societies) expressed interest in establishing plants in order to reach the recycled PET (rPET) food grade quality. However, they know that the process to produce rPET food grade quality is quite expensive and complex. Further studies will need to be done to assess the viability of setting up a food grade PET recycling plant in Ghana (or in Western Africa) – but such a project would definitely provide a more local solution for this polymer (rather than exporting it to other continent).

Finally, some GRIPE members are participating in subsidies for the PET plastic collections done locally. For instance, Voltic is subsidising Coliba while Danone via FanMilk is doing the same with the association Environment 360.

| OPPORTUNITIES | CHALLENGES |
|---|---|
| • Many PET waste products are present in the streets and dumpsites and could be easily picked up.<br>• GRIPE societies Danone and Voltic are subsiding local associations and programmes to promote (mainly PET) plastic waste management.<br>• Producers of PET pre-forms are considering the possibility of developing the food-grade PET recycling within the area.<br>• Companies (Environment 360, Coliba, rePATRN) are trying to develop this market, with new models and initiatives for PET collections (as described in the section4.6 Collection of Plastics). | • Collection of PET bottles suffer from low prices delivered to waste pickers, which is related to the lack of a stable market in Ghana for this material ; this is explain by the lack of local or regional PET recycling infrastructure and the difficulty and cost related to exporting the PET flakes to others continents. into new products. As a result of this, there currently is a low level of interest in PET collection as a result of a low market price[20].<br>• On the 4 existing companies that prepare PET for recycling 3 are located in Tema and Adenta. Therefore, transportation costs are expensive for the middlemen who gather the materials in Central Accra.<br>• As PET is low density transport costs are more significant than for HDPE or LDPE.<br>• Concerning the transportation from Ghana to Europe and Canada, the rates are obviously high because of the distance but also because of the low volumes produced monthly.<br>• To promote the implementation of local or regional PET recycling infrastructures, a local / regional demand for recycled PET would be needed. |

The following diagram summarises the flow of PET from its importation and production to its recycling.

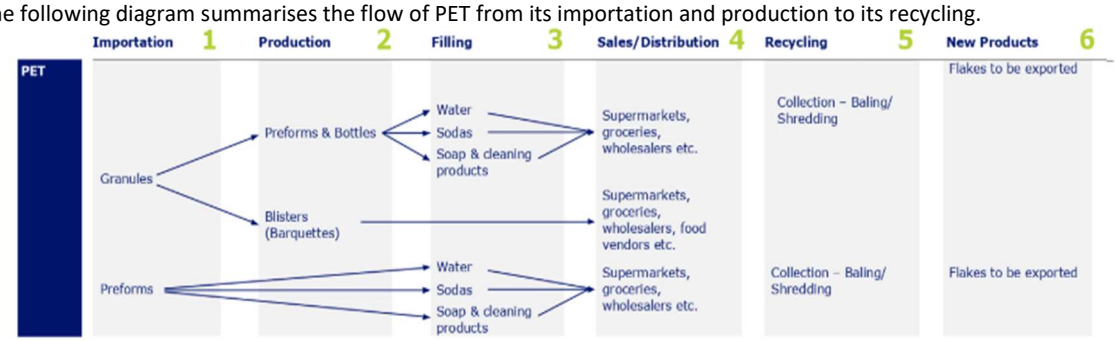



*Table 30: PP Recycling*

**PP RECYCLABILITY**

**Rigid PP:** The recycling process of rigid PP is very similar to the HDPE recycling process and has four steps as follows:

- Shredding
- Washing
- Drying
- Extruding

A recycled PP pellet can then be used to manufacture household wares.

**Raffia PP:** The recycling process of flexible raffia PP follows the LDPE recycling process, with five steps as follows:

- Shredding
- Washing
- Drying
- Agglomerating
- Extruding

The final product obtained is a recycled PP pellet that can be used to make raffia bags, plastic mats and coverings.

[20] This situation is quite unusual compare to Asia for example where PET has a very high market price and where no PET bottles are found accumulated on the beaches.

**MAIN ACTORS**

**Rigid PP**

The collection of rigid PP is well developed in the Accra area, due to the high price of this material. Almost all of the rigid PP is already collected. However, this is not the case with flexible wrapping PP.

The informal societies in the Darkuman district which recycle low and high PE plastics also recycle rigid PP plastic. They manage the whole process from waste to production of plastic pellets. The global production of recycled PP pellets of these companies is assessed at 30 tonnes a day.

The companies producing the rigid PP products for households' wares are able to use 25% of recycled PP flakes in their production process. These flakes must be sorted by colour to reach the specification of the clients. For instance, KGM, Qualiplast, Cherkieh are currently buy recycled PP pellets to produce objects such as chairs, buckets, garden furniture...

For the rigid PP plastic, the same model of waste to process presented in the PE parts exist. The company Hiesh's Plastic Recycling based in Tema buys rigid PP wastes, turns them into pellets for an immediate integration in their production process.

**Raffia PP**

The collection of raffia PP is also well developed in the area. The company SpacePlast is the only recycling actor of this specific material based on a waste to production model. Using the waste collected in the area, the company produces recycled materials that are integrated to its production process,

**Flexible wrapping PP:** There is no current collection nor recycling.

| OPPORTUNITIES | CHALLENGES |
|---|---|
| • The price of rigid PP is quite high.<br>• Development of the raffia PP collection.<br>• The rigid and single-use PP, once recycled, can be turned into long lived products thanks to current recycling companies.<br>• Plastic product producing companies are looking for a steady partnership model with their current suppliers. Also, they would appreciate if its suppliers could develop new skills such as laboratory testing of the product and a standardisation of plastic pellet production. | • No relevant recycling solution of flexible wrapping PP because of the small amounts used in Ghana.<br>• Raffia PP recycling needs an additional and expensive agglomerating step.<br>• It is difficult for waste pickers to separate PP films from LDPE or HDPE films.<br>• The small informal companies in the Darkuman district are not fully legal entities and have poor working conditions. Those recyclers have a risky business model and lack a guaranteed cash-flow. Also, it was reported that some of them have illegal electricity and water connection. |

The following diagram summarises the flow of PP from its importation and production to its recycling.


*Table 31: PS Recycling*

**PS RECYCLABILITY**

Polystyrene and Expensed Polystyrene can be recycled – processes have been developed especially for PS and EPS from industrial processes. However, PS and EPS waste produced by households, which are more contaminated, especially by food, are more difficult to recycled as the washing and separation of PS for recycling is complicated (PS has a density similar to water). Furthermore, because it is also very light and not generated in large quantity, there are very few recycling infrastructures for this polymer today.

**MAIN ACTORS**

There is no current collection nor recycling of this type of plastic waste in Ghana. Only the losses from production process are recycled into new pellets and re-used in process.

| OPPORTUNITIES | CHALLENGES |
|---|---|
| • A new market could be developed for this type of plastic as there is no recycling done. | • Small amount of PS (<br>• The lightness of the material.<br>• There are usual contaminants on its surface such as food. |

The following diagram summarises the flow of PS from its importation and production to its recycling.


*Table 32: Composite plastics and laminates recycling*

**COMPOSITES RECYCLABILITY**

As multiple materials are combined into one foil for technical functionality, recycling this type of plastic is a challenge. Indeed, mechanical recycling would turn multilayer of material into a complex blend of plastic. Very few options exist today for this type of plastics.

**MAIN ACTORS**

In Ghana, Nelplast has been involved for several years in the processing of pavements from a mixture of 70 % sand and 30 % of plastics. The company can use these laminated and composite plastics in its production.

| OPPORTUNITIES | CHALLENGES |
|---|---|
| • The existing process developed by Nelplast can use composite and laminated plastics. | • Composites are all different<br>• Lightness of these materials<br>• Difficult to identify the different types of polymers within those packaging<br>• Recycling those types of products is extremely complicated – potentially, those products could be melted together in order to recycle them, but PP is. a contaminant for the other plastic polymers |

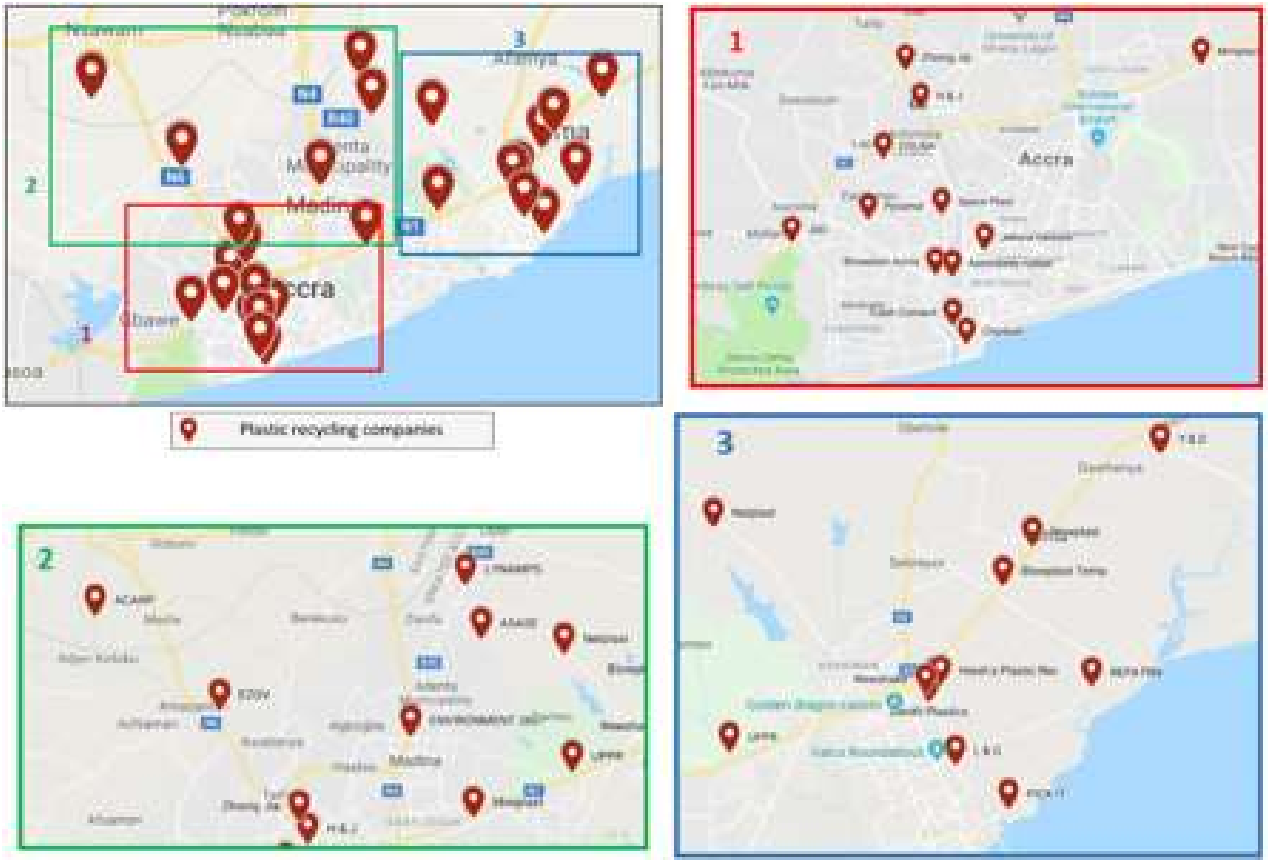
The following diagram summarises the flow of composite plastics in Ghana.

### 4.7.1 Survey of Plastic Recycling Companies

Under the APMP, local plastic recycling companies have been surveyed to have a better knowledge of the different plastic fluxes they recycle every month and their characteristics. Nineteen (19) recycling companies have been met and provided information on their process, structure and their regular clients. This assessment was quite exhaustive, and the 19 companies identified are the main recycling actors in Accra and its surroundings.

The following plastic recycling companies based in the GAMA districts (except YD Recycling based in Prampram) were surveyed (Annex H):

*Figure 23: Map of the 19 plastic recycling companies surveyed during the APMP (Seureca, 2019)*



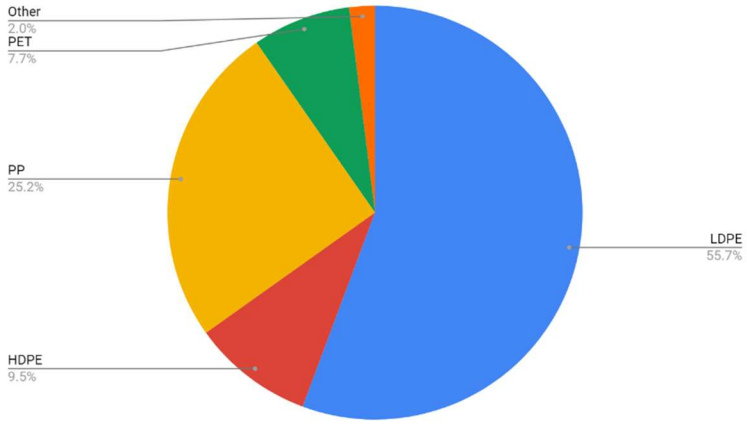
The table below presents the data collected from the companies surveyed.

*Table 33: Data collected from the companies surveyed*

| Company | Nb of employees | Process machines possessed by the company | | | | | | | Type of recycled product | Type of Client |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Shredder | Washer | Dryer | Agglomerator machine | Extruder | Baling machine | Final product | | |
| **Acarp** | 500 | X | X | X | X | X | X | | PET Balls PEHD/LDPE products | Export |
| **Asomdwey Rubber** | 160 | X | X | X | X | X | | | Plastic bags | Groceries |
| **Blowplast** | 50 | X | X | X | X | X | | | Plastic bags | Groceries |
| **Charkieh** | 60 | | | | | X | | X | Basins & Buckets | Hardware stores |
| **H & J** | 45 | | | | | X | | X | Chairs & Basins | Hardware stores |
| **Hiesh's Plastic Rec** | 196 | X | X | X | | X | | X | Chairs & Basins | Hardware stores |
| **L & G** | 30 | | | | | | | X | Basins & Buckets | Hardware stores |
| **Lynamps** | 5 | X | X | X | | | X | | PET Flakes | Export |
| **Miniplast** | 700 | | | | | X | | X | Chairs & Basins | Groceries |
| **Nelplast** | 70 | | | | | X | | X | Pavement | Churches, Schools & Ministries |
| **Newplast** | 7 | X | | | | | | | Flakes for Export | Export |
| **Pyramid** | 28 | X | X | X | X | X | | X | Granules & Pipes | Recycling companies |
| **Repatrn** | 10 | X | X | X | | | X | | Flakes for Export | Export |
| **Spaceplast** | 1500 | X | X | X | X | X | | X | Plastic bags | Groceries |
| **UPPR** | - | X | X | X | | X | | X | Bins | Service Providers |
| **Weeshake** | 60 | | | | | X | | X | Chairs & Basins | Hardware stores |
| **YD Recycling** | - | X | X | X | | | | | flakes for Export | Export |
| **Zenith Plastics** | 150 | X | X | X | X | X | | X | Plastic bags | Groceries |
| **Zhong Jia Plastics** | 25 | | | | | X | | X | Plastic bags | Groceries |

### 4.7.2 Synthesis on Plastic Recycling and Plastic Prices

From the information gathered through interviews and visits of sites of the main recyclers in Accra, it is estimated that around 3,000 tonnes per month (i.e. around 35,000 tonnes per year[21]) of plastics are currently recycled in Accra. However, the different types of plastics are not all recycled at the same level.

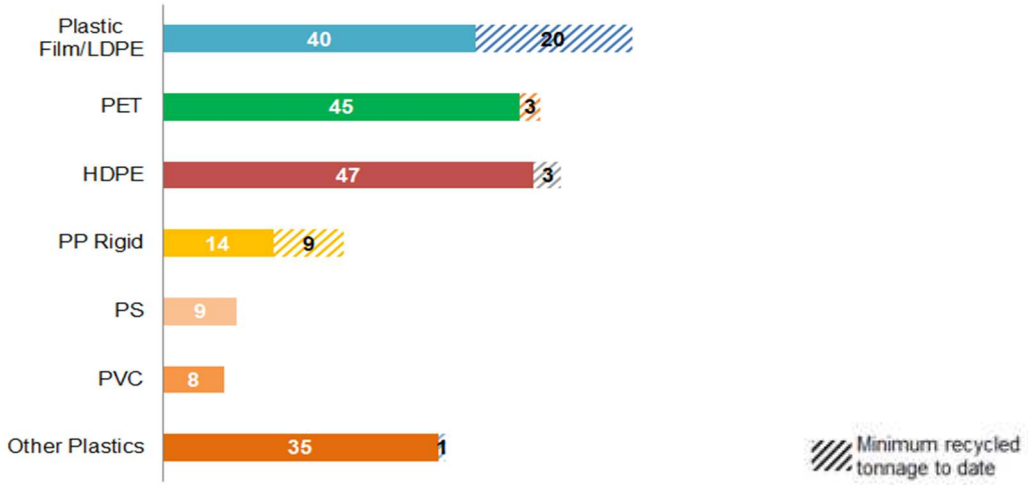



The comparison between plastic waste generation (from the MSW stream) and plastic recycling confirms that there is a large difference between the different type of polymers.

*Figure 24: Plastic polymers recycled in Accra*

The graph below compares the estimated quantity recycled out of the estimated quantity generated.

*Figure 25: Production of different polymers and recycled polymers in 2019 in Greater Accra region (in thousand tonnes)*




Key findings and comments on the above figures include:

- The majority of the plastic film and LDPE collected, corresponds to water sachets. Plastic bags are not being collected and recycled as they are dirtier and more difficult to collect. This is consistent with what has been assessed at the Kpone landfill and on the pollution hotspots in Accra and Tema, where numerous plastic bags can be found.
- Although it appears that HDPE is not well collected, there were not so many HDPE items

[21] It should be noted that, since the beginning of the interviews, the recycling sector has evolved significantly. The PET that was barely collected and recycled (as presented in the results of this Baseline Study) has generated growing interest and recyclers of PET have received some investments. Therefore, the figures presented in this report are these obtained between February and May 2019 and do not include the rapid change of the PET market between June and September 2019.

found left in disposal sites and at the pollution hotspots surveyed in Accra and Tema. Some sources indicated that there may be other informal network(s) collecting these valuable materials and exporting them to neighbouring countries (such as Niger and Mali) – this information is very difficult to confirm as those network are informal and very secretive – however, it would definitely explain the situation observed on the market and on the field.

- Most PET is not collected. This is consistent with what was assessed at the landfill and at the major pollution hotspots surveyed in Accra, where heaps of PET can be found[22].
- Finally, the level of recycling of different polymer types also depends on the value of these in Accra. The table below presents the current market prices for LDPE, HDPE, PP and PET which are the main polymer traded on the plastic market in Ghana. These prices are based on the various interviews of waste pickers, middlemen, aggregators and recyclers. Depending on the type of polymer and quality of the material (not clean (from landfill), clean (post-production), shredded, washed, pelletized, etc.), the prices vary, as shown in the table below.

*Table 34: Current selling price for different plastic types in Accra (in GHS/kg)*

| | | Seller | | | | |
|---|---|---|---|---|---|---|
| **Type of plastic** | **Products** | **Waste Pickers** | **Middlemen & Aggregators** | **Recyclers: Shredding & Washing** | **Recyclers: Pelletizing** | **End Product** |
| **LDPE** | Water Sachets | 0.5 | 0.6 to 1 | 4 to 4.4 | | Plastic Bags |
| | Plastic Bags | 0.5 | 0.8 | | | Small Market - No Data - Weak Demand |
| **HDPE** | Bottles | 0.8 | 1.2 to 1.5 | 4 to 4.4 | | Pipes / Tubes - Plastic Bags |
| | Gallons | 0.5 to 0.8 | 1.2 to 1.4 | 3.3 to 3.5 | | Pipes / Tubes - Plastic Bags |
| | Crates | 1.2 | 2 | 3 to 4 | | Bins |
| **PP** | Rigid | 0.8 | 1.2 to 2 | 2.5 | | Buckets - Household Wares |
| | Raffia Bags | 0.4 | 0.8 | 2 | 3.6 | Raffia Bags |
| | Soft / Flexible | No Market | | | | |
| **PET** | Bottles | 0.3 to 0.5 | 1 | 1.5 to 2.1 | Does not exist | Export to Europe / Canada |

[22] As mentioned above, it should be noted that, since the beginning of this report, the PET recycling sector has evolved significantly resulting in increased collection of PET. Therefore, the figures presented in this report do not include the rapid change of the PET market between June and September 2019 (some PET recycling companies received investment and increased their volume of collected PET).

## 4.8 Conclusion

The analysis of the main polymers above shows that the level of collection, preparation for recycling and use of recyclate in Ghana varies significantly across the different types of plastic. This relates to the current operations of stakeholders and market prices, as well as differences in the recyclability and characteristics for each plastic type.

The following table provides a general synthesis of the current situation, for each plastic polymer.

*Table 35: General synthesis on main plastic polymers in Ghana*

| Plastic Polymers | Importation of material | | Waste Collection | Recycling in Accra | Export of Recyclate | Comments & |
|---|---|---|---|---|---|---|
| | Raw | Recycled | | | | |
| LDPE | Yes | None | Water sachets: +++<br>Plastic bags: - | Water sachets: +++<br>Plastic bags: + | None | LDPE management is already well developed<br>Manufacture of new recycled short-lived products only, in Ghana (mainly plastic bags) |
| HDPE | Yes | Yes | All HDPE plastics: +++ | All HDPE plastics: +++ | None | HDPE management is already well developed<br>Manufacture of new household products, pipes and bins in Ghana |
| PET | Yes | None | PET bottles: +<br>PET packaging: - | None but forecast | Exportation of PET flakes | PET bottles are the only PET plastic collected materials<br>They are shredded, washed and exported<br>Recycling process is technical and expensive but there is a rising interest in this polymer |
| PP | Yes | Yes | Rigid PP: +++<br>Raffia PP: +<br>Wrapping PP: - | Rigid PP: +++<br>Raffia PP: ++<br>Wrapping PP: - | None | Rigid PP plastics are recycled in Ghana to manufacture new household products<br>Raffia PP plastics are recycled to make new raffia plastic bags with 100% recycled material.<br>However, wrapping PP are not collected nor recycled. |
| PS | Yes | None | None | None | None | PS recycling concerns only the process losses in industries and their immediate reintegration. |
| Composites | Yes | None | None | Limited | None | Only one company in Ghana can include composites in its process for the production of pavement bricks. However, the amount taken are limited/marginal. There is no dedicated system to collect these types of plastics. |

*Legend for collection and recycling: +++ well ++ correct + little - poor*

The analysis of the plastic chain reveals the following main findings:

**Importation/production**

- Plastics imports and production are mostly led by formal companies operating at a large scale. This includes production of plastic bags, some of them including recycled pellets in their production but still producing single-use items (e.g. small black plastic bags).

**Manufacturing**

- Manufacturing companies are usually large-scale except for water sachet manufacturers and the recyclables processors (to make long-lasting recycled plastic products).
- The water sachet sector is extremely competitive with over 400 manufacturers in the Greater Accra region. These companies produce water sachets of different density, in LDPE or co-extruded LDPE-LLDPE & HDPE[23].

**Consumption**

- Sensitisation and education of the population about waste and plastic management is quite low. It is mostly led by NGOs and service providers, but with only limited current actions by local authorities (the assemblies).

**Collection**

- The collection of MSW is zoned, with one authorised service provider contracted for each area to provide collection (door-to-door collections as well as public containers) for residential and small commercial customers. Currently, there is only one service provider providing source segregation waste collection. Some actors (such as the bola-taxis and small start-up) - who are not authorised service providers - would be interested in doorstep collection of plastics but are not legally allowed under the current zoning system. The stakeholders proposing collection points (such as Coliba) placed the bins in public areas (such as fuel stations, or parking spaces) but not in the streets which are part of the zoning system.
- Most of the recyclers surveyed in the Accra area indicated that they are interested in scaling-up their activity but face challenges to find the required quantities of recyclate. The collection of PET in particular was reported to be low, which led to the development of new actors (Environment 360, Repartn, …) who implemented a collection system (bins, tricycles) in the last years. The development of those actors has started to influence the market.
- All of the stakeholders - except for the waste pickers - reported that transportation costs are a major hindrance to the collection, recycling and selling of plastic recyclates.

**Recycling**

- There is no recycling plant to make food-grade recycled HDPE, LDPE or PET in Ghana. These plants would require consequent investments, large quantities of recycled plastic and a specific industrial and chemical know-how.
- Most of the flakes and pellets produced by the recyclers are either used by the producers for the production of plastic bags or exported. Several companies producing long-lasting plastic

[23] This co-extrusion is made to fit the demands of the clients, since LDPE and LLDPE give to the water sachet a more flexible aspect. However, at their end of life, when water sachets must be recycled, the difference of densities can be fought by adding extra rigid HDPE recycled products in the granulation process.

goods out of recycled plastics were identified: Cherkieh Industries, Hiesh's, Weeshake (basins, buckets), Nelplast (pavement bricks), SpacePlast (kettles), Pyramid Recycling (wires) and Universal Plastics Products and Recycling (waste bins). However, these companies are mainly using rigid plastic, instead of single-use plastics.

- The recycled plastic market is quite developed for HDPE, LDPE and PP plastics but remains limited for PET, PS and composite plastics. For PET, all the recycling initiatives started less than four years ago. All PET recycling initiatives consist of production of flakes that are exported to developed countries for food-grade (bottle to bottle) or textile applications (total PET exported is estimated between 2000 and 3000t/year – but with a strong appetite of the actors to increase their capacity as there is a demand on the international market). For PS, there is no recycling of post-consumer waste, only post-production waste is recycled. For composites, there is only one company recycling them (into pavement bricks).
- Most of the recyclers met are recycling relatively small quantities of plastic (from 5 to 30 tonnes per month) and are willing to expand their business. The major recycling companies, who typically manage between 100 and 500 tonnes per month, prefer to focus on the transformation of recycled pellets or flakes, rather than to establish collection systems.
- Lastly, it should be noted that the recycling sector has evolved significantly between the conduct of the interviews (February to May 2019) and the submission of this report (September 2019). The recycling sector is quite dynamic in Ghana and adjusts rapidly to the demand and to investments.

**Plastic initiatives**

- There are numerous existing initiatives led mostly by private stakeholders and NGOs, some are financed by international organisations and institutional stakeholders. Most of these are relatively recent: almost half of the initiatives investigated were initiated less than five years ago. The plastic waste issue is generating a lot of interest in Accra and the plastic sector appears to be quite dynamic.
- Despite these initiatives there remains a lack of coordination and transparency in the plastic sector, especially in the informal sector. There is no aggregated data at the local or national level regarding plastic management. The creation of the Waste Recovery platform is making a positive change in this regard as it allows the gathering of all the actors working on the plastic sector.

# 5 CONCLUSION AND RECOMMENDATIONS

**The Plastic Chain**

The analysis conducted in the Baseline study reveals that overall, the plastic market is quite dynamic in Ghana. Yet, there are various challenges along each process of the plastic chain - importation, production, manufacturing, collection and recycling. These challenges vary from one polymer to another.

- There is no production of plastics from oil in Ghana. The importation of plastics is through raw plastics (pellets), semi-finished products and finished packaging products (bags, preforms, etc.) and finished products (ex: detergent, shampoo, etc.). Despite the fact that there is an active production of plastics good in Ghana (raw plastics represent 73% of imports while semi-finished and finished packaging account for 27%), the analysis of waste generation reveals that the importation of finished products represents roughly 70% of the plastic waste.
- The collection of plastics is performed mostly by the informal sector (waste pickers, middlemen, aggregators, borla-taxis), followed by local initiatives led by NGOs and start-ups. The plastics are collected from communities (streets, drains, bins, etc.), transfer and disposal sites, and households, organisations or events (door-to-door). As most of the plastic are collected by the informal sector, it is difficult to monitor this activity. Furthermore, waste pickers collecting plastic waste at the landfill and transfers stations work in poor conditions. Transportation issues has been reported as one of the main challenges faced by the plastic collectors, preventing them to enhance their activities.
- The authorised service providers are facing already important challenges with mixed MSW collection that prevent them from organising source segregation and separate collection that would result in additional costs.
- The collection of LDPE, HDPE and PP is quite effective while the collection of PET remains a challenge due to the limited development of this market. Unsurprisingly, there are no collection systems in place for PS and composite plastics.
- It is estimated that around 3,000 tons per month of plastics are recycled in Accra. LDPE (55.7%), PP (25.2%) are the main recycled polymers, followed by HDPE (9.5%) and PET (7.7%). LDPE is the most recycled material (around 33% of produced LDPE is recycled) with PP (39%). Only 6% of PET and HDPE waste is recycled. For LDPE, it should be noted that recycling mostly concerns the water sachets: plastic plastic bags are not being collected nor recycled and are found in large quantities in beaches, drains or disposal sites.
- The value of the material clearly influences its collection and recycling: the waste pickers and recycling companies tend to focus on the plastic stream with the highest value (LDPE, PP, HDPE) and most accessible recycling process (production of recycled chairs or basins from PP, of plastic bags from LDPE, or pellets from LDPE and HDPE). There is no production of recycled pellets in Ghana for PET - only flakes - as it would require high investments and specific know-how.
- A large part of the plastic is recycled into lower-value applications (plastic bags), that are, after used, not recycled.

**Waste Management and Regulatory Framework**

The actors of the plastics chains are impacted by two other sectors:

1. The management of municipal solid waste, which is supervised by local authorities and performed by authorised service providers according to a zoning system, and sometimes by informal actors (borla-taxi) in areas that are not accessible to the large vehicles of the authorised service providers.
2. The regulatory and institutional context, which includes different actors of government that need to coordinate their actions to ensure the smooth management of issues inter-related such as the protection of the environment, the management of plastics, the management of waste, or sanitation.

The analysis of the waste management sector reveals a complex organisation: authorised service providers with limited capacity and competed by informal collection, a fee collection by the providers resulting in non-payment for services, a zoning system that limits opportunities for other actors to implement source segregation, a fragmentation of Accra Metropolis into seven local authorities. These challenges will need to be addressed to improve the MSW system. A better MSW collection system would eventually improve plastics collection and result in reduced plastic leakage into the environment, if combined with the needed education and sensitisation of the population.

The analysis of the regulatory and institutional framework shows that there are numerous stakeholders (Ministries, Agencies, Local authorities) with sometimes potential overlaps in their mandate (MLGRD and MSWR) and that there is no law to holistically provide for the management of waste and plastics. A National Plastics Management Policy is currently under review by the Cabinet and two other instruments directly address the plastic challenge, but the existing regulatory and institutional framework would require to be enhanced.

**Plastic Pollution**

As a consequence of the challenges described above, a significant amount of waste (minimum of 20%) - including plastics - leaks into the environment. The field assessment results are striking, with places with high economic potential such as water streams, markets and beaches are filled with waste. While organic waste is rapidly washed into the ocean, plastic waste remains on the beaches, clogs the drains and may be a cause of flooding. The characterisation of waste found on the beaches proves the importance of the plastic challenge in Ghana: over 70% of the items found are plastics, accounting for 35% of the total weight of characterised waste. Mainly low value plastics are found as the most valuable ones are collected by waste pickers. Thus, the strategic road map will need to look particularly at those plastics.

**Recommendations**

Solving these challenges will require the development of solutions adapted to each type of polymer and the strengthening of the collection system and the waste management sector along with a supporting enabling regulatory framework.

The stakeholders are very committed to solve the plastic pollution in Ghana and there is a real momentum on this issue at the moment. This momentum should be used to propose, test and implement concrete strategies and actions. The followings have been identified:

1. Creating more value in the plastic chain

There is a need to create more value in the global recycling chain in order to enhance plastic collection and ensure better working conditions.

As indicated along this report, some plastics are not (or only scarcely) collected because their market value is too low. To increase the total value chain, different levers can be envisaged:

- Identify and encourage the production of high value plastic products with recycled plastics (LDPE is currently recycled to produced plastic bags, that are a single-use item and have a low value)
- Encourage the use of recycled plastics in the manufacturing industries
- Support capacity building and training to increase the knowledge and know-how in plastic recycling
- Limit the production/importation of plastics that cannot be recycled

2. Improving infrastructure

During the baseline study, it was also pointed out that logistic was the real challenge for plastic collection, limiting the quantity and type of plastic collected. The implementation of transfer/sorting infrastructures and associated equipment could help the actors involved in collection to improve their logistic and therefore limit the cost of transportation that is penalising them. This physical infrastructure could also be supported by a virtual infrastructure that would allow a better communication between the actors, especially for identifying buyers and seller of plastic material.

3. Regulatory framework /stakeholders' commitments

The regulatory framework should be enhanced to support the implementation of the potential futures solutions. Voluntary commitments from the stakeholders should also be supported and encouraged.

4. Awareness and communication

Education and raising awareness on plastic pollution and recycling is key to change the behaviours and improve the coherence and efficiency in the plastic value chain.

Potential solutions and further recommendations will be developed and presented in the strategic Roadmap with the aim of achieving the following long-term objectives:

- To reduce permanently plastic waste leakage into the environment (zero plastic leakage objective)
- To increase circular material use
- To deliver socio-economic benefits for the local community by creating new jobs and ensuring social equity
- To improve the public's stake-hold in the environment

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- The Customs and Excise (Duties and Other Taxes) (Amendment) Act, 2013 (Act 863).
- The Renewable Energy Act, 2011 (Act 831)

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# ANNEX

## A. Technical Note #1: Informal Plastic Sector Study

SEURECA VEOLIA

*Project Ref.*: APMP

*Date*: 14/05/2019

# Technical Note #1

## *Informal plastic sector study - a focus on waste pickers, aggregators and middlemen*

| General Information | | | |
|---|---|---|---|
| *Project* | Accra Plastics Management Pilot | | |
| *Client* | Department for International Development (DFID) | | |
| *Objective* | The objective of this technical note is to assess the informal sector contribution to plastic recycling (incl. volumes, prices, revenues), understand its functioning and the opportunities it offers to waste pickers, aggregators and middlemen to improve their livelihood while contributing to the reduction of plastic pollution. | | |
| *Recipients* | DFID | | |
| *Author* | Mélanie Grignon | | |
| *Contributors* | All waste pickers, aggregators and middlemen who were interviewed<br>The NGO Environment 360 and the company Coliba who facilitated interviews<br>Mathilde Gourion-Retoré, Seureca | | |
| *Approved by* | Marie Gouttebroze | | |
| *Version* | V1 | *Date* | 14 May 2019 |

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## List of Acronyms

| | |
|---|---|
| **AMA** | Accra Metropolitan Assembly |
| **APMP** | Accra Plastics Management Pilot |
| **E360** | Environment 360 |
| **GAMA** | Greater Accra Metropolitan Area |
| **GHS** | Ghanaian cedi (currency) |
| **GSS** | Ghana Statistical Services |
| **HDPE** | High-Density Polyethylene |
| **ILO** | International Labour Organisation |
| **kg** | kilogramme |
| **LDPE** | Low-Density Polyethylene |
| **PET** | Polyethylene Terephthalate |
| **PP** | Polypropylene |
| **PS** | Polystyrene or Styrofoam |
| **PVC** | Polyvinyl Chloride |
| **SMEs** | Small and Medium Enterprises |
| **TMA** | Tema Metropolitan Assembly |
| **TNT** | Tema New Town |
| **WIEGO** | Women in Informal Employment: Globalizing and Organizing |

# 1. INTRODUCTION

## 1.1. Context of the APMP

The Accra Plastics Management Pilot (APMP) started in February 2019. It is funded by the Department for International Development (DFID) with the main objective of tackling plastic pollution in Accra, Ghana. The project should be a catalyst to initiate, enhance and fund pilot projects; and act as an integrator to coordinate the efforts of the various initiatives, in order to have a structured and global approach towards plastic management. The Accra Plastics Management Pilot focuses on Accra and its surroundings (including Tema and other close areas where industries, companies are based). It targets plastics management and in particular single-use plastics, often used in food packaging.

The APMP is organised into four main activities that should be completed over the twelve (12) months of duration of the pilot. The four activities listed below will be tied up with actions, with the final objective of creating spin-off projects resulting in the implementation of viable solutions for a sustainable plastic management:

1. **Facilitation and Partnership Support**, which aims to strengthen stakeholders' collaboration, between five types of stakeholders - national governmental stakeholders, international organisations, private sector, informal sector and civil society organisations
2. **Technical Support and Action-Innovation**, which aims to assess the current situation in Accra and define a strategy and a roadmap
3. **Investment**, which aims to analyse investment needs and identify potential sources of financing
4. **Replication and Scaling-up**, which aims to develop best practices and a methodology in order to enable the replication and scaling-up of this approach in Ghana and other countries.

## 1.2. Overview of the role of waste pickers worldwide in waste management systems

Historically and in most societies, the poorest have always taken in charge waste management for the whole society, including the middle and upper classes under different names: scavengers, cartoneros, pepenadores, zabbalin or ragpickers. Waste pickers provide waste collection, segregation, sometimes processing and make a living through the selling of recyclables material in various cities of the emerging and developing countries.

As mentioned in the definitions of the previous section, the waste pickers are part of the informal employment, under which workers do not receive social protection through work or legal protection through the state. The concept originally applied to self-employment in small unregistered enterprises.

Globally, it is estimated that the informal recycling sector gathers nearly 15 million of informal workers in developing countries[1] or 1 to 2% of the world urban population[2]. In many cities it employs more people than the formal sector.

For many poor people, waste picking seems to be the only activity they can engage into. Indeed, waste picking distinguishes itself from other activities by the fact that this activity does not require any capital to start with, nor a certain level of education. For this reason, poor people who have not received any training or can not afford any type of investment (even small, such as the one that would be made by a street vendor for example) will see in waste picking an opportunity to make money out of products (wastes) that are believed to have no value by the majority of the population. Therefore, waste picking is an important source of revenue for the poorest livelihoods. The income of waste collectors considerably varies depending on the region, the type of activity and gender. Although recovery is often the least paid activity in the recycling chain, these workers can earn more than the minimum wage. Waste picking is an activity for which the waste pickers is paid on its performance, hence important differences of income

[1] https://blog.secteur-prive-developpement.fr/2012/11/12/integrer-secteur-informel-pour-meilleure-gestion-des-dechets/
[2] Bartone, 1988

between waste pickers as the volumes collected considerably vary from one waste picker to another. Moreover, it happens that waste pickers who are able to save money from this activity decide to re-invest it in this business and to buy from other waste pickers in order to increase their revenues while continuing to collect waste on their side as well.

Access to rights, decent work, and the rise of economic activities of these scavengers are priority issues in the fight against poverty. To achieve this, the strategy that seems to be the most consistent is to enhance the value of this business, recognise its place in society and positive impact for the people, and to reorganise it in order to articulate waste picking with the service delivered by the formal service providers of municipal solid waste management.

## 1.3. Evaluating the work and social conditions of waste pickers in Accra

Accra is a fast growing capital city, with more than 2,3 million inhabitants producing around 2150 tons of waste every day in 2017 according to the AMA. The AMA estimates that 80% of the waste generated are currently collected, leading to 20% of leakage of waste, and particularly plastics into the environment. The Greater Accra Metropolitan Area (GAMA) has about 4 million inhabitants, which makes it the 11th largest metro area in Africa.

The informal sector plays an important part in the collection and aggregation system of plastic waste in Greater Accra Metropolitan Area (GAMA).

WIEGO[3] estimates that around 5000 waste pickers are working in GAMA. 2000 of them - the so-called “Bola-Taxis”- provide door-to-door collection service in the districts that are not served by the franchised service providers. Generally, these districts are difficult to access (narrow roads) and not accessible to the collection trucks owned by large service providers. The bola-taxis generally segregate valuable materials like plastics and metals at the transfer station. The other waste pickers collect directly the materials at dumpsite, streets and markets.

Incorporating the informal sector to the waste management chain is a strong lever to increase the collection and recovery of plastics. It also can prevent competition from between formal and informal systems. According to the Accra Metropolitan Assembly (AMA), it is one of their on-going activities: the AMA is encouraging the incorporation of the collection provided by the tricycles and bola-taxis (in neighbourhoods that cannot be accessed by the truck of the service providers) into the collection system provided by service providers. Service providers are requested to include the tricycles and bola-taxi in their collection activities, creating a formalisation of the informal sector.

[3] http://www.wiego.org/
Stands for Women in informal employment: Globalizing and organising

# 2. METHODOLOGY OF THE SURVEY

## 2.1. Objectives of the survey

This Technical Note falls under activity 1. It focuses on one of the major stakeholders involved in plastics collection: the waste pickers, which are part of the informal sector and play a crucial role in a country like Ghana, where the private sector service providers are not able to collect all the municipal solid waste generated. According to the Labour Force Survey (2017) conducted by the Ghana Statistical Services (estimated), 67.9% of the working age population (15 years old and above) is employed meaning a total of 9.2 million over a population of 13.7 million aged 15 years old and above. Out of this employed population, the GSS estimates that 90% is working in the informal sector, men accounting for 45.1% and women for 54.9% (LSF, 2017, p.83). This is a striking figure that shows the importance of considering the informal sector in Ghana.

This survey on the informal plastic sector enabled to have a better understanding of the structure of the informal sector operating in Acca with the aim of improving its functioning and possibly creating a shared management model. This Technical Note includes the first phase of the survey that was carried out from the 18th to the 27th of March. This first phase consisted, on the one hand, in interviews with NGOs and social entrepreneurs dealing with waste pickers, and on the other hand, in interviews with waste pickers and middle-men in the streets, landfills and recycling sites.

This first phase aimed at:

1. Mapping the different stakeholders and their role in the informal waste collection, sorting and recycling chain
2. Identifying the sociological and gender profile of the waste pickers
3. Understanding the working conditions of the waste pickers and their expectations and identifying the economic and social drivers that could encourage them to further cooperate with the formal sector
4. Getting a sense of volumes and selling prices of plastics collected by the waste pickers.

## 2.2. Definitions

For the purpose of this Technical Note, the following definitions will apply:

**Attendance site** is the term used by the workers of the informal sector to designate transfer stations. In particular, it is used by the bola-taxi who bring the mixed waste collected at the attendance sites to sort the recyclables while other wastes are transferred to disposal sites.

**Bola-taxis** is the term used in Accra to designate the tricycles performing informal mixed or segregated solid waste collection, usually in areas that cannot be accessed by the equipment (large trucks) of the official municipal solid waste service providers.

**Informal employment** refers "*to all employment arrangements that do not provide individuals with legal or social protection through their work, thereby leaving them more exposed to economic risk than the others, whether or not the economic units they work for or operate in are formal enterprises, informal enterprises or households*[4]". Recyclables collectors working for or selling to registered companies do not benefit from any legal or social protection and don't have any contract signed with the companies. They do not work for a salary and do not have prescribed hours for work; and are paid solely on the basis of the materials collected. In this perspective, waste pickers' work falls under the definition of informal employment.

**Middlemen** (also used in this survey to designate middlewomen) **/ Aggregators** both refer to the people buying recyclables in order to gather larger volumes to make profit out of the selling of these volumes.

[4] International Labour Office, *Women and men in the informal economy: a statistical picture (second edition)*, Geneva, 2013, p.3.

The term middleman would refer to a person who does not have direct contact with a recycling company or large manufacturers and has no or little equipment. The term aggregator refers to a person who are in direct contact with manufacturers or recycling companies. For example, a middleman will buy from waste pickers or another middleman and sell to another middleman or an aggregator. An aggregator would buy from waste pickers and middlemen, and sell to recycling companies or manufacturers.

**Municipal Solid Waste (MSW)** refers to the stream of waste collected by the municipal assemblies (by the private contractors under their franchise agreement and by the assemblies themselves) coming indistinctly from the households and from the small and medium commercial and industrial companies.

**Waste pickers**, according to the definition used in the ILO Report, are "*those who do the primary collection and sorting of waste*. […] *Waste pickers extract and reclaim reusable and recyclable materials from mixed types of waste that others have cast aside. They may collect or sort household waste from the curbside, litter from streets and urban waterways, or commercial and industrial waste from dumpsters. Some work at municipal dumps or landfills, and some may also be involved in the processing of recyclable waste*[5]". Based on this definition, the report distinguishes three types of waste pickers: unorganised or autonomous waste pickers, organised waste pickers – working through cooperatives and associations, and waste pickers with a contract – this third category is considered to be formally employed (ex: metallurgical industries, public sector). According to the ILO, waste picking is one of the four groups of work occupied by "urban informal workers" (the other three are: domestic work, home-based work and street vending). These groups have the specificity to provide little security (most are not protected against loss of work and income), to have low and erratic earnings and to operate "*outside the reach of government regulations and protection"*, remaining "*largely invisible in official statistics*[6]".

## 2.3. Scope of the study

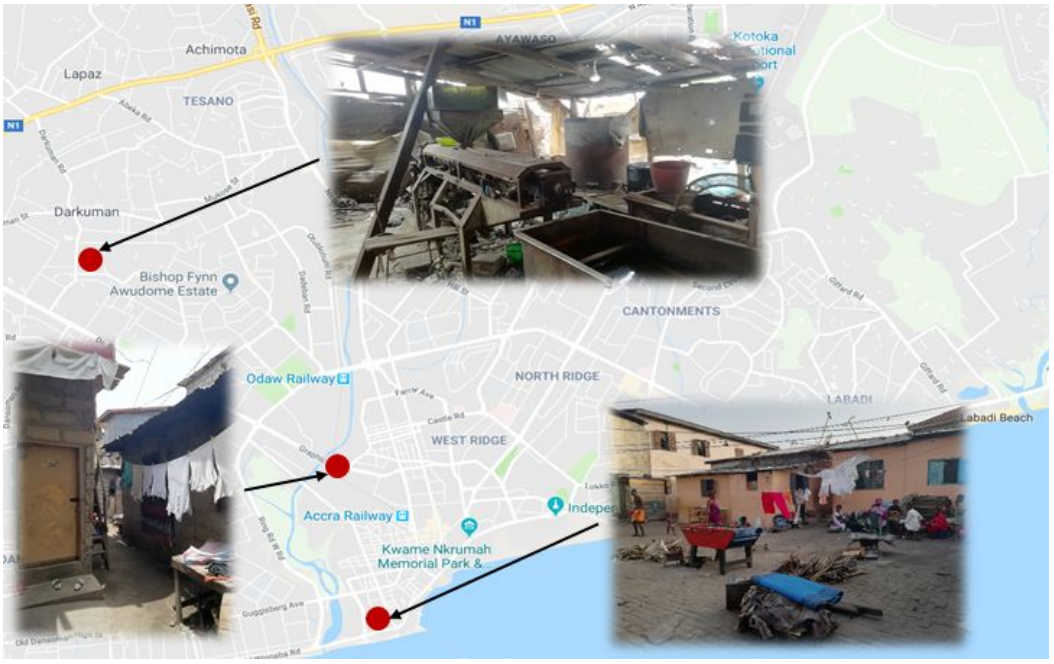
This survey about the waste pickers in Accra Metropolitan Area is not meant to be exhaustive but to provide an understanding of the organisation of the informal sector, in particular the waste pickers in relation to plastics management (segregation, collection, sorting, selling).

The publications of WIEGO are the main source of literature used. According to Mrs. Dorcas Ansah[7], WIEGO is working on a baseline survey to assess the waste pickers activity in Ghana but this study has not yet been published. It will be shared with the APMP team once completed. The author of this report met with 38 waste pickers, aggregators and middlemen, interviewed in 8 different places in Greater Accra Metropolitan Area (GAMA) as shown in the picture below.

*Places of interviews in Greater Accra Metropolitan Area*


[5] Idem, p.47.
[6] Idem, p.39.
[7] Accra Focal City Coordinator, WIEGO

*Zoom: places of interviews in Accra*




## 2.4. Cautions

**Language:** The questionnaire was written in English language by the interviewer. The interviewer was assisted for the translation into local language by an employee of E360, Mr. Israel Agbleta during the 20th, 21st and 22nd of March when the survey carried out in Old Fadama, Jamestown, Tema community, Tema sorting Center and Tema landfill. The language used by Mr. Agbleta were, according to the origin of the waste picker or middleman: Tsui, Gha or Ewe.

The interview of one of the middlemen in Tema landfill was produced in French as the man was Nigerien.

The interviewer was assisted by Mr. Prince Agbata on the 25th of March in Darkuman Quortes site and the language used for the discussion with the waste pickers and middlemen was Tsui.

On the 26th of March, the interviewer was assisted by the supervisor of the Nsumia landfill for the translation. Contrary to Mr. Agbleta and Mr Agbata, his English was basic and the translation from English to Tsui quite difficult. For that reason, only two interviews were carried out on this site.

Generally speaking, the translation of the questionnaires into local languages (Twi, Ga and Ewe) represents a potential shortcoming as not all terms could be translated with the certainty that their meaning would always be equivalent.

**Data:** The price per kilogramme (kg) are expressed in Ghana Cedi (GHS), the local currency. Most of the waste pickers are not recording what they sell and at which price. The declarations concerning volumes of plastic recovered and the revenue from plastic selling should be taken with care and would have to be assessed more deeply and on a larger panel. Lastly, it should be noted that the interview of waste picker 11 was not complete enough to include the result in this study.

## 2.5. Support from NGOs and local recycling companies for the conduct of interviews

Three organisations were met and involved during this survey: WIEGO, Environment 360 (E360) and Coliba. WIEGO, a global network, was met in order to understand their activity in Accra regarding the informal sector. Environment 360, a local NGO, and Coliba, a startup, were met in order to know more about their relationship with the waste pickers and about their plastic recycling business. E360 and Coliba both helped to facilitate interviews with waste pickers as well as the translation. Below are brief descriptions of the three organisations.

**WIEGO**

WIEGO stands for *Women in Informal Employment: Globalizing & Organising*. WIEGO is a global network focused on securing livelihoods for the working poor, especially women, in the informal economy. WIEGO aims to create change by building capacity among informal worker organisations, expanding the knowledge base, and influencing local, national and international policies.

In Ghana, WIEGO is working with street vendors, market vendors and head porters. Two years ago they started to work with waste pickers, an activity in which they have experience in other countries. WIEGO intervenes on two projects regarding the waste pickers:

- The *Pick It* project for which it is responsible for organising the local waste pickers organisation in Tema landfill (around 200 waste pickers) and Tema New Town (around 80 women). According to WIEGO, there is a strong competitive advantage in organising workers into associations. WIEGO has also started to work with the Taxi Bolas and to organise with them quarterly joined meetings.
- A new project on reducing waste in coastal cities of West Africa.

**Environment 360**

*Interviews of waste pickers*

Environment 360 (E360) is a local NGO created by Mrs. Cordie Aziz to support circular economic models by working on inclusive collection systems that empower informal sector's waste workers. E360 aims to have an economic and environmental impact on the communities through their activity. Its goal is to foster strong relationships between value chain stakeholders, private organisations and local and national government to ensure the development of innovative closed loop systems that can be replicated and scaled in African communities.

E360 is currently working on 3 projects:

- The *Pick it* Project (described in section 3.2) based in Tema (30km from Accra). E360 is in charge of the economic model of the project. They have developed a residential collection system and a plastic sorting centre for two years.
- A GIZ-financed project which is taking place in Kumasi with scrap dealers - dealing with plastic as well as metals. E360 is working on formalising collection points.
- A project to co-design a collection system for PET in Jamestown and Old Fadama (neighbourhoods of Accra) with 100 women. PET is an issue in Accra due to the absence of a structured market for PET recycling.

**Coliba**

Coliba (a Haoussa word that means bottle, and used to designate the people collecting) is a startup implemented first in Abidjan, and then in Accra.

The company is buying of PET from aggregators and waste pickers at landfills (mostly), and in communities.

In Ghana, Coliba has developed the #iRecycle project in partnership with Voltic and Total that consists in:

- 40 collection points within Accra, most of which are located on Total fuel stations, where people can bring their PET bottles
- 28 waste pickers who are responsible for the bins and empty them regularly. They add to it the quantities of plastics that they collect from streets and drains. Tricycles of Coliba come on-call to pick up the recyclables.


*Plastic segregation container for PET set up by Coliba (AMA)*

## 2.6. Questionnaire description and panel of respondents

This Technical Note presents the results of the interviews of 33 waste pickers and 5 aggregators/middlemen for a total of 38 respondents. A questionnaire was administered to the panel of waste pickers and aggregators/middlemen and is presented in the annexes. It is structured in five parts:

0. Status, to draw the sociological profile of the respondent
1. Background, to know about the professional experiences and social background of the respondent
2. Organisation, to understand how waste pickers operate, what are their motivations to engage in waste picking and the kind of difficulties/opportunities they are facing/benefiting from.
3. Collection and Volumes, to gather information about the types and volumes of the plastic collected by the waste pickers
4. Economics, to evaluate the price of plastic sold by the waste pickers as well as the revenue they earn from plastic selling.

The panel of the respondents to the questionnaire is composed as follows:

*Panel composition by gender and activity*

| Gender | Aggregators | Middlemen .women | Waste Pickers | Total | % |
|---|---|---|---|---|---|
| **Men** | 3 | 1 | 11 | **15*** | **39%** |
| **Women** | 0 | 1 | 22 | **23*** | **61%** |
| **TOTAL** | **5** | | **33** | **38** | |
| **%** | **13%** | | **87%** | | |

*Panel composition by organisation introducing waste pickers and supporting the translation*

| Organisation introducing waste pickers and supporting the translation | Number of waste pickers, aggregators, middlemen interviewed |
|---|---|
| E360 | 29 |
| Coliba | 7 |
| Nsumia Landfill supervisor | 2 |

*Panel composition by places of interviews*

| Name of the places | Men | Women | Total |
|---|---|---|---|
| Old Fadama | - | 6 | **6** |
| Jamestown | - | 4 | **4** |
| TNT attendance site | 2 | - | **2** |
| Manheen Community | - | 3 | **3** |
| TNT Pick It Sorting Centre | - | 4 | **4** |
| Kpone Landfilll | 8 (incl. 2 aggregators) | 2 | **10** |
| Darkuman | 3 (incl. 1 middleman) | 4 (incl. 1 middlewoman) | **7** |
| Nsumia disposal site | 2 (incl. 1 aggregator) | - | **2** |

# 3. OVERVIEW OF THE INFORMAL PLASTIC MARKET

## 3.1. Types of plastics recovered in Ghana.

Plastic is an essential component of many items, including water bottles, combs, and beverage containers. There are different types of plastics which have different characteristics (rigid, flexible):

*Types of plastics*

| | |
|---|---|
| Polyethylene Terephthalate (PETE or PET) | Polypropylene (PP) |
| High-Density Polyethylene (HDPE) | Polystyrene or Styrofoam (PS) |
| Polyvinyl Chloride (PVC) | Miscellaneous plastics (includes: polycarbonate, polylactide, acrylic, acrylonitrile butadiene, styrene, fiberglass, and nylon). |
| Low-Density Polyethylene (LDPE) | |

In AMA and Tema, four types of plastics are segregated by waste pickers (it should be noted that, as water sachets production is not standardised, there are on the market water sachets made of LDPE and others made of HDPE):

1. **LDPE** ( water sachets, cling wrap…), mostly by women

LDPE is mostly favored by women. This is for two reasons: it is lighter to pick and carry and also the men tend to capture HDPE and PP as they have higher value than LDPE and to prevent women from collecting them at disposal sites.

2. **PP** (Kitchenware, tupperware, yogurt containers…), mostly by men
3. **HDPE** (water sachets, milk jugs, juice containers grocery bags, trash bags, shampoo, soap and conditioner bottles, detergent and bleach container…), mostly by men
4. **PET** (bottles mainly), not really segregated until now in the absence of a local recycling market for this material.

Regarding the collection, sorting and selling of PET, it should be noted that only one woman was collecting PET bottles in Old Fadama. These bottles were not recycled, they were sold to Kerosene and Oil sellers and used as liquid container. Indeed, there is no organised and solid market for PET bottles in Ghana. It is only recently that some initiatives (E360 Pick It sorting centre) or companies (rePATRN, Coliba) have started to create a market. Recycled PET is used a lot in the synthetic textile industry and there is no synthetic textile industry in West Africa. E360 on one side through a cooperative model, and Coliba, on the other side, through a social entrepreneurship model, are now trying to build a recycling business around PET. Their goal is to manage to get high volumes to be able to send the flakes of PET to Europe (Germany mostly) or Canada (for Coliba) at a profitable price despite the transportation costs.

**The fact women mostly collect recyclables with the least price value (by choice because of the weight or due to pressure) has consequences on the volumes and revenues of the women waste pickers.**

## 3.2. Plastics collection

There are three types of areas from which the plastics are collected: communities / neighbourhoods (streets, drains, bins etc.), households or small and medium enterprises (SMEs) or organisations (door-to-door collection for households, events, churches etc.) and disposal sites / transfer stations.

In this survey, there was no waste picker who declared collecting from small and medium enterprises (such as shops, restaurants etc.) and no interview took place at a transfer station.

### *3.2.1. Collection from streets and drains in communities and neighbourhoods: Old Fadama, Jamestown and Manheen*

The women interviewed in Old Fadama, Jamestown and Manheen Community in TNT pick the waste directly in the streets and drains.

*A street in Jamestown (AMA)*

**Schedule**: The women pick LDPE pure water sachets either early in the morning (5-6 am) before the heat starts, or early evening (5 pm) when the sun is decreasing and the children are coming back from school. The oldest women prefer to pick plastic at night because there is less competition for plastic picking.

**Employment / job**: The women met in Old Fadama and Jamestown are busy with their main activity (another job) the rest of the day. The women met at TNT would work at the Pick It sorting centre during the day.

### *3.2.2. Door-to-door collection from households, SMEs or organisations: Old Fadama, Jamestown and Manheen*

At Old Fadama and Jamestown, women met at are not doing regular door-to-door households plastics collection. Yet, from time to time, they ask their neighbours or their community at the Church, to call them for plastic collection, when they are doing some celebrations. The events are an opportunity to work and collect plastics.

Under the Pick It project, 200 households have registered for plastic door-to-door collection in Manheen Community in TNT. In the next three months, the aim, for E360, is to reach 1,000 households registered for the collection of recyclables.

In Accra and Tema, the bola-taxis, driven by the men, are performing door-to-door collection of mixed waste. Then, they segregate plastics at attendance sites - such as the men interviewed at the attendance site TNT, or directly at disposal sites - such as the two waste picker/bola taxis met in Darkuman Quortes. The men working at the attendance site sort plastics among mixed waste at the site until the loading of waste by Zoomlion trucks. They segregate the different plastics in bags for PET and LDPE or in specific areas for the voluminous HDPE and PP plastics.

*A bag of PET (Attendance site TNT)*


*The segregation of PP and HDPE at TNT attendance site*

### *3.2.3. Collection from disposal sites: Kpone, Nsumia and Darkuman*

Disposal sites are usually chosen as a place of work by the waste pickers due to the amount of waste entering the site and the large quantities of recyclables that can be collected. The disposal sites are also a place of choice for the aggregators (who buy from the waste pickers to sell them to companies or recycle them) and the middlemen (who work at a smaller scale than aggregators and do not directly send to companies but to aggregators or other middleman).

The waste pickers segregate the waste in big bags at the disposal sites. Most of the waste pickers selling at Darkuman collect from disposal sites and their recyclables are collected by truck by the aggregators.

In Kpone, they have to hire a tricycle if they want to transport the bags from the top of the landfill to the middlemen storages located at the bottom of the landfill. The landfill is a hilly area.

In Nsumia, the middlemen are just next to the landfill and the waste pickers bring the bags directly, as the site is flat.

*Bags full of plastics at Kpone landfill (TNT)*

## 3.3. Plastics buyers

### *3.3.1. Middlemen and aggregators*

Three of the five buyers interviewed are aggregators as they are buying plastics to sell it directly to companies or recycle them themselves. They are able to sell directly to the processors because they managed to get more significative volumes of plastics than the middlemen who operate at a smaller scale. Two of the respondents are middlemen, they are buying from waste pickers and selling to another aggregator or middleman.

All are working either next to a landfill - Darkuman area - or on the landfill - Kpone and Nsumia. Two aggregators were interviewed at Kpone landfill and one at Nsumia. One middleman was interviewed at Nsumia Landfill and one middlewoman at Darkuman site.

*Stocks of bags in Kpone landfill (TNT)*

### *3.3.2. Recycling companies*

The middlemen/aggregators interviewed declared that they sell the plastic to the following recycling companies (i.e. the company either washes, bales, crushes into flakes or extrude into pellets the recyclables; in grey the companies for which detailed information was not provided). It should be noted that E360 has for now only a sorting centre meaning its business is not yet recycling, but it is planned as a future development of its activity.

*Clients (recycling and manufacturing companies) of the aggregators/middleman interviewed*

| Name of the company | HDPE | LDPE | PET | PP |
|---|---|---|---|---|
| Al Hadji Ali | | Yes | | |
| Coliba | | | Yes | |
| E360 | Yes | Yes | Yes | |
| Lyliann Recycling | Yes | Yes | | |
| Blowplast (Indian company) | Yes | Yes | | |
| Space Plast (Lebanese company) | | Yes | | Yes |

| | | | | |
|---|---|---|---|---|
| Nelplast | Yes | Yes | Yes | Yes |
| Polyplast (Lebanese company) | | | | |
| Pyramid Recycling | Yes | Yes | | |
| rePATRN | | | Yes | |
| re-PET | | | Yes | |
| Lynamps | | | Yes | |
| Richard Company Ltd | | | | Yes |

- For PET, the demand for the material mostly comes from three companies: Coliba, rePATRN and Lynamps..

Coliba used to buy HDPE and LDPE but decided to focus its activity on PET due to the fact that many actors on HDPE and LDPE markets while PET is a market yet to be developed. The company produces flakes (outsourced, because the company does not own yet its machine) that are exported in Canada. The company is looking forward to having its own recycling plant for PET in order to produce PET pellets. In addition, the company works with the Council for Scientific and Industrial Research (CSIR) about food-grade PET and industrial grade (in partnership with the Mohinani Group).

RePATRN is based in Tema and buys PET without caps and labels, transforms PET into flakes and exports them in Germany.

Lynamps is a small company which started 2 years ago in Adenta (North of Accra), and invested in a shredder, a washing line and a dryer. They sell their flakes abroad, since there is no market for them in Ghana.

Nelplast can buy PET as its company produces pavements bricks made of all types of plastics, even complex plastics (composites). As this company is not an important actor specifically for PET, it was not detailed in the list above.

The company re-PET was mentioned by some respondents but not met or reached at this stage of the project. Therefore, no additional information is available. It should be noted that some companies working informally avoid to be reached.

- For LDPE, HDPE and PP, the demand is high and there are various buyers and sellers.

Due to a larger number of buyers, the prices for HDPE, LDPE and PP are much higher. HDPE and PP are chased in Accra for several years by ragmen.

Therefore, the E360 Pick It Centre does not focus on the collection of these two, but mainly on PET and LDPE (with a focus on water sachets, some of them being HDPE). It should be noted that the Pick It Sorting Centre welcomes some workers sent by recycling/processing companies to control the quality and cut the materials. These workers were working without any PPE and were wearing sandals.

In Tema, the waste pickers reported to focus their efforts on the collection of water sachets (some are made of LDPE, some are made of HDPE). The water sachets are sold by E360 to a large manufacturer also in Tema area.

#### *3.3.3. Processing companies and large manufacturers*

Depending on the type of recyclable (PET, HDPE, etc.) and its characteristics (flexible, rigid, color etc.), different processing solutions can be implemented. The most common are:

- The production of plastic bags, often black
- The production of cables, pipes
- The production of plastics chairs, tables, flower pots etc.

Four other noticeable solutions can be mentioned:

- The production of road pavements bricks (ex: Nelplast)
- The production of boards, and floors. This solution does not exist in Ghana at this moment, but some investors seem to be interested.
- The production of food-grade packaging, meaning that single-use packaging are recycled into pellets that meat food-grade standards. This solution does not exist in Ghana.
- The production of fuel, also called 'plastic to fuel' that aims at closing the loop and retransform plastics into fuel. This solution is still at its early stages globally (experimental) and does not yet exist in Ghana.

In the previous table, two recyclers (i.e. the company either washes, crushes into flakes or extrude into pellets the recyclables) are also known to be processors (i.e. the company produces a final product that has added value): Pyramid Recycling (cables) and Nelplast (pavement bricks).

During this study, the following processors / manufacturers were mentioned by the aggregators, middlemen and waste pickers:

1. The company Nelplast was not met during this study but its plant was already visited by the APMP team. This company produces pavements bricks made of 20 to 40% of recyclable plastics. The company buys all the types of plastics, even composites and uses them in different proportions.
2. One manufacturing company (Blow plast in Tema) buys from the Pick It Sorting Centre in order to produce plastic bags. The company washes the water sachets, shreds them and produces new pellets or bags. However, this company only buys natural or colored flexible bags, but not the black plastic bags. Indeed, black LDPE bags might have contained contaminating agents (ex: human waste), which is not the case with water sachets.
3. Mr. Ibrahim Yangbore was met during the study. He is the manager of the company Pyramid Recycling, in Darkuman Quortes. As a recycler, the company owns some old machines enabling to wash the plastic, crush it and transform it into pellets. As a processor, the company produces colored cables. The waste pickers sell directly to the manager and he also sends his team with equipment (truck) to transport recyclables from the landfill to its processing company.

*A crusher in Darkuman (AMA)*

*Pellets of PP - Darkuman informal recycler (AMA)*

## 3.4. Frequency of buying and selling

### *3.4.1. Plastics selling by the waste pickers*

**Weekly:** In the communities (streets and markets) the middlemen come every week to carry the LDPE pure water sachets bags picked by the women in the streets and drains. At the landfills, most of the waste pickers sell their material every week or every two weeks to the aggregator/middleman when they have accumulated plastics.

*A bag of PET in Old Fadama (AMA)*

### *3.4.2. Plastics buying and selling by the aggregators and middlemen*

Concerning the aggregators/middlemen, they generally buy continuously from the waste pickers but only sell to recycling companies once they have sufficient quantities.

**Buying - Daily:** At the disposal sites, the middlemen and aggregators are permanently on the site and buy constantly. They have, most of the time, a place, where they store their materials. When the quantities are sufficient, they rent a truck and send the plastics to the processors.

**Selling - Weekly:** One declared to buy materials from 50 waste pickers and to sell to 4 different clients every week. One washes, crushes LDPE and HDPE, and sells plastic pellets every week. Another one also sells every week.

**Selling - Variable:** One buys from 10 waste pickers and sells LDPE every week, HDPE and PP every two weeks and PET every three days.

**Selling - Less than once per month:** One stores his material on the landfill and sells to an aggregator every 2 months.

*Aggregator stock in Kpone landfill (TNT)*

*Aggregator stock in Nsumia disposal site (AMA)*

# 4. VOLUMES, PRICES AND REVENUES

As mentioned in the section Methodology, the data obtained is based on the declaration of the waste pickers. Most of them do not keep records of the quantities they collect or the revenues they earn. Another aspect to take into account is the fact that some waste pickers sell the plastics per bag rather than per kilogrammes. Therefore, the average weight of a bag was used to estimate volumes and revenues. Despite these potential discrepancy in the data, the volumes and revenues presented in the subsections below enable to have an understanding of the plastics sector from the waste pickers, aggregators and middlemen' perspectives as well as the main differences between areas (mostly between disposal sites and all other types of zones of collection).

It should be noted that prices are an exception and are known precisely both by the waste pickers and by the aggregators and middlemen for each type of plastics.

## 4.1. Volumes of plastics collected by the respondents

### *4.1.1. Waste Pickers from Old Fadama and Jamestown*

As mentioned in the previous section, women from Old Fadama and Jamestown mostly collect from streets and drains in the communities but also perform sometimes door-to-door collection. The table below summarises the volumes collected by the respondents. The respondents usually replied per compressed bag, instead of kilogrammes. The weight of one compressed bag is estimated to be roughly 15 kg for LDPE. For PET. The estimation for a bag full of PET could not be obtained.

In the table below, the waste pickers 5, 7 and 8, are picking and selling waste as their main activity. It is, thus, not surprising that they tend to get higher volumes than the others.

*Weekly volumes of plastics from waste pickers in Old Fadama and Jamestown*

| Respondent | LDPE (nb of compressed bag per week) | LDPE (kg/week) | PET (nb of squeezed bag per week) |
|---|---|---|---|
| Waste picker 1 | 3 | 45 | - |
| Waste picker 2 | 1 | 15 | - |
| Waste picker 3 | *Less than 1** | | - |
| Waste picker 4 | 2 | 30 | - |
| Waste picker 5 | 8 | 120 | - |
| Waste picker 6 | - | | 2 |
| Waste picker 7 | 4 | 60 | - |
| Waste picker 8 | 4 | 60 | - |
| Waste picker 9 | 1 | 15 | - |
| Waste picker 10 | 2 | 30 | - |
| **TOTAL** | **25** | **375** | **2** |
| **AVERAGE** | **3.1** | **46.9** | **2** |

**Waste picker 3 could not be included in the estimation.*

### 4.1.2. Pick it Sorting Centre and Manheen Community

The recyclables sorted at the Pick It Sorting Centre come both from the streets and drains and door-to-door households' collection. Therefore, the volumes are presented separately than the volumes above:

- The waste pickers 13,14,15 collect in Manheen Community at Tema New Town.
- The waste pickers 16,17,18 and 19 pick waste in the streets around 2 to 3 hours per day and then, from 8:30 am until 3 pm, they sort the different types of plastics brought by all the waste pickers at the Pick It Sorting Centre.

The volumes presented below only include the plastics collected by each of them, it does not take into account the amount sorted at the Pick It Sorting Centre, an activity for which they earn a revenue.

*Weekly volumes of plastics from waste pickers inPick It Sorting Centre and Manheen Community*

| | Volumes in kg per week | | | | |
|---|---|---|---|---|---|
| **Respondent** | **PET** | **PP** | **HDPE** | **LDPE** | **All types** |
| Waste picker 13 | 38.25 | - | 1.5 | 15 (1 bag) | **54.75** |
| Waste picker 14 | 18 | - | - | 30 (2 bags) | **48** |
| Waste picker 15 | 22.75 | 2.5 | 4.25 | 8.25 | **37.75** |
| Waste picker 16 | 16 | 5 | 28.75 | 14.75 | **64.5** |
| Waste picker 17 | 16.5 | - | - | 15 (1 bag) | **31.5** |
| Waste picker 18 | 17.5 | 5.25 | 3.25 | 9.5 | **35.5** |
| Waste picker 19 | 5 | - | 7.25 | 15 (1 bag) | **27.25** |
| **TOTAL** | **134** | **12.75** | **45** | **107.5 (estimated)** | **299.25** |
| **AVERAGE** | **19** | **4.25** | **9** | **15.4** | **42.75** |

*Weight system at Pick It Sorting Centre*

### 4.1.3. Waste Pickers from Kpone and Nsumia landfills, and Darkuman

PP and HDPE are not significant in residential areas, and are mostly found at the disposal sites. LDPE is segregated by women while men mainly focus their activity on HDPE and PP. PET material is less collected by the waste pickers because there is not a lot of enterprises interested in this material.

Therefore, the waste pickers collect based on the market. The respondents collect from the following sites:

- Waste pickers 20, 21, 22, 23, 24, 25, 26, 28, collect from Kpone landfill
- Waste pickers 31, 33, 34, 35, 36 collect from various disposal sites and sell to aggregators/middlemen based in Darkuman
- Waste picker 37 collects from Nsumia disposal site.

The volumes picked on the disposal sites are much higher than the volumes segregated by the women of Jamestown, Old Fadama, Pick It Sorting Centre or Manheen Community as shown in the table below.

*Weekly volumes of plastics from waste pickers in Kpone and Nsumia disposal sites and Darkuman*

| | **Volume in kg per week** | | | | |
|---|---|---|---|---|---|
| **Respondent** | **PET** | **PP** | **HDPE** | **LDPE** | **All types** |
| Waste picker 20 | - | 70 | 100 | - | **170** |
| Waste picker 21 | - | 50 | 40 | - | **90** |
| Waste picker 22 | - | 80 | 70 | - | **150** |
| Waste picker 23 | - | - | - | 100 | **100** |
| Waste picker 24 | - | 75 | 100 | - | **175** |
| Waste picker 25 | 100 | - | - | 120 | **220** |
| Waste picker 26 | - | 40 | 50 | - | **90** |
| Waste picker 28 | - | 100 | 80 | - | **180** |
| Waste picker 31 | 96 mix | | | | **96** |
| Waste picker 33 | 126 mix | | | | **126** |
| Waste picker 34 | 108 mix | | | | **108** |
| Waste picker 35 | 108 mix | | | | **108** |
| Waste picker 36 | 108 mix | | | | **108** |
| Waste picker 37 | 40 | 50 | 30 | 20 | **140** |
| **TOTAL** | **140+*** | **465+*** | **470+*** | **240+*** | **1,861** |
| **AVERAGE** | **70** | **66** | **67** | **80** | **132.9** |

**Total volumes cannot be exact because waste pickers 31 33 34 35 and 36 sell mixed plastics.*

*A waste picker on Kpone landfill (TNT)*

#### 4.1.4. Volumes from Pick It Sorting Centre, recycling companies and aggregators/middlemen

**Pick It sorting Center**

Since its creation, the sorting centre has collected a total of 15 tons of plastics since its creation in July 2018 until February 2019 (average: 2 tons per month), out of which 5 tons from January to February 2019.

**Recycling companies: Coliba**

Coliba recycles around 5 tons of PET per month.

**Aggregators and middlemen**

*Weekly volumes of plastics from aggregators and middlemen*

| | Volumes in kg per week | | | | |
|---|---|---|---|---|---|
| **Respondent** | **PET** | **PP** | **HDPE** | **LDPE** | **All types** |
| Waste picker 12[8] | 450 | 150 | 250 | 240 | **1,090** |
| Aggregator 27 - Kpone | 3,000 | 1,250 | 1,250 | 1,000 | **6,500** |
| Aggregator 29 - Kpone | 1,000 | 1,000 | 1,000 | - | **3,000** |
| Middleman 30 - Darkuman | 2,000 | | | | **2,000** |
| Middleman 32 - Darkuman | Non communicated | | | | |
| Aggregator 38 - Nsumia | 1,000 | 1,000 | 1,000 | 1,000 | **4,000** |
| **TOTAL** | **5,450** | **3,400** | **3,500** | **2,240** | **16,590** |
| **AVERAGE** | **1,362.5** | **850** | **875** | **746.7** | **3,318** |

#### 4.1.5. Volumes summary

The table below summarises the volumes presented in the previous subsection. It is noticeable that the waste pickers working on the landfills get much higher volumes than the ones picking in the communities (streets, drains, door-to-door).

*Summary of the weekly volumes of plastics from waste pickers, aggregators and middlemen*

| | Average volumes in kg per week and Minimum and Maximum | | | | |
|---|---|---|---|---|---|
| **Respondent** | **PET** | **PP** | **HDPE** | **LDPE** | **All types** |
| Waste pickers (communities and door-to-door) | 19 [5-38.25] | 4.25 [2.5-5.25] | 9 [1.5-28.75] | 32 [8.25-120] | **44.95** |
| Waste pickers (landfills) | 70 [40-100] | 66 [40-100] | 67 [40-100] | 80 [20-120] | **132.9** |
| Aggregators/middlemen | 1,362.5 [450-3,000] | 850 [150-1,250] | 875 [250-1,250] | 746.7 [240-1,000] | **3,318** |
| **Difference waste pickers from landfills / communities** | **268% (3.6 times more)** | **1,450% (15.5 times more)** | **644% (7.4 times more)** | **150% (2.5 times more)** | **195% (3 times more)** |
| **Difference aggregators /** | **1,846% (19.5** | **1,187% (12.9** | **1,205% (13** | **833% (9.3** | **2,396% (25** |

[8] The waste picker 12 - the leader of the attendance site in TNT - is classified under this category in this table because the volume is collected by 7 people.

| | | | | | |
|---|---|---|---|---|---|
| **waste pickers from landfills** | **times more)** | **times more)** | **times more)** | **times more)** | **times more)** |

## 4.2. Plastics Prices

### *4.2.1. Selling price of the waste pickers*

The table below summarises the prices at which the waste pickers sell the different types of plastics. There are some price differences that can be explained by the following factors:

- The quality of the material can vary and explain the buying price difference (clean / not clean, with / without labels, with / without caps, etc.)
- Competition - different buyers and sellers, hence different prices
- Lack of market transparency and asymmetry of information.

Competition seems to be an important factor as the waste pickers working on disposal sites are able to sell their plastics at a price on average 10% to 25% higher than the waste pickers working in communities.

*Selling prices of plastics from all waste pickers*

| | **Price per kg in GHS** | | | |
|---|---|---|---|---|
| **Respondent** | **PET** | **PP** | **HDPE** | **LDPE** |
| **Old Fadama and Jamestown** | | | | |
| The prices for Old Fadama and Jamestown cannot be estimated by kg as they sell per bag. An estimation would not be sufficiently accurate to be proposed in this study as the buying prices vary and the weight of the bags as well. Below are the buying prices declared by the waste pickers:<br>● 15 GHS per bag of water sachets (reported as LDPE, even though some may be HDPE)<br>● 25 GHS per bag of PET bottles | | | | |
| **Manheen Community (TNT) and Pick It Sorting Centre** | | | | |
| Waste picker 12 | 0.3 | 1 | 0.8 | 1 |
| Waste picker 13 | 0.4 | - | - | - |
| Waste picker 14 | 0.4 | 1 | 1 | 0.8 |
| Waste picker 15 | 0.4 | - | 1 | - |
| Waste picker 16 | 0.4 | 1 | 1 | 0.8 |
| Waste picker 17 | 0.4 | - | 1 | - |
| Waste picker 18 | 0.4 | - | - | - |
| Waste picker 19 | 0.4 | 1 | 1 | 0.8 |
| **Kpone, Nsumia and Darkuman** | | | | |
| Waste picker 20 | - | 1.4 | 1 | - |
| Waste picker 21 | - | 1.5 | 0.87 | - |
| Waste picker 22 | - | 1.38 | 1.2 | - |
| Waste picker 23 | - | - | - | 1 |
| Waste picker 24 | - | 1.1 | 0.8 | - |
| Waste picker 25 | 0.6 | - | - | 1 |
| Waste picker 26 | - | *2.25** | 0.8 | - |
| Waste picker 28 | - | 1.2 | 1 | - |

| | | | | |
|---|---|---|---|---|
| Waste picker 31 | 0.4 | 1.2 | 1.2 | 1.2 |
| Waste picker 33 | 0.4 | 1.2 | 1.2 | 1.2 |
| Waste picker 34 | 0.4 | 1.2 | 1.2 | 1.2 |
| Waste picker 35 | 0.4 | 1.2 | 1.2 | 1.2 |
| Waste picker 36 | 0.4 | 1.2 | 1.2 | 1.2 |
| Waste picker 37 | 1 | 1 | 1.5 | 1 |
| **AVERAGE** | **0.5** | **1.2** | **1.1** | **1** |
| **Min-Max** | **[0.3-1]** | **[1-1.5]** | **[0.8-1.5]** | **[0.8-1.2]** |
| **Per type of waste picker (Average per kg and Minimum and Maximum)** | | | | |
| Waste pickers (communities and door-to-door) | **0.4 [0.3-0.4]** | **1** | **1 [0.8-1]** | **0.9 [0.8-1]** |
| Waste pickers (landfills) | **0.5 [0.4-1]** | **1.2 [1-1.5]** | **1.1 [0.8-1.5]** | **1.1 [1-1.2]** |
| **DIFFERENCE** | **25%** | **20%** | **10%** | **22%** |

**Statistical outlier: the answer from waste picker 26 on PP price was excluded from the calculation of the average and minimum and maximum because it would significantly impact the results.*

*Various plastic types collected by the waste pickers and gathered for future selling (TNT)*

### *4.2.2. Selling and buying prices of the aggregators*

The table below summarises the prices at which the different aggregators who buy and sell the different types of plastics. There are some price differences that can be explained by the following factors:

- The quality of the material can vary and explain the buying price difference (clean / not clean, with / without labels, with / without caps, etc.) and the selling price difference (not transformed, transformed into flakes, transformed into pellets)
- Competition - if the plastics are bought from a place with a lot of competition (such as disposal sites) the buying prices may be impacted
- Lack of market transparency and asymmetry of information.

As mentioned in the previous section, competition seems to be an important factor as the waste pickers working on disposal sites are able to sell their plastics at a price on average 10% to 25% higher than the waste pickers working in communities. The results below do not include data from Coliba and Pick It Sorting Centre in order to guarantee confidentiality as these two companies are named (contrary to aggregators) and as the sample (only two organisations) is not large enough to present results as an average without compromising confidentiality.

On average, the margins of the aggregators range from 60% to 72%, depending on the type of plastic. Nevertheless, the data should be considered with caution as some aggregators did not share their buying and selling price per material stream. Therefore, assessing the most profitable type of plastic is not possible for aggregators 30, 32 and 38. For Aggregators 27, PET is the most profitable (60%) material and for aggregator 29 it is LDPE the most profitable (30%) plastic stream.

*Purchasing and selling prices of plastics from aggregators and middlemen*

| | **Price per kg in GHS** | | | |
|---|---|---|---|---|
| | **PET** | **PP** | **HDPE** | **LDPE** |
| **Aggregators - Purchasing price** | | | | |
| Aggregator 27 - Kpone | 0.5 | 1.4 | 1.1 | 1 |
| Aggregator 29 - Kpone | 1 | 1.4 | 1 | - |
| Middleman 30 - Darkuman | 1.2 | | | |
| Middleman 32 - Darkuman | 1.2 | | | |
| Aggregator 38 - Nsumia | 1-1.1 | | | |
| **AVERAGE** | **1** | **1.2** | **1.1** | **1.1** |
| **Min-Max** | **[0.5-1.2]** | **[1-1.4]** | **[1-1.2]** | **[1-1.2]** |
| **Aggregators - Selling price** | | | | |
| Aggregator 27 - Kpone | 0.8 | 1.7 | 1.3 | 1.3 |
| Aggregator 29 - Kpone | 1.2 | 2 | 1.4 | - |
| Middleman 30 - Darkuman | 2.4 | | | |
| Middleman 32 - Darkuman | 2.4 | | | |
| Aggregator 38 - Nsumia | 1.3 | | | |
| **AVERAGE** | **1.6** | **2** | **1.8** | **1.9** |
| **Min-Max** | **[0.8-2.4]** | **[1.3-2.4]** | **[1.1-2.4]** | **[1-2.4]** |
| **DIFFERENCE Selling/Buying** | **60%** | **66%** | **64%** | **72%** |

## 4.3. Revenues

### *4.3.1. Waste Pickers revenues*

The tables below summarise the revenues declared by the waste pickers from the different areas where interviews took place: Old Fadama and Jamestown, Pick It Sorting Centre, Manheen Community and Kpone, Darkuman and Nsumia.

*Revenues of waste pickers from Old Fadama and Jamestown*

| | Revenue per week in GHS | | | Monthly |
|---|---|---|---|---|
| **Respondent** | **From LDPE/PET*** | **Other** | **Total** | **Estimate in GHS** |
| Waste picker 1 | **45** | 30 | 75 | **300** |
| Waste picker 2 | **15** | 50 | 65 | **260** |
| Waste picker 3 | **10** | 90 | 100 | **400** |
| Waste picker 4 | **20** | 70 | 90 | **360** |
| Waste picker 5 | **140** | 0 | 140 | **560** |
| Waste picker 6 | **100*** | 0 | 100 | **400** |
| Waste picker 7 | **60** | 0 | 60 | **240** |
| Waste picker 8 | **60** | 0 | 60 | **240** |
| Waste picker 9 | **15** | 100 | 115 | **460** |
| Waste picker 10 | **30** | 400 | 430 | **1,720** |
| **AVERAGE** | | | | **494 [240-1,720]** |

*Revenues of waste pickers from Pick It Sorting Centre and Manheen Community*

| | Revenue per week in GHS | | | | | | Monthly |
|---|---|---|---|---|---|---|---|
| | **From PET** | **From PP** | **From HDPE** | **From LDPE** | **Other** | **Total** | **Estimate in GHS** |
| Waste picker 13 | 15.3 | - | 1.5 | - | Not available | 16.8 | **67.2** |
| Waste picker 14 | 7.2 | - | - | - | Not available | 7.2 | **28.8** |
| Waste picker 15 | 9.1 | 6.6 | 4.25 | 2.5 | Not available | 22.45 | **89.8** |
| Waste picker 17 | 6.6 | - | - | - | 38 | 44.6 | **178.4** |
| Waste picker 16 | 6.4 | 11.8 | 28.75 | 5 | 50 | 101.95 | **407.8** |
| Waste picker 18 | 7 | 7.6 | 3.25 | 5.25 | Not available | 23.1 | **92.4** |
| Waste picker 19 | 2 | - | 7.25 | - | Not available | 9.25 | **37** |
| **AVERAGE** | | | | | | | **129 [28.8-407.8]** |

*Revenues of waste pickers from Kpone and Nsumia disposal sites and Darkuman*

| | Revenue per week in GHS | | | | | | Monthly |
|---|---|---|---|---|---|---|---|
| **Revenue per week (GHC)** | **From PET** | **From PP** | **From HDPE** | **From LDPE** | **Other** | **Total** | **Estimate in GHS** |
| Waste picker 20 | - | 98 | 100 | - | 60 | 258 | **1,032** |
| Waste picker 21 | - | 75 | 35 | - | 40 | 150 | **600** |
| Waste picker 22 | - | 110 | 84 | - | 38 | 232 | **928** |
| Waste picker 23 | - | - | - | 100 | - | 100 | **400** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Waste picker 24 | - | 83 | 80 | - | 60 | 223 | **892** |
| Waste picker 25 | 60 | - | - | 120 | - | 180 | **720** |
| Waste picker26 | - | 90 | 40 | - | 12 | 142 | **568** |
| Waste picker 28 | - | 120 | 80 | - | 45 | 245 | **980** |
| Waste picker 31 | 115 | | | | - | 115 | **460** |
| Waste picker 33 | 151 | | | | 600 | 751 | **3,004** |
| Waste picker 34 | 130 | | | | 540 | 670 | **2,680** |
| Waste picker 35 | 130 | | | | - | 130 | **520** |
| Waste picker 36 | 130 | | | | - | 130 | **520** |
| Waste picker 37 | 40 | 50 | 45 | 20 | 25 | 180 | **720** |
| **AVERAGE** | | | | | | | **1,002 [520-3,004]** |

### *4.3.2. Aggregators and middlemen revenues*

The table below summarises the revenues declared by the aggregators and middlemen from the different areas where the interviews took place: Kpone, Nsumia and Darkuman.

*Revenues of aggregators and middlemen*

| | **Revenue per week in GHS** | | | | | **Monthly** |
|---|---|---|---|---|---|---|
| | **From PET** | **From PP** | **From HDPE** | **From LDPE** | **Total** | **Estimate in GHS** |
| Waste picker 12[9] | 140 | 150 | 300 | 240 | 830 | **3,320** |
| Aggregator 27 - Kpone | 900 | 375 | 250 | 300 | 1825 | **7,300** |
| Aggregator 29 - Kpone | 200 | 600 | 400 | - | 1200 | **4,800** |
| Middleman 30 - Darkuman | - | | | | Non communicated | |
| Middleman 32 - Darkuman | | | | | 2400 | **9,600** |
| Aggregator 38 - Nsumia | Non communicated | | | | 150 | **600** |
| **AVERAGE** | | | | | | **5,124 [600-9,600]** |

### *4.3.3. Revenues summary*

The table below is a summary of the results presented in the previous subsections. On average, the waste pickers earn 541 GHS per month, while aggregators earn 5,124 GHS, which is over than 9 times higher than waste pickers. This difference is reduced when considering the waste pickers working at the disposal sites (5 times higher instead of 9). There is a noticeable earning difference between the waste pickers working at disposal sites and the waste pickers working in communities or doing door-to-door collection. On average, the waste pickers working at disposal sites earn 3 times more (1,002 GHS/month) than the other waste pickers (311.5 GHS/month).

[9] The waste picker 12 - the leader of the attendance site in TNT - is classified under this category in this table because the volume is collected by 7 people.

*Summary of the revenues of waste pickers, aggregators and middlemen*

| Category | Monthly estimate in GHS | Min-Max in GHS |
|---|---|---|
| Waste pickers from Old Fadama and Jamestown | 494 | [240-1,720] |
| Waste pickers from TNT | 129 | [28.8-407.8] |
| Waste pickers from Kpone, Nsumia and Darkuman (disposal sites) | 1,002 | [520-3,004] |
| **All waste pickers** | **541,2** | **[28.8-3,004]** |
| **Aggregators** | **5,124** | **[600-4,800]** |
| **DIFFERENCE waste pickers from disposal sites / others waste pickers** | **221% (3,21 times more)** | |
| DIFFERENCE aggregators / waste pickers from disposal sites | 411% (5,11 times more) | |
| DIFFERENCE aggregators / waste pickers not from disposal sites | 1544% (16,44 times more) | |
| **DIFFERENCE aggregators / all waste pickers** | **847% (9,47 times more)** | |

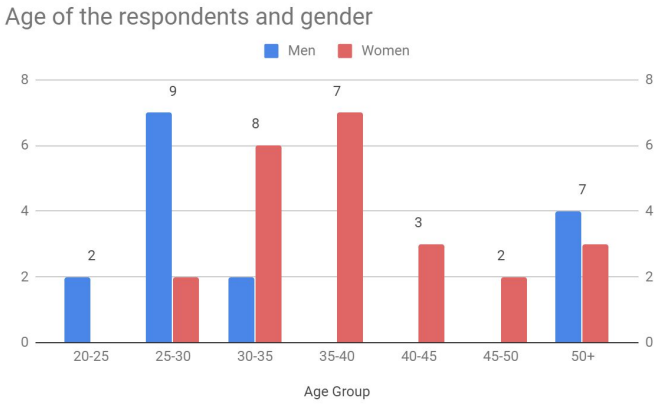
# 5. PROFILE OF WASTE PICKERS, AGGREGATORS AND MIDDLEMEN IN ACCRA

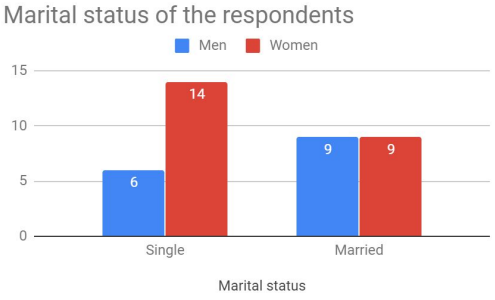
## 5.1. Gender, Age, Marital status and Job

More than half of the interviews were conducted with the support of E360. As E360 is working mainly on empowering women picking plastics, more women than men were interviewed. Around 60% of the women working as waste pickers are single women, most of them declared having children.

Most of the waste pickers interviewed were previously sellers or are still selling goods while having a waste picking activity. A quite significative proportion of men (40%) working at the landfills or attendance site have started waste picking just after schooling.

Lastly, a high proportion of the waste pickers started to pick less than 5 years ago. The majority of waste pickers are quite young.





*Previous activity of the waste pickers, aggregators and middlemen*

| Previous activity | Men | Women | Total |
|---|---|---|---|
| Selling goods | 4 | 20 | **24** |
| Factory Hand | 2 | 1 | **3** |
| Mechanic | 2 | - | **2** |
| Farmer | 1 | - | **1** |
| Schooling | 6 | - | **6** |
| Unemployed | - | 2 | **2** |

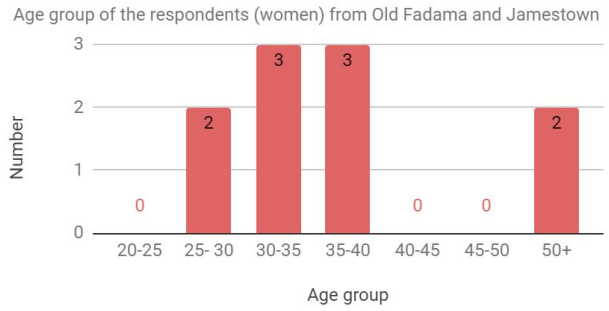
## 5.2. Analysis of the waste pickers, aggregators and middlemen profiles per area

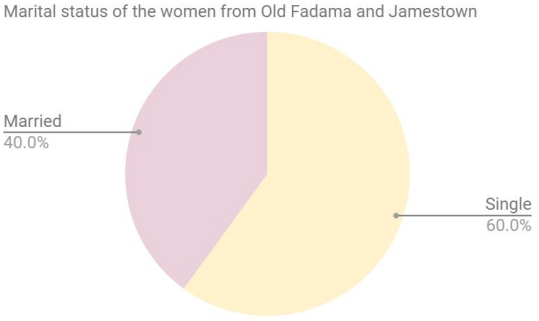
**Old Fadama & Jamestown**

Six women were met in Old Fadama and four in Jamestown. They are relatively young as 8 of them are between 25 and 40 years and 2 of them are more than 50 years old. The majority of them are single women with children. The women, met in these areas, are usually selling goods in the markets like pure water sachets or bottles of water, yam, fruits, cooked food - like banku, fried fish or rice - or clothes.

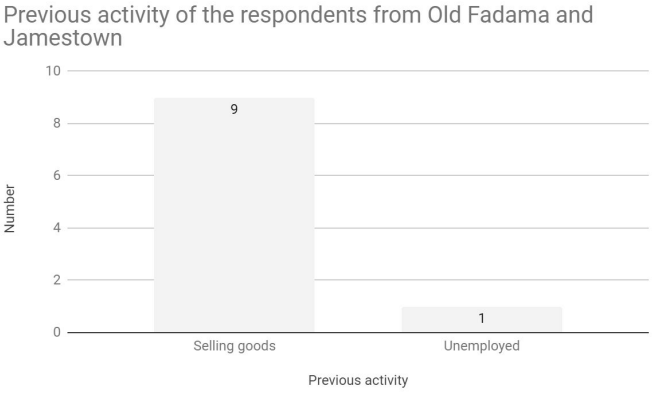
8 women out of 10 started to pick plastic less than 5 years ago. They get the idea to pick plastics, because they were either seeing other women doing it, or because they were approached by an aggregator at the market, willing to buy the pure water sachets from them.

They all work independently but would like to be part of an association or cooperative to be able to sell higher quantities of plastics at a better price.




*A woman sorting PET bottles in Old Fadama*




**Pick it Sorting Centre and the Manheen Community at Tema New Town**

The women met in Tema New Town (TNT) all work under the Pick It project, a joint project between Fan Milk (Danone), E360 and WIEGO, launched to enhance plastic recycling[10]. Three women were interviewed in Manheen Community in Tema New Town and four at the sorting center managed by E360 in Tema New Town.

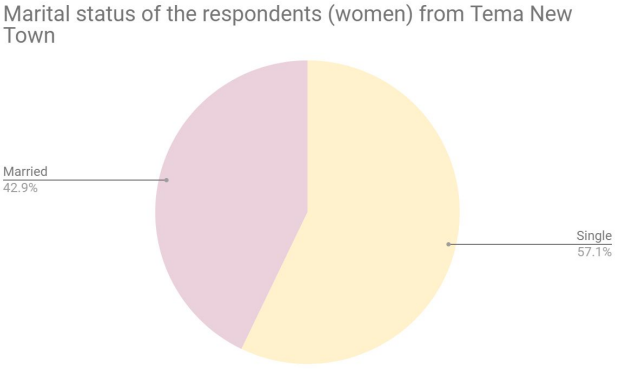
They all work under the association created by the Pick It project called *Biakoye*. The association gather 35 women in the community. They are older than the women met in Old Fadama and Jamestown. The majority of them are again single women with children.

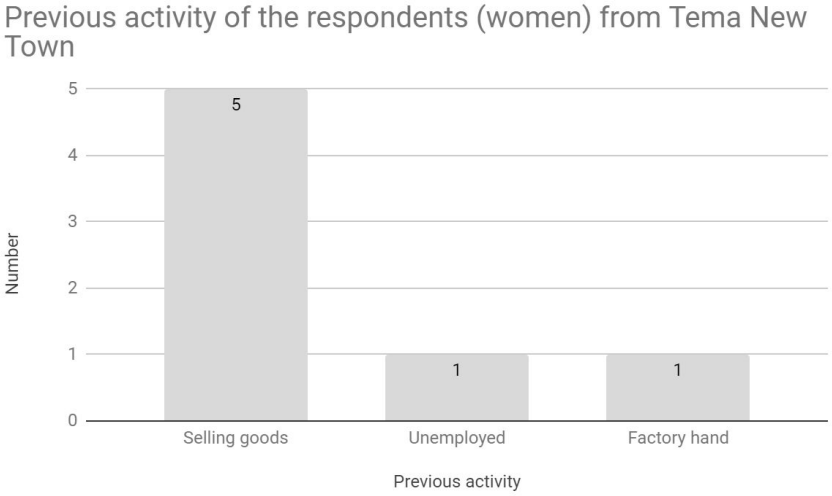
[10] see*2.2.2.1. The Pick it project in Tema: organising & raising capability of the waste pickers*

Most of them were selling goods before becoming a waste picker. They started picking waste because they were seeing other women doing it and they get to know about the value of plastic. Some of them were introduced to waste picking by their friends and neighbours.

*The women met at Manheen Community (TNT)*

*The women met at Pick It sorting Center (TNT)*


## Kpone landfill

The waste pickers and aggregators met in Kpone landfill - Tema New Town - work under the Pick It project and the same association than the women working with E360 in Tema New Town - Biakoye.

The association gathers 250 waste pickers - 120 women and 130 men working independently - in the landfill. Eight waste pickers - 6 men and 2 women -and two aggregators were interviewed in Kpone landfill.

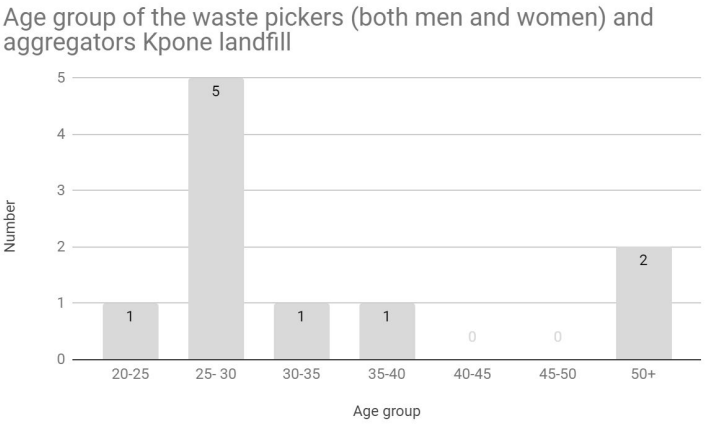
The waste pickers are young as 7 of them are under 35 years old and one is 37. The two aggregators met are above 50 years old. 5 waste pickers are single, 3 are married and the 2 middle-men are married. The 2 women interviewed are single. Before becoming waste pickers most of them were selling goods or schooling.

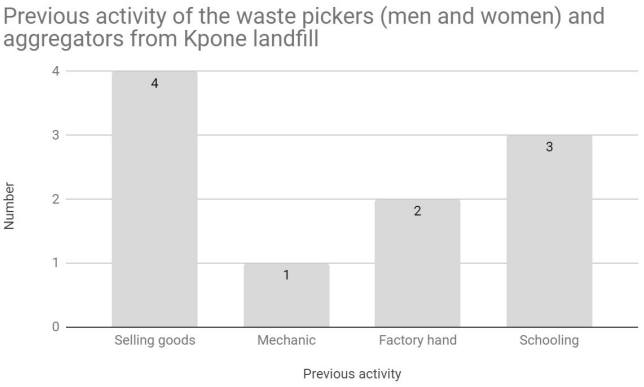
Five of them started picking less than 5 years ago and 4 of them are working in material recycling for more than 10 years.

Most of them were co-opted by the middle-men working in the landfill or other waste pickers. They all have to pass interviews to be able to work on the landfill.

Some of the waste pickers see waste picking as an interesting transitory activity to save money and start their own business later on. The majority of them consider waste picking as a permanent activity and wish to be able to sell directly to the processors in a few years.

*Waste pickers at Kpone Landfill*




**Tema New Town Attendance Site**

Only men are working at the attendance site - TNT - visited on 20 March 2019. It was not possible to lead more than two interviews on this site because they were busy with the arrival of a Zoomlion truck, soon after our arrival.

Men working at the attendance site collect waste, door to door, in Community 1 at Tema New Town (TNT). They charge the waste in wheelbarrow or tricycle and then Zoomlion trucks charge the waste to be sent to Kpone landfill.

One of the waste pickers met was also a bola-taxi, performing door-to-door collection of mixed waste with informal motorised tricycle. There are around 2,000 bola-taxis operating in Accra Metropolitan area. and the AMA has recently given them the possibility to formally work with the official service providers in certain zones were large trucks cannot go through. The bola-taxis usually segregate the plastics and metals at attendance sites (i.e. transfer stations).

The waste pickers interviewed segregate plastic at the site before the arrival of the private company's trucks in charge of waste collection. Once the truck is at the attendance site all the men stop segregating materials and start filling the dump truck with the waste.

One man, 32 years old, started this job just after schooling, around 16 years ago, and now manages the site. Six other men aged roughly 20 years old are currently working for him. The manager declared that *"when he sees people complaining about their job or sees students looking for job during vacation he introduces them to recycling"*. Cooptation seems to be the main channel for young men to become full-time waste pickers.

*Waste pickers at TNT Attendance Site*

**Darkuman Quortes**

The waste pickers and middle men met Darkuman Quortes - Accra Metropolitan area - were introduced by Coliba. They all work independently and do not belong to any association. Nevertheless they all sell plastics to the informal recyclers established in Darkuman quortes.

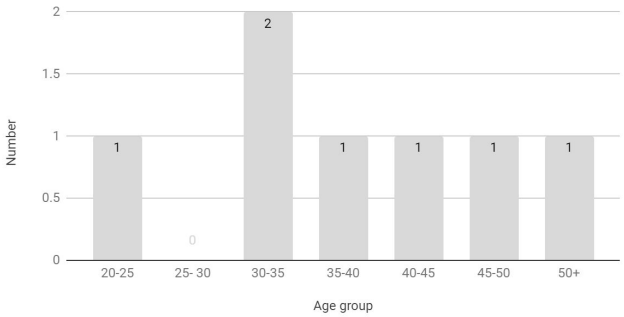
Five waste pickers - 2 men and 3 women - and 2 middlemen (one being a woman) were interviewed in Darkuman Quortes Area. The waste pickers interviewed belonged to all age groups. Four of them declared to be single and three to be married. It should be noted that two of the waste pickers met in Darkuman were also bola-taxis performing informal door-to-door mixed waste collection with motorised tricycles. They are around 2000 operating in Acra Metropolitan area and the AMA has recently given them the possibility to formally work with the official service providers in certain zones were large trucks cannot go through. The bola-taxis usually segregate the plastics and metals at attendance sites (i.e. transfer stations).

Before becoming waste pickers most of them were selling goods. Five of them started picking more than 10 years ago and all of them started to work in that field because they heard about the value of material.

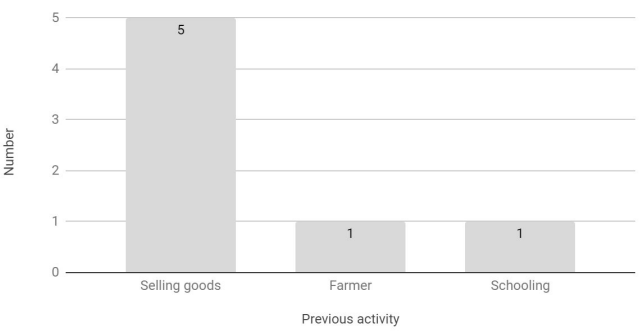
Some of the waste pickers see waste picking as an interesting transitory activity to save money and start their own business later on. The majority of them consider waste picking as a permanent activity and wish to be able to sell directly to the processors in a few years.

*Waste pickers at Darkuman Quortes*

Age group of the waste pickers (men and women) and middlemen met at Darkuman site




Previous activity of waste pickers (men and women) and middlemen met at Darkuman site



**Nsumia landfill**

The waste picker and the aggregator interviewed in Nsumia Landfill were introduced by the supervisor of Nsumia landfill. The aggregator was quite young -28 years old.

The waste pickers work independently but under the umbrella of an association of 100 waste pickers - of whom 18 women. They have created a solidarity fund that can help the waste pickers going through troubles.

The Waste landfill company operating the site make them meet twice a month. They brief them on security regarding the machines working in the landfill, the PPE - most of them were wearing a yellow jacket -, and the rules on the landfill regarding respect - fighting and stealing is strictly prohibited.

## 5.3. Analysis of the differences based on gender

Through the interviews - confirmed by the meeting with Wiego and E360 - we observe a specialisation of plastic collection depending on gender.

- The women tend to collect water sachets (LDPE/HDPE)

The women met in Old Fadama, Jamestown and TNT Community pick only in the streets, the markets and sometimes ask to the churches and households they know. They mainly collect pure water sachet - mostly LDPE - because it's a light material and they are not able to carry heavy weight. In the landfill as well, women collect mostly pure water sachet meaning the less valuable plastic among others.

Some of them are starting collecting PET as E360 is going to buy the PET from them at a better price than the current market price.

- The men focus on PP and HDPE collection

Men do not seem to pick directly in the street, probably because the amount collected is quite low compared to the volumes collected on the landfills. The men seem to monopolise the collection of PP and HDPE - in the two landfills visited as well as in the attendance site - the two kinds of plastic having the highest value in AMA.

## 5.4. Key differences between aggregators, middlemen and waste pickers

Many of the waste pickers interviewed declared they would like to evolve to become an aggregator or a middleman. Aggregators and middlemen mostly differentiate themselves from the waste picker by the capacity they have to buy recyclables (capital) and by their knowledge of the sector (prices, contacts with recycling and manufacturing companies, capacity to buy and know-how to operate recycling machines). Two key factors were identified during the interviews to become an aggregator or a middleman:

**Capital is an asset**

Capital is a strong asset to become a buyer. Having available cash flow is an issue for many middlemen and aggregators. Three out of the five aggregators and middlemen interviewed were men above 50 years old. Only one was a woman.

All of them managed to become middleman thanks to their savings. Two women working as waste pickers in Darkuman have expressed the fact that they would like to be able to have money to be able to invest in plastics and become middlemen or aggregators.

**Relations matter**

The middlemen and aggregators authorised to work directly on the landfill seem to have privileged relationships either with the Municipality, some middlemen, or the private companies in charge of the site operations.

50 waste pickers have been able to join the association of Kpone landfill and were authorised to access picking on the landfill thanks to one of the aggregators of Kpone - he is also the brother-in-law of the Secretary of Kpone landfill waste pickers association.

In the same way, another aggregator working on Kpone landfill, declared, that, thanks to him, 30 waste pickers have joined the landfill association and are able to pick. In Darkuman area, a middleman declared that 9 waste pickers have joined the picking activity because of him.

## 5.5. Waste pickers professional status

According to the ILO definition (2013) mentioned in the section Methodology of this Technical Note, the waste pickers can either work:

1. Independently, autonomously
2. As part of an organisation - an association or a cooperative
3. Under a contract

The waste pickers met in the different areas belong to the first two categories that are explained below. The bola-taxis are currently having their status formalised but it does not seem at this stage that they are operating under a contract.

**Working as an independent**

Waste picking is typically a highly autonomous form of labour in which the worker determines his or her own work schedule, decides what to collect, where to collect, how to collect and to whom to sell. Most of the waste pickers have declared that they would like to be part of and association or cooperative when they are not. The ones belonging to an existing association value it.

**Working as part of an organisation (in this case: an association)**

- Capacity building

Capacity building (or capacity development) is the process by which individuals and organisations obtain, improve, and retain the skills, knowledge, tools, equipment and other resources needed to do their jobs competently or to a greater capacity (larger scale, larger audience, larger impact, etc).Community capacity building refers to strengthening the skills, competencies and abilities of people and communities in small businesses and local grassroots movements so they can achieve their goals and potentially overcome the causes of their exclusion and suffering.

According to WIEGO, organising the informal waste pickers under an association umbrella is a way to strengthen capacity building as well as solidarity among waste pickers. WIEGO works to support and strengthen organisations of the working poor and to link organisations together. WIEGO organisation & representation supports the development of membership-based organisations (MBOs) – trade unions, cooperatives, and worker associations – that are democratic and representative, as well as national and international alliances and networks. The programme provides capacity-building support to organisations of informal workers; builds knowledge on the organisation of informal workers through the development of a database on workers' organisations and case studies; and produces education and capacity building resources to help informal workers understand their rights as workers and citizens and to build effective organisations. Membership-based organisations of informal workers are involved in the identification, prioritization and design of all of their activities.

- Creating a barrier

Kpone landfill is managed by Tema Municipality. They have set up a “right to pick” as the waste pickers have to belong to the association to be authorized to collect the materials on the landfill . To become a member of the association every waste picker wishing to join has to pass an interview with the leaders of the association.

The scavengers working on Nsumia landfill have also to belong to the waste pickers association of the landfill. The membership and thus "right to pick" is given by the private company which operates the landfill and brief the waste pickers on safety obligations every two weeks.

The access to the official landfills is thus restricted and regulated. According to E360, the waste pickers, even under an association, build their own team depending on their tribes.

## 5.6. NGOs & local actors: three models to structure the informal sector and improve waste pickers' professional status

### *5.6.1. The Pick It project in Tema: organising and building the capacities of the waste pickers*

- Objectives of the pilot and setting up

Environment 360 and Fan Milk (subsidiary of Danone) have been working together to launch a project called the "Pick-It" project. Pick It has the objective to improve plastic recycling - particularly PET - and improve waste pickers income thanks to higher volumes segregated in a sorting center designed by the partners. WIEGO is also a partner of the project.They looked, more specifically, at formalising and voicing up for the waste pickers. The MIT D-Lab was also involved in the design of the project.

The "Pick It" project started in 2017 and the sorting centre located in TNT has started working in June 2018. The ambition of the different partners is to be able scaled up this pilot if successful and/or replicated in Ghana and West Africa. This pilot will last until September 2019. The total funding allocated is €888,000 (http://ecosysteme.danone.com/projectslists/pick-it/). Around 30% is used for operational costs (land, equipment, building etc.). The rest was used for the design of the project and the training needs. The land where the sorting centre is located in was negotiated with the Tema Metropolitan Assembly.

- Waste pickers working for the Pick It project

Waste pickers were identified at TNT communities and at Kpone landfill and organised under an association called Biayoke. They received capacity building in business and were taught what to pick and sort at the sorting centre. The waste pickers work either at the landfill or in residential areas. 60% of the materials come from neighborhoods while the rest come from the landfill.

E360 seems to have higher difficulty to convince waste pickers of Kpone landfill to bring their materials to Pick It sorting center. Indeed, 8 aggregators/middlemen are coming every day to Kpone to buy plastics and metals and the waste pickers have an old relationship with the aggregators/middlemen and thus keep on selling to them.

*Tricycle at the Pick It Sorting Centre*

As mentioned above, most of the waste pickers working in residential areas are women. At the landfill, waste pickers are 40% women and 60% men. They have also received support to work with the Waste Management Department of the Tema Metropolitan Assembly (AMA) and to do some registration. As of now, the sorting centre works regularly with 30 waste pickers, and aims at reaching 60 to 100 by the end of the year 2020.

The sorting centre has a tricycle that enables collection at waste pickers' home, for those who can't bring at the sorting centre directly.

- Management of the project

The core team of Pick-it sorting centre is composed of:

- ❏ Two projects managers: one from Fan Milk and one from Environment 360
- ❏ One Business Manager
- ❏ One Community Organiser
- ❏ Five women at the sorting centre to sort and remove labels and caps

The women are part of the BIAKOYE Waste Pickers Association.

- Economic model

The sorting centre is self-sustaining and buys the materials to waste pickers with an average 0,20 GHS extra per kilogram, compared to what waste pickers were getting when selling to aggregators/middlemen. The sorting centre does not shred nor clean the plastics: it only removes caps and labels and has invested in a baling machine. The costs of electricity are high in Ghana and the buying price for washed / shred material did not motivate the extra effort.

At the end of the month, 30% of net sales are handed over to the association which splits it among the women based on their work attendance. In February 2019, an estimated amount of 1,300 GHS was paid to the association (resulting in approximately 260 GHS - $50 - per woman sorting the plastics).

Before the launch of the Pick It project, Environment 360 already had some connexions with industries. They built on these to sell the sorted plastics. Depending on the material and the buyer, the sorting centre provides transportation or industries provide transportation.

- Next steps

In the near future, it is envisioned by E360 to develop  other sorting centres, with the lessons learnt from this first pilot project (for example : the next centers may have a lighter infrastructure). An exit strategy should be developed at the end of this pilot (September 2019).

#### *5.6.2. Towards a cooperative in Accra: E360 project*

The total number of waste pickers working in Accra region is estimated to reach between 3000 and 5000. Till 2018 they have never been organised. The Biayoke association have shown some limits according to E360. The women are less incentivise to convert plastic segregation into a viable and profitable business. According to E360, under the Pick it project, women feel that only some women benefit from the association.

For this reason E360 wants to create the first cooperative of waste pickers in Accra in the next 6 months. Their objective is to create 30 cooperatives of 10 minimum people and be able to link the cooperatives to gather 300 waste pickers overall. The cooperative model allows waste pickers to own what they pick and get their own revenue to expand and at the same time to create joint services. The waste pickers would be able to stay informal but would have to register.

E360 is starting to give training to the women met in Old Fadama and Jamestown- leadership, use of PPE, indications regarding the types of plastic to pick - and organisation - like audit of waste pickers books so that they record their quantities and revenues - through the cooperative setting up. E360 is currently giving 3 days of training per week to the women targeted. E360 is particularly trying to work on PET exportation to Germany because there is almost no market for this type of plastics in West Africa.

#### *5.6.3. The inclusion of waste pickers in plastic business: Coliba's model*

Coliba buys the plastic materials as follows:

- 10% from "in house" waste pickers who work for him, have tricycles, and smartphones. They collect from institutions, households and commercial using the app.
- 5% from aggregators. The company has set aggregators (8 men) chosen because they were willing to commit financially and had sufficient space. The company wants to provide them with balers and crushers. They have storage capacity and keep PET bottles for Coliba.

- 5% from waste pickers that pick up in the street and public plastic bins installed on the Total stations. Coliba created 40 collection centres across Accra that are serviced by 25 waste pickers responsible for these collection points. These waste pickers are chosen because they reside at a close walking distance from the collection centre (bin). They collect from the bins and aggregate plastics at their home, they also pick from the streets. At their place, they also do sorting of the recyclables but they do not remove caps and labels. When they reach large quantities, Coliba comes to pick the plastics from their place. These WP do not work only for Coliba, they check the bins every day, have not received a smartphone so do not use it. They call or text Coliba to have a pick up of what they have accumulated at home (bins + street). The inhabitants can see on their smartphone the location of the bins.
- 80% from the waste pickers on landfill.

By the end of the year 2019, Coliba's goal is to have 200 collection centres.

# 6. THE WORKING CONDITIONS OF THE WASTE PICKERS

## 6.1. Working hours

The women met in Old Fadama market and pick plastics less than 4 hours per day. Waste picking is thus a part-time activity bringing them an additional revenue.

The women met at Manheen Community also pick plastic around 4 hours per day.

The ones interviewed at the TNT sorting center plastics and/or segregate the plastics at the sorting center more than 4 hours per day. Picking plastic is their main activity even if some of them still have an additional activity.

Regarding the men working at the attendance site, they collect household waste and segregate valuable materials.

The waste pickers interviewed in Kpone and Nsumia landfills work on the landfill more than 7 hours per day and every day except Sunday.

Waste picking is their single activity as for the waste pickers met in Nsumia landfill or the ones of Darkuman area. In Darkuman, most of them work more than 9 hours per day, every day except Sunday.

## 6.2. Perception and impact of waste picking

All the waste pickers interviewed have declared to be proud to be waste picker as it either helps them to increase their current revenue or it has become their main occupation enabling them to sustain their family.

The women picking in the street are respected because they contribute to clean the environment by picking plastics. Most of them are saying that the perception regarding waste pickers is changing in a positive way.

For all the women met in Old Fadama it helps them to improve their livelihoods and support their children to go to school. One of them even told the interviewer that thanks to waste picking she was able to buy her property.

Initiatives like the Pick it project, The Waste Picker Day organised by Coliba, Total and Voltic, and the fact that AMA has led the process to integrate the bola taxi into the collection system have given voice to the informal sector.

Most of the time, the waste pickers suffer from a bad image and reputation among the large public and their relatives or neighbours, and all these projects contribute to change people's mind and to put emphasis on the critical role that waste pickers play in society.

## 6.3. Health

WIEGO did an initial health check up to have a baseline survey before starting the Pick It project. According to Mrs. Dorcas Ansah from WIEGO, all the waste pickers - women in the community and women and men picking at Kpone landfill are suffering from body pains. Back pain was recurrent.

She described also lot of issues around vascular, sinus,and cardio issues for the waste pickers working on the landfill because they are inhaling hazardous gases. As they are eating with their hands, WIEGO found also a lot of tummy troubles. Five people were discovered to be infected by HIV.

Almost all the waste pickers working in Kpone, Nsumia and Darkuman surrounding landfills have expressed their wish to have regular medical check. They would like to be able to get some directions about what to do or not regarding their health.

The women picking in the streets would like to have access to pharmacy and/or hospital.

**Health is a concern**

- First aid and ambulance

The waste pickers in Kpone and Nsumia landfill insisted on the fact that they would like to have access to first aid and ambulance. They seemed really afraid of the accidents that could happen in the landfill because of trucks or fall.

- Health insurance

Almost all the waste pickers interviewed - the women picking in the street as well as the ones working on the landfill - would like to have a valid health insurance.

## 6.4. Safety

**Equipment used for picking & transportation of plastics**

All the waste pickers - picking in the street or on the landfills - are carrying a bag on their shoulder as they do not have access to any wheelbarrow, cart, bicycle or tricycle. The Pick It project has set up a tricycle service. The waste pickers can call it to bring their materials to the sorting center.

**Personal Protective equipment (PPE) and its use**

The women of Old Fadama and Jamestown are not using any PPE. The women from Manheen Community were given some PPE through the Pick It project but two out of three were not wearing it. Nevertheless, one waste picker in Manheen Community, stated that she was respected since she was wearing her PPE cause people thought that she was employed by the Municipality.

All the waste pickers trained at the sorting center by E360 are provided with personal protective equipment (PPE) comprised of:

- Gloves
- Tee-shirt and pant
- Gumboots
- High-Visibility vest
- Identification cards (useful when collecting at residences)

The waste pickers working on Kpone and Nsumia landfills own the full PPE equipment but some of them are not wearing it everyday. On the day of the visit, in Kpone many women were wearing sandals.

## 6.5. Training and its impacts

**On recyclables**

Most of the waste pickers interviewed did not receive any official training on recyclables before starting to pick.

Usually they were told by a buyer/middleman what to pick: pure water sachet for the women working in the streets and markets, LDPE, HDPE and PP for the waste pickers working on the landfills.

In Darkuman site, the middleman interviewed organise a two-days training for the new waste pickers working with him.

Through the Pick It project, E360 has given training about the type of plastic to segregate. Thanks to this training and E360 buying, the women are now picking PET in TNT as well as in Old Fadama and Jamestown, where E360 try to organise them in cooperatives.

**On Health and Safety issues**

The waste pickers interviewed in Old Fadama, Jamestown, Tema and Darkuman did not receive any training on health and safety issues.

E360 has started some training and gives PPE to the waste pickers following the training on health and safety in TNT, Old Fadama, Jamestown and Kpone landfill.

On Nsumia landfill, the supervisor of the private company operating the landfill, said that the waste pickers are briefed every two weeks on safety measures to follow to work on the landfill. Nevertheless, the waste pickers were working in the middle of trucks and compactors.

## 6.6. Improvements requested by the waste pickers

In this part of the questionnaire, the waste pickers were asked the types of improvements that they would like to see in their job.

### *6.6.1. Being organised under an association or cooperative*

All the waste pickers have expressed their wish and interest to be part of an association or cooperative to:

- Learn more about recyclables
- Be able to pick more materials
- Have support in terms of business
- Expand their income base
- Work with people
- Have a better network
- Get help in terms of health
- Have access to sorting centers.

### *6.6.2. Bettering the picking conditions*

**Back pain:** Most of the women and some men have declared having back pain. They would like to get some support - like stick - to be able to pick without bending. One of them would like the help of a wheelbarrow to transport the plastic collected.

**PPE adapted to weather conditions:** Some waste pickers have insisted on the fact that they would like to have additional PPE adapted to the weather conditions particularly the rain - boots and umbrella - and the heat - shades. Gloves and boots are the two most demanded equipment in Old Fadama and Jamestown.

### *6.6.3. Plastic transportation facility*

Almost all the men working in the landfills would like to own - two men working at Darkuman area hire - a tricycle to carry their materials.

Women in Kpone landfill would like to have access to a tricycle free service to transport their materials from the top of the landfill to the zones where the middlemen aggregate the materials.

### *6.6.4. The sorting center: by-passing the middlemen and aggregators?*

The women met in Old Fadama and Jamestown would like to have a collection and sorting center to be able to sell directly to the processors.

The waste pickers of Kpone landfill have expressed the same expectations. Despite the fact that they have access to E360 sorting center in TNT, they are still selling most of the plastic to the 8 aggregators/middlemen working on the site. One explanation provided was the fact that waste pickers keep going to sell to middlemen, even if they have currently an alternative with E360, because aggregators/middlemen provide them with loans and are used to pay in advance. It seems, thus, that aggregators/middlemen have managed to instaure a kind of dependency through the services they provide to the waste pickers.

# 7. CONCLUSION

The waste pickers in Ghana are used to work independently and in tough conditions. For two years some NGOs or the AMA authority - for the 2000 bola taxis - have started to organise them into associations.

Still among 3,000 waste pickers, a maximum of 500 are starting to work under the umbrella of an association.

Some NGOs, like E360, are just starting to try a different model - the cooperative model - as the association model has not proven to be efficient in terms of business revenue and bettering of livelihoods for the waste pickers. Still the return of experience has to be carried out regarding the association model.

The waste pickers are largely proud to work in their activity because it gives them a decent revenue to take care of themselves and their family.

Nevertheless, and despite the support of associations and entrepreneurs, the plastic recycling chain is still not optimised. Efficient transportation of material as well as sorting system are basics and could easily be improved. The discrepancy in terms of prices shows well that the plastic market is neither transparent neither organised: the waste pickers are dependent of the price fixed by the middlemen with whom they trade. They have no idea of the real price of each material.

There is a need to organise the whole value chain to improve plastic recycling as well as the waste pickers revenue. This is particularly true for the PET market as it has no outlet inside Ghana. Finding partners abroad would help the local actors to export PET and those decrease PET leakages into the environment.

The social profile of waste pickers has been described in detail because it is a strong material to understand the waste pickers needs. It will help us to design the right incentives to bring them aboard later on into the pilot projects phase.

More particularly, the future recommendations would have to consider the gender issue, as we observed a real discrepancy in terms of plastics recovered - the less valuables - which lead female waste pickers to earn less than their male counterparts.

# ANNEXES

## A. Questionnaire

### Waste Pickers Interview number

**Status**
Date:
First name:
Surname:
Age:
Marital Status (married/unmarried/single):
Number of people in the waste picker households:
Job of the other members of the family:
Area of intervention:
NGO mediation:

#### I. Background

What did you do before working in recycling?
When did you start this job?
How did you hear about it?
How did you meet ?
Job of the other members of the family:

#### II. Organization

**1) Way to operate**

Through:

❏ Association/NGO — How many waste pickers are members?
❏ Cooperative — How many waste pickers are members?
❏ Independent

**2) Working conditions**

**1. Training**

- Were you given any training / information by (name of the aggregator) when you started?
- About safety and hygiene?
- The type of recyclables to collect?

**2. Equipment used for collection**

**Equipment:**

❏ Wheelbarrow — Owner: YES/NO
❏ Cart — Owner: YES/NO
❏ Bicycle — Owner: YES/NO

**Do you pick up the waste by hands?** YES/NO

**Other?**

**Personal Protective Equipment (PPE)**

- ❑ Gloves
- ❑ T-Shirt and pants
- ❑ Gunboots
- ❑ High visibility vest
- ❑ Identification card

**3) Social conditions**

Number of years of experience:

Principal activity: YES/NO Other activity:

Working time

- Number of hours per day:
- Time you start:
- Time you finish:
- Number of days per week :

Would you say it is a difficult job?

Did working in waste changed your perception of it?

Did you share knowledge you gained on waste with your children? Family? Neighbours?

Would you recommend this job?

Have you recommended it already?

Have people joined this activity because of you? How many?

What are the impacts of this job on your life?

With your family / neighbours / friends? Negative impacts? Positive impacts?

Could you describe 3 kinds of improvement that you would like regarding your working conditions?

## III. Collection and Volumes

### 1) Collection of waste?

**District/area:**

**How:**

- ❑ Door to door households
- ❑ Shops
- ❑ Commercial Building/Offices
- ❑ Restaurants
- ❑ Transfer station
- ❑ Landfill
- ❑ Street/Drains
- ❑ Others

### 2) Frequency

- Number of rounds per day:
- Number of clients visited per day

**3) Type of plastic collected**

- ❑ PET
- ❑ PP
- ❑ HDPE
- ❑ LDPE
- ❑ Others:

**4) Volume of plastic collected per week**

- ❑ PET:
- ❑ PP:
- ❑ HDPE:
- ❑ LDPE:
- ❑ Multilayers
- ❑ Others:

**5) Clients**

- To whom do you sell plastics?
- Minimum volume:
- How many times per week do you bring them to the aggregator?

## IV. Economics

**1) Price of plastic per kg**

- ❑ PET:
- ❑ PP:
- ❑ HDPE:
- ❑ LDPE:
- ❑ Multilayers
- ❑ Others:

**2) Revenue per week:**

**3) Other sources of revenue per week**

- ❑ Households:

Frequency of payment if any:

- ❑ Others sources of revenue: :
- ❑ How do you spend those revenues?
  - Education of the children / grandchildren?
  - Rent?
  - Food?
  - Health?
  - Savings?
  - Other?

**Any other comments**

## ANNEX

### B. Technical Note #2: Estimation of the Plastic Quantity in MSW

SEURECA VEOLIA

*Project Ref.*: GHSP00505E

*Date*: 30/09/2019

# Technical Note #2

## *Estimation of the Plastic quantity in the Municipal Solid Waste Stream*

| General Information | | | |
|---|---|---|---|
| *Project* | Accra Plastics Management Pilot | | |
| *Client* | Department for International Development (DFID) | | |
| *Objective* | To estimate MSW production & plastics quantities and qualities in Accra | | |
| *Recipients* | DFID | | |
| *Authors* | Gilles de Raymond-Cahuzac, Seureca, Waste Management Expert<br>David Dupré La Tour, Seureca, Team Leader | | |
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| *Approved by* | Raphael Berdugo, Seureca, Project Director | | |
| *Versions* | V1 | *Date* | 28 May 2019 |
| | V2 | | 30 September 2019 |

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## List of Acronyms

| | |
|---|---|
| AMA | Accra Metropolitan Assembly |
| APMP | Accra Plastics Management Pilot |
| CDW | Construction and Demolition Waste |
| CIW | Commercial and Industrial Waste |
| GAMA | Greater Accra Metropolitan Area |
| GHS | Ghanaian cedi (currency) |
| GSS | Ghana Statistical Services |
| HDPE | High-Density Polyethylene |
| ILO | International Labour Organisation |
| kg | kilogramme |
| LDPE | Low-Density Polyethylene |
| MSW | Municipal Solid Waste |
| PET | Polyethylene Terephthalate |
| PP | Polypropylene |
| PPP | Purchasing Power Parity |
| PS | Polystyrene or Styrofoam |
| PVC | Polyvinyl Chloride |
| SMEs | Small and Medium Enterprises |
| TMA | Tema Metropolitan Assembly |
| TNT | Tema New Town |
| WEEE | Waste Electrical and Electronic Equipment |

*For this Technical Note, tonnes correspond to metric tonnes, not imperial tons.*

## 1. Introduction

The objective of the present Technical Note is to estimate the quantities and qualities of plastics used in Accra that may pollute the land and oceans once it becomes waste. This Technical Note focuses on single-use plastics consumed in Accra and its surroundings.

### 1.1. Single-used plastics

As the Accra Plastic Management Pilot is focusing on packaging and single-use plastics, this note will not take into account plastic used in construction, car manufacturing, WEEE, etc.

The figure below presents the main plastic resin types and their applications in packaging.

*Figure 1: Main plastic resin types and their applications in packaging*[1]

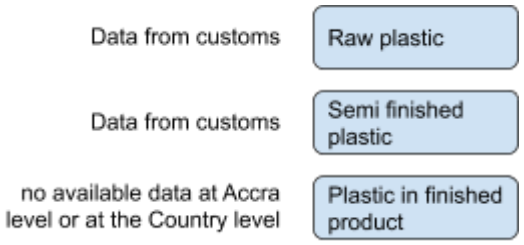

[1] The New Plastics Economy - Rethinking the future of plastics © WORLD ECONOMIC FORUM, 2016

## 1.2. Approach and methodology

This Technical Note uses two complementary approaches to estimate the quantity of plastics: (1) analysing the quantity of plastics imported and (2) estimating the quantity of plastics contained in waste.

### 1.2.1. Plastic importation

There is no raw plastic production from oil in Ghana, therefore, all plastics have to be imported.




Plastics may be imported as raw materials (pellets), semi-finished products (forms) or finished products. For raw and semi-finished plastics data may be obtained from customs and considered as reliable.

Yet, it is much more difficult, not to say impossible, to obtain the importations of plastics finished products. Consequently a second method was developed to estimate the quantities of plastics based on Municipal Solid Waste (MSW) data.

### 1.2.2. Plastics in Municipal Solid Waste (MSW)[2]

The MSW flows includes two types of waste generators:

1. The households
2. Small shops and offices for the other side. Such shops and offices are collected in the same way as households waste.

**1. Waste from households:**

The quantity of households' waste produced is proportional to the number of inhabitants with a production ratio per capita depending on the income level. International benchmark allows to have reliable data on this topic.

The conduct of waste characterisation studies enables to know the composition of households waste. A characterisation study was conducted in Ghana in 2014, the results obtained are used in this Technical Note. Again, international benchmark exists and allows to cross check the figures obtained in Ghana to see whether these are reliable.

For waste produced by small shops and offices (or waste assimilated to MSW), no data exists in Ghana and it is difficult to characterise such waste due to the fact that they depend on the type of business considered. The Consultant has thus used international benchmark to estimate the quantity of plastics generated by such entities.

In addition to MSW, plastics may be found out in CIW (Commercial and Industrial Waste) and CDW (Construction and Demolition Waste). Waste generated by those entities are collected separately from households waste through a dedicated waste collector. Often, recyclables are already valorised, especially if the material is easily segregated and clean (for example plastic leftover from production) . They represent an additional source of plastics but are not estimated in this Technical Note.

[2] The terminology Municipal Solid Waste (MSW) is used to define the stream of waste collected by the municipal assemblies (by the private contractors under their franchise agreement and by the assemblies themselves) coming indistinctly from the households and from the small and medium commercial and services activities (ie. small shops, restaurants, hairdressers … )

## 2. Imported plastic quantities

### 2.1. Raw plastics

The Consultant has obtained from the Customs Department under the Ghana Revenue Authority, a database of primary plastic pellets importation for the years 2016, 2017 and 2018 in Ghana. After data crushing and refining work, the main key lessons are presented below. These data should be taken as indicative as there may be some plastics/plastic products smuggled into the country and the customs register may contain errors regarding the types of plastics.

Five main streams of plastics have been analysed:

1. Polystyrene, in primary forms: named PS below
2. Polyethylene having a specific gravity <0.94, in primary forms: named LDPE below
3. Polyethylene having a specific gravity >=0.94, in primary forms: nam0ed HDPE below
4. Polyethylene terephthalate, in primary forms: named PET below
5. Polypropylene, in primary forms: named PP below

The annual tonnage of imported primary plastic pellets, for the five considered polymers, increase from 209 to 243 thousand tonnes between 2016 and 2018. This result is consistent with the economic development of the country, with a GDP increasing for the past three years[3].

Each stream of plastic includes several kinds of polymers for different uses. The following analysis focuses on packaging and single-use plastic. In order to extract these plastics, the imported plastic tonnages were classified by the Consultant by final usage: packaging manufacturing, pipes manufacturing...etc. It was done for HDPE and PP which are the two polymers which may be used for other applications than packaging. Based on this categorisation, the final imported plastic figures retained for this assignment are presented below. HDPE used for packaging amounts to approximately 70% of overall HDPE raw material importation whereas it amounts to 30% for PP.

*Figure 2: Imported primary plastic pellets for packaging and single use products*

| Type of plastic | Unit | 2016 | 2017 | 2018 |
|---|---|---|---|---|
| PS | tonnes | 5,540 | 5,554 | 6,315 |
| LDPE | tonnes | 35,440 | 46,770 | 49,968 |
| HDPE | tonnes | 91,998 | 69,748 | 69,691 |
| PET | tonnes | 25,422 | 37,356 | 45,476 |
| PP | tonnes | 9,918 | 9,522 | 7,725 |
| **TOTAL** | tonnes | **168,317** | **168,950** | **179,176** |

The figures above are for the whole country. In order to assess the tonnages applicable for the study area only, the inhabitants distribution rates can be considered: Greater Accra represents 16% of Ghana population. However, the capital city is certainly consuming more plastic packaging than the rural areas. Therefore, the Consultant suggests to retain a 20% to 25% rate instead of 16%. The following results present the estimated average for the last 3 years from imported primary plastic pellets for Greater Accra region.

[3] Source: Worldbank website, April 2019 (https://data.worldbank.org/country/ghana?display=graph)

*Figure 3: Estimated packaging and single-use products from imported primary plastic pellets for Greater Accra region*

| Type of plastic | Unit | Average 2016-2018 |
|---|---|---|
| PS | tonnes | 1,100 - 1,400 |
| LDPE | tonnes | 8,800 - 11,000 |
| HDPE | tonnes | 15,400 -19,300 |
| PET | tonnes | 7,200 - 9,000 |
| PP | tonnes | 1,800 - 2,300 |
| TOTAL | tonnes | **34,300 - 43,000** |

It is noticeable that:

- LDPE and HDPE are the main stream of raw material imported, representing in total around 71% (26% for LDPE and 45% for the HDPE) of the total raw plastic imported for packaging and single use applications. HDPE is used to produce water sachets and also a lot of cosmetic and food packaging; LDPE is also used for water sachets manufacturing but also plastic bags.
- The quantity of PET imported represents around 21% of the total raw plastics imported. PET is mainly used for bottle packaging and for this application, the raw PET is first transformed into preforms, then blown into a bottle. PET preforms are also imported in Ghana (around 6,000 tonnes / year).
- The PS quantity imported in Ghana is low. This plastic is mainly used to produce Expanded Polystyrene, a very light material, which is used for food packaging in restaurants.

## 2.2. Semi-finished and plastic in finished products

In order to have a better understanding of the imported plastics, an additional request was made to the Customs Department, to assess the quantity of semi finished plastic products that are imported in Ghana. This semi finished products includes among other:

- PET preforms (that are widely used to produce PET bottle)
- Plastic films in rolls that can be used to manufacture sachet and others packagings
- Plastic sacks and bags
- Empty plastic packaging.

After data crushing and refining work, the Consultant classified the products according to the same five stream of plastic used for the primary importation analysis. The tonnages are presented below for 2016, 2017 and 2018:

*Figure 4: Imported semi-finished and finished packaging and single use products*

| Type of plastic | Unit | 2016 | 2017 | 2018 |
|---|---|---|---|---|
| PS | tonnes | 771 | 528 | 584 |
| LDPE | tonnes | 44,622 | 40,751 | 58,734 |
| HDPE | tonnes | - | - | - |
| PET | tonnes | 8,607 | 4,097 | 7,688 |
| PP | tonnes | 5,424 | 7,506 | 11,605 |
| **TOTAL** | tonnes | **59,424** | **52,882** | **78,611** |

The plastic imported in Ghana as finished product (for example PET bottle containing mineral water from France or HDPE bottle containing a shampoo manufactured in South Africa) cannot be estimated based on the customs figures. Indeed, it would require to know the exact quantity of all products packed in plastic and the weight of all the various packaging used.

Therefore, in order to assess the total imported plastics, the Consultant analysed plastics in the waste stream. The difference between the output (waste) and input (raw material) provides an approximate quantity of the remaining imported plastics as finished products.

## 3. Plastic Waste from Households

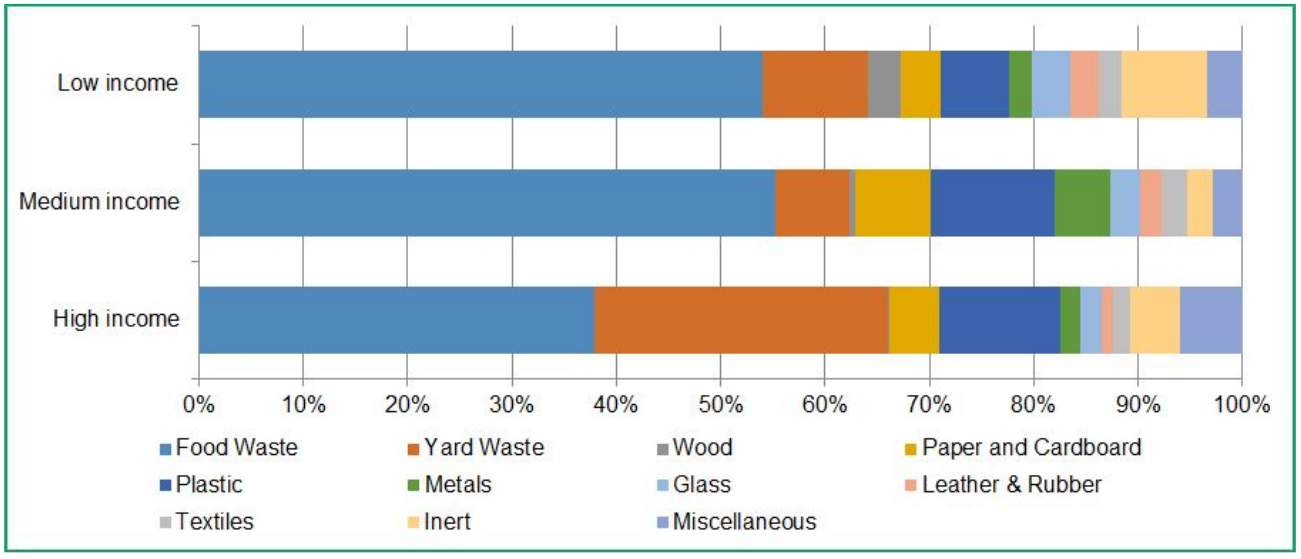
In order to calculate the quantity of households' plastic waste, the Consultant used several key parameters: inhabitants, waste generation rate and the share of plastics in the municipal solid waste stream. In addition, the social factor is considered in the assessment (high, medium and low income brackets). Habits and thus waste production are related to the living standards.

### 3.1. Household Solid Waste Characterisation

For MSW characterisation, the Consultant used the study undertaken in 2014-2015 by the Kwame Nkrumah University of Science and Technology in Ghana in partnership with the Technical University of Denmark (DTU) DK 2800[4].

In order to establish the waste characterisation of Municipal Solid Waste in Accra Metropolitan Assembly (AMA), the searchers did an analysis of the composition of ten tonnes of waste from eighty-one households of different size and living standards. A summary of the main results is presented below:

*Figure 5: Municipal Solid Waste characterisation figures in AMA in 2014*




The biodegradable waste (food and yard waste) is the highest component, with more than 60% of the MSW flow for AMA. The plastic comes in second position, with a share between 7% and 12%. These results are consistent with the typical waste composition pattern of countries of similar levels of development in the same region: half of MSW is organic and 9% is plastic[5].

The waste plastic stream was studied in more detail and the following characterisation is provided in the study as an average for all the samples analysed in the country:

[4] Miezah, K., Obiri-Danso, K., Kádár, Z., Fei-Baffoe, B. and Mensah, M. (2015). Municipal solid waste characterisation and quantification as a measure towards effective waste management in Ghana. Waste Management, 46, pp.15-27.

[5] Kaza, Silpa, Lisa Yao, Perinaz Bhada-Tata, and Frank Van Woerden. 2018. What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050. Urban Development Series. Washington, DC: World Bank. doi:10.1596/978-1-4648-1329-0. License: Creative Commons Attribution CC BY 3.0 IGO

*Figure 6: Plastic waste characterisation figures in Ghana in 2014*

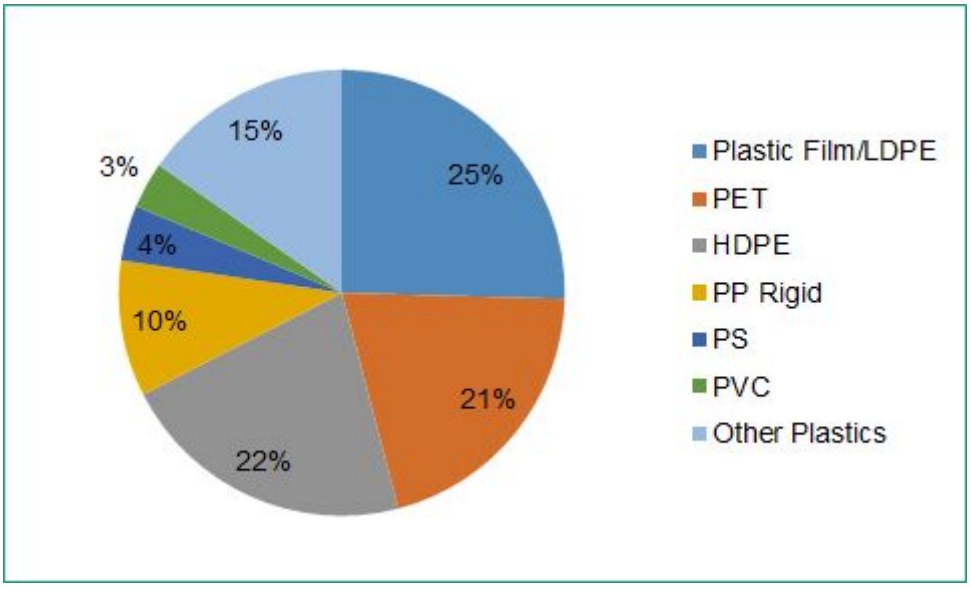
| Type of plastic | High income | Medium income | Low income |
|---|---|---|---|
| Plastic Film/LDPE | 15% | 25% | 36% |
| PET | 24% | 23% | 14% |
| HDPE | 23% | 19% | 23% |
| PP Rigid | 11% | 11% | 8% |
| PS | 4% | 4% | 4% |
| PVC | 4% | 4% | 2% |
| Other Plastics | 18% | 14% | 14% |

These figures show that low income population adopted LDPE in a lot of situations. For water sachets, first, as the water supply from pipes is not secure, and also to bring from market, small quantities of food, which are packed in LDPE plastic bags. On the other hand, medium and high income population use more PET packaging, which is mainly used for bottle packaging. These figures seem aligned with the fact that buying water in PET bottle is more expensive than buying water in sachet (a 1.5 litre PET bottle of water costs 2 GHS whereas a 0.5 litre LDPE water sachet costs 0.2 GHS)

For the other plastics, there is no significant difference between social classes. PVC and PS are the lowest plastic types used in Accra, which fit to the very low importation data about these polymers.

Based on these figures and assumptions retained by the Consultant on the population distribution in AMA between high, medium and low income classes areas[6], the balanced average figures of plastic characterisation for AMA are presented below:

*Figure 7: Plastic waste characterisation average figures in AMA in 2014*




LDPE, HDPE, PET and PP represent all together 78% of plastic waste. Such polymers are the most recycled around the world. In his address of March 2019, the President Akufo-Ado mentioned that 80% of plastics used in Ghana could be recycled, not far from the 78% arising from the characterisation.

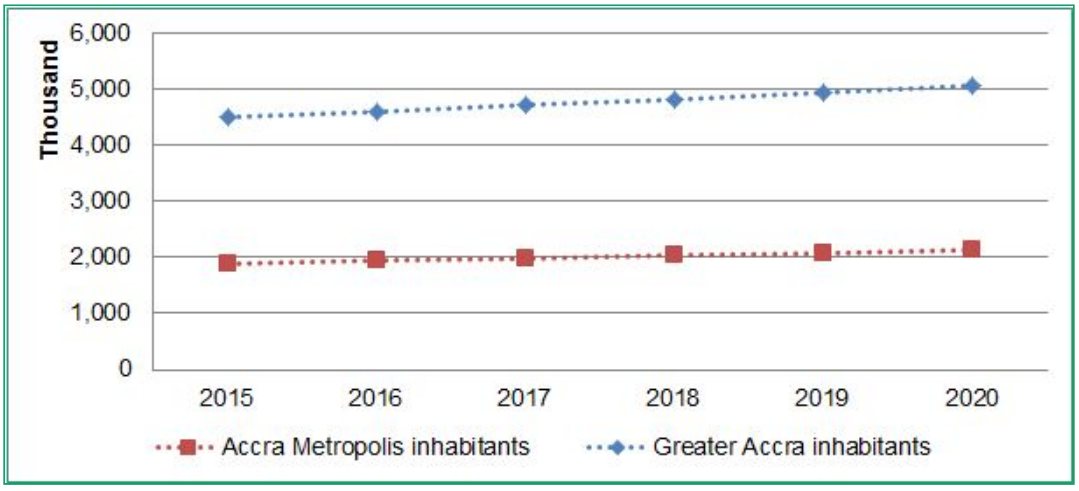
[6] Back to 2014 and the study undertaken on waste characterisation, one third has been retained as the distribution figure between the three classes areas based on official government data. The same distribution is retained in this note.

Without consolidated data for Greater Accra region, the Consultant used the assumption that the same waste characterisation figures are applicable. However, this assumption could be discussed as AMA is mostly urban while Greater Accra includes rural areas. The sensitivity of this assumption will be assessed on a later stage, when the financial viability of the suggested solutions will be studied.

## 3.3. Number of Inhabitants

Based on the Ghana Statistical Services calculations for AMA and Greater Accra region between 2015 and 2020, the following figures for the number of inhabitants are obtained:

*Figure 8: Inhabitants figures forecasted for AMA and Greater Accra between 2015 and 2020*




The figures are based on 2010 census results and assumptions retained on the population growth rate tendency for AMA and Greater Accra with respectively 13% and 12% of increase between 2010 and 2015, and then respectively from 2.60% and 2.36% in 2016 to 2.45% and 2.28% in 2020. A linear decrease of the growth rate seems to have been retained by the Ghana Statistical Services, as illustrated in the figures trends.

## 3.4. Household Solid Waste Generation Rate

According to the study undertaken in 2014-2015 by the Kwame Nkrumah University of Science and Technology in Ghana, the following rates of household waste generation were applicable in 2014 in AMA:

*Figure 9: Household Solid Waste generation figures in 2014 in AMA*

| Unit | Weighted[7] average for AMA | High income area | Medium income area | Low income area |
|---|---|---|---|---|
| kg/capita/day | 0.61 | 0.76 | 0.57 | 0.49 |

These results are aligned with the average value of waste generation for a country of a similar development level, as stated in the last World Bank report on waste[8]: 0.51 kg/capita/day in Ghana in 2016 and an average of 0.46 kg/capita/day for Sub-Saharan Africa Region. The generation rate is expected to be higher in urban areas than rural ones, and AMA is mostly urban. It would explain the difference with the average figure for the country.

Based on these figures, the Consultant calculated the forecasts of waste generation per capita up to 2020. An equation developed by the World Bank experts[9] put in relation the GDP per capita with the household

[7] See previous footnote

[8] Kaza, Silpa, Lisa Yao, Perinaz Bhada-Tata, and Frank Van Woerden. 2018. What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050. Urban Development Series. Washington, DC: World Bank. doi:10.1596/978-1-4648-1329-0. License: Creative Commons Attribution CC BY 3.0 IGO

[9] See footnote above

waste generation. This equation is based on discrete values calculated thanks to the combined data of a significant number of countries. The proxy between GDP per capita and waste generation is presented below:

*Figure 10: World Bank equation between GDP per capita and household solid waste generation*

$$Proxy = 1,647.41 - 419.73 \times ln(GDP\ per\ capita) + 29.43 \times ln(GDP\ per\ capita)^2$$

The proxy is a polynomial of second order equation with a decrease of the growth rate in the time. It is aligned with the international shared conclusion that waste generation growth speed decreases together with GDP growth for a country. The GDP per capita figures are based on World Bank database for Ghana, with a linear forecast from 2018 to 2020 calculated by the Consultant.

The waste generation figures are then calculated based on the proxy growth rate between each year. The calculated figures from 2014 to 2020 are presented below:

*Figure 11: Household Solid Waste generation figures from 2014 to 2020 in AMA*

| Variable | Unit | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|
| GDP per capita | 2011 PPP International $ | 3,828 | 3,824 | 3,868 | 4,092 | 4,300* | 4,441* | 4,582* |
| Proxy | NA | 188 | 188 | 188 | 192 | 196 | 198 | 201 |
| Weighted[10] average of household solid waste generation for AMA | kg/capita/day | 0.61 | 0.61 | 0.61 | 0.62 | 0.63 | 0.64 | 0.65 |

** forecast calculated by the Consultant based on a linear tendency assumption*

The growth speed varies between 0% and 2% between 2014 and 2020. This range matches the household solid waste generation growth rate retained in the countries of the same level of development and similar GDP trend: between 1% and 2% annual increase in the municipal solid waste generation.

Without consolidated data at Greater Accra scale, the Consultant retains as assumption that the same waste generation figures are applicable. However, this assumption is quite optimistic as AMA is mostly urban while Greater Accra includes rural areas. The sensitivity of this assumption will be assessed on a later stage, when the financial viability of the suggested solutions will be studied.

## 3.6. Household waste quantities

The household solid waste figures are finally calculated with a multiplication between the waste generation per capita and the inhabitants figures. The results from 2016[11] to 2020 are displayed below:

*Figure 12: Estimated Household Solid Waste annual generation from 2016 to 2020 in AMA and Greater Accra*


[10] See previous table footnote

[11] 2016 is retained as the starting year for the financial analysis. Consolidated figures used as inputs for the financial models start in 2016.

When calculated per day, it gives an evolution from 1,200 tonnes/day in 2016 to 1,400 tonnes/day in 2020 for AMA and from 2,850 to 3,300 for Greater Accra.

## 3.7. Plastic Waste from Households Quantities

The quantities of plastic waste generated from households is calculated based on the waste characterisation figures and the waste quantities forecasts. As an initial assumption, the Consultant used the plastic share in the household waste flow figure of 2014 for the forecasts. However, this figure will necessary change over the years. The reasons can be multiple: change in inhabitants habits, change in the market, change of national policy (ban for example)...etc. Thus, several scenarios are presented by the Consultant. The total plastic flow is presented at the end of this chapter.

*Figure 13: Plastic waste generated by households in AMA from 2016 to 2020*

| Type of plastic | Unit | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|
| Plastic Film/LDPE | tonnes | 9,985 | 10,450 | 10,912 | 11,320 | 11,735 |
| PET | tonnes | 9,900 | 10,361 | 10,819 | 11,223 | 11,635 |
| HDPE | tonnes | 9,580 | 10,025 | 10,469 | 10,860 | 11,258 |
| PP Rigid | tonnes | 4,684 | 4,902 | 5,119 | 5,310 | 5,505 |
| PS | tonnes | 1,837 | 1,923 | 2,008 | 2,083 | 2,159 |
| PVC | tonnes | 1,677 | 1,755 | 1,832 | 1,901 | 1,971 |
| Other Plastics | tonnes | 7,036 | 7,363 | 7,689 | 7,976 | 8,269 |
| TOTAL plastic waste from households in AMA | tonnes | 44,699 | 46,780 | 48,847 | 50,672 | 52,533 |

*Figure 14: Plastic waste generated by households in Greater Accra from 2016 to 2020*

| Type of plastic | Unit | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|
| Plastic Film/LDPE | tonnes | 23,785 | 24,839 | 25,886 | 26,803 | 27,740 |
| PET | tonnes | 23,583 | 24,627 | 25,665 | 26,575 | 27,504 |
| HDPE | tonnes | 22,819 | 23,830 | 24,834 | 25,714 | 26,613 |
| PP Rigid | tonnes | 11,158 | 11,652 | 12,143 | 12,573 | 13,013 |
| PS | tonnes | 4,377 | 4,571 | 4,763 | 4,932 | 5,105 |
| PVC | tonnes | 3,994 | 4,171 | 4,347 | 4,501 | 4,658 |
| Other Plastics | tonnes | 16,760 | 17,502 | 18,240 | 18,886 | 19,546 |
| TOTAL plastic waste from households in Greater Accra | tonnes | 106,476 | 111,193 | 115,877 | 119,985 | 124,179 |

# 4. Plastic Waste from small Shops and Offices

Data on small shops and offices waste generation does not exist to date in Accra. In order to be able to roughly assess the associated quantities, the following assumptions are retained:

- Waste from shops and offices accounts for between 20% and 30% of total MSW flow[12].
- Plastic waste accounts for between 10% and 30% of total waste from shops and offices flow[13].

Based on these two assumptions, the following plastic waste generation figures are presented for AMA and Greater Accra region:

*Figure 15: Plastic waste generated by shops and offices in AMA from 2016 to 2020*

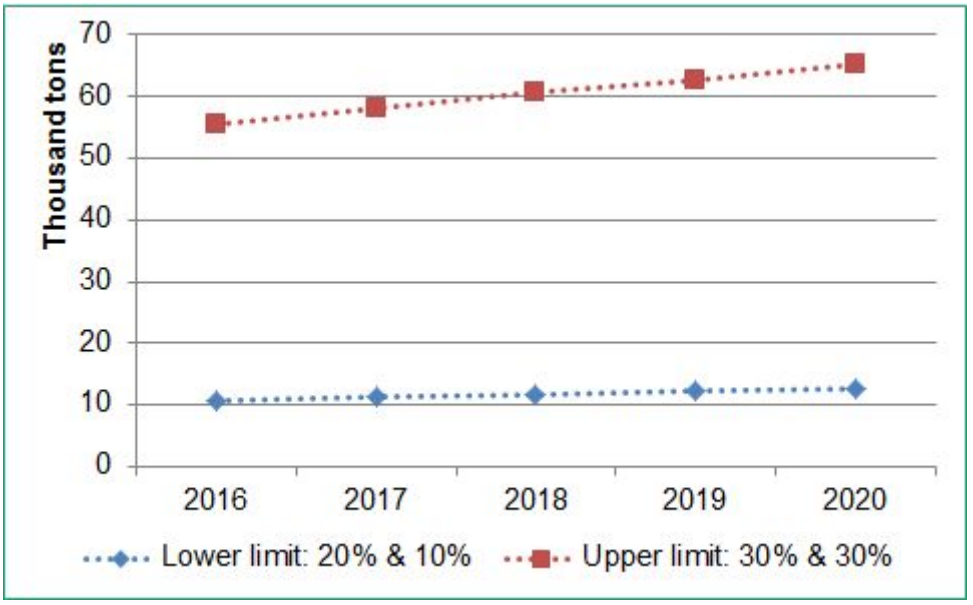
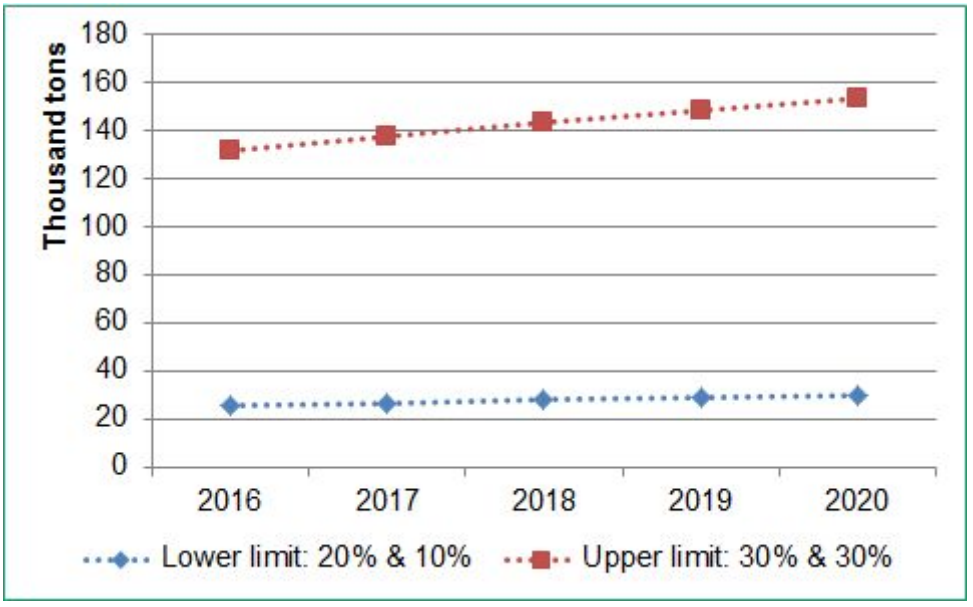



*Figure 16: Plastic waste generated by shops and offices in Greater Accra from 2016 to 2020*




The range of incertitude is significant. The average values - 25% and 20% - are retained for the total assessment of the plastic flow presented below. It goes from 28,250 tonnes in 2016 to 32,750 tonnes in 2020 for AMA; and from 67,300 tonnes in 2016 to 77,450 tonnes in 2020 for Greater Accra.

[12] This range corresponds to the international admitted figures for a city of similar level of development.
[13] This range is based on Consultant's plastic expert expertise.

## 5. Total Plastic Waste Generation

The total plastic waste tonnage generated by households, shops and offices between 2016 and 2020 is summarised below:

*Figure 17: Plastic waste generated by households, shops and offices in AMA and Greater Accra region from 2016 to 2020*

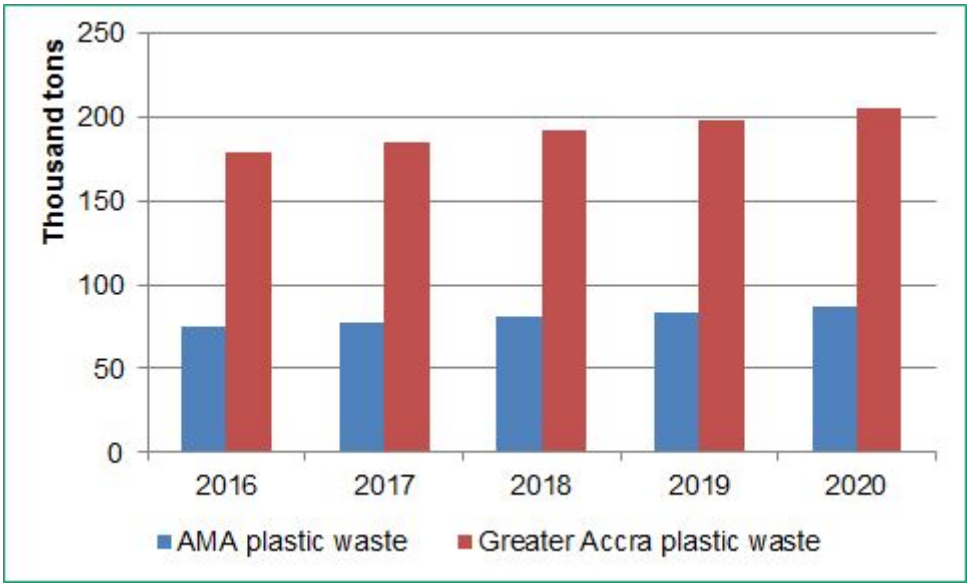
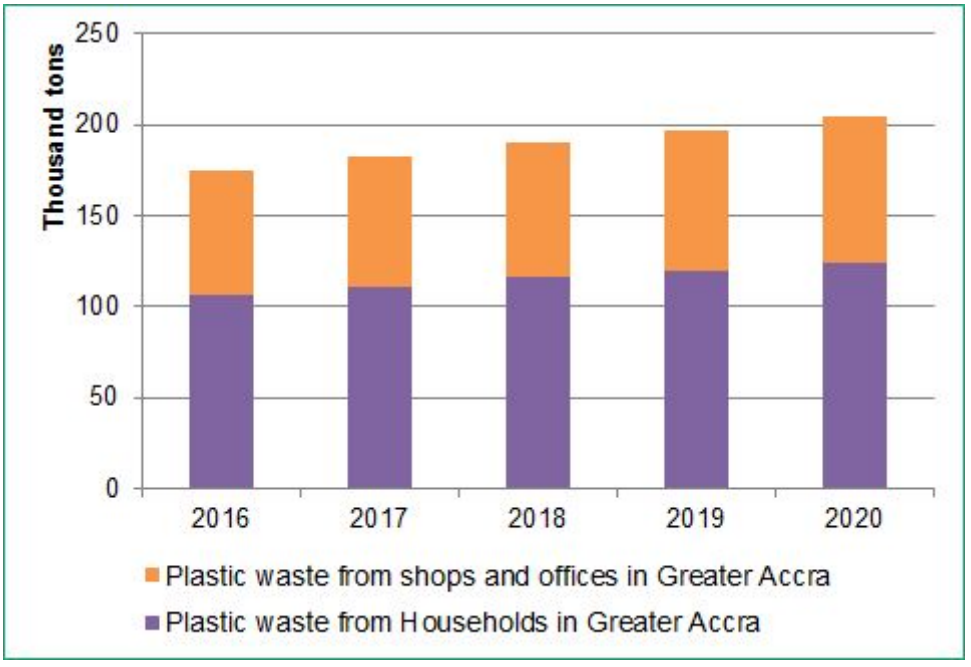



*Figure 18: Estimated Plastic waste generation in Greater Accra region by households & small shops and offices from 2016 to 2020*




The results are based on the methodology presented by the Consultant in the previous chapters and the corresponding assumptions retained. They correspond to a rough picture of the situation, and they should not be taken as accurate figures. Sensibility assessment of the several variables presented in this technical note would be needed if financial models were to be developed.

# 6. Analysis

## 6.1. Plastic evolution scenario

In order to take into consideration different assumptions, the Consultant did an analysis of several plastic waste scenario trends and compared them with the total plastic waste figure obtained. These scenarios come from two reports:

1. The Ocean Cleanup Foundation, Rotterdam, The Netherlands & The Modelling House, Raglan, New Zealand & North Carolina State University, Raleigh, NC, USA ; *Future scenarios of global plastic waste generation and disposal* ; 2019
2. World Economic Forum ; *The New Plastics Economy Rethinking the future of plastics* ; 2016

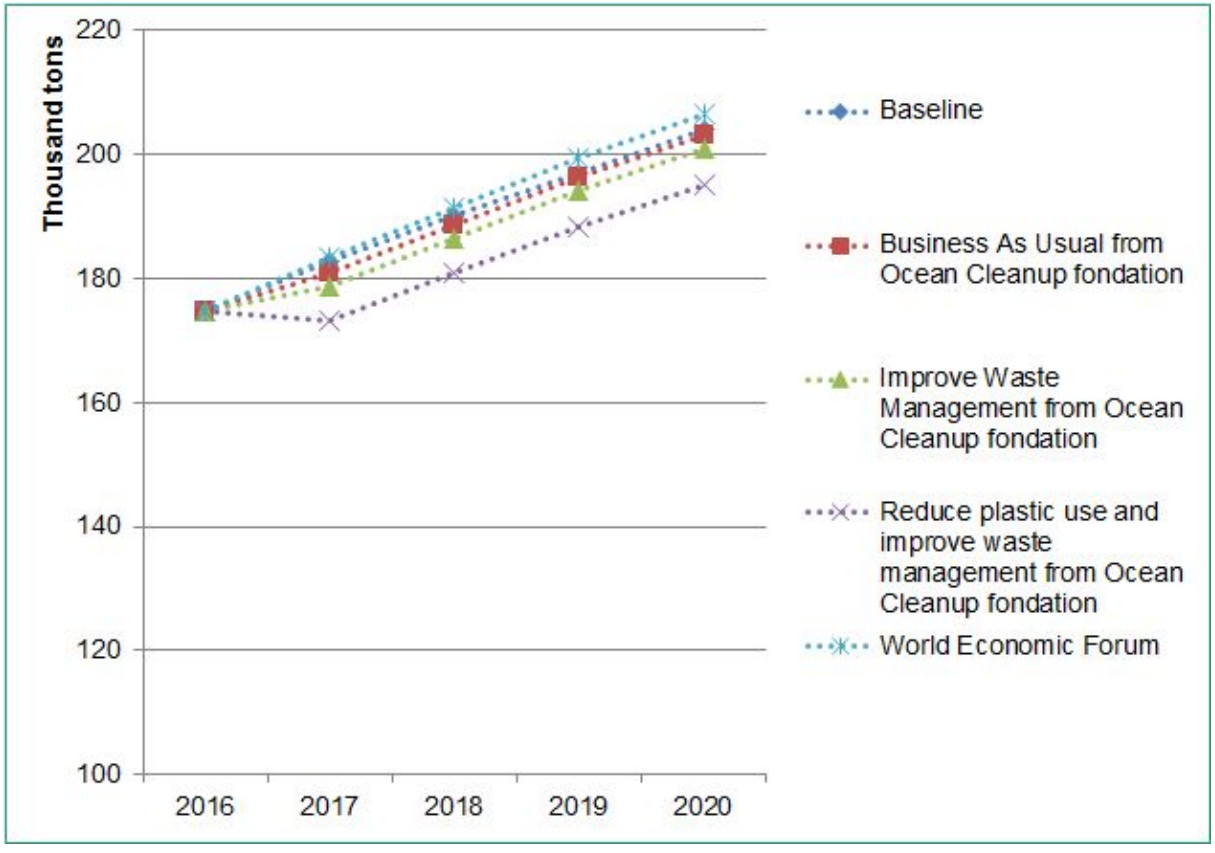
In the first report, three scenarios of mismanaged plastic waste evolution from 2020 to 2060 are presented. The first one is the “Business As Usual” scenario. The second one is the “Improve Waste Management” scenario. And the last one is the “Reduce plastic use and improve waste management” scenario.

In the second report, only one scenario is presented for the packaging plastic production evolution in the world from 2013 to 2050.

None of these scenarios is exactly on the same flow that the one studied in this note, and they are worldwide (or for a continent) figures. However, they give an indication of a possible tendency for plastic waste generation in the next decades.

The impact of these several growth rates comparison on the plastic waste figures of the Greater Accra is summarised in the figure below:

*Figure 19: Plastic waste scenarios in Greater Accra from 2016 to 2020*




No matter the retained scenario, the plastic waste tonnage for 2020 is expected to be more or less two hundred thousand tonnes, with a gap of 6% between the highest and lowest values. The growth rates considered in the current study is therefore consistent with both studies.

## 6.2. Plastic importation / Plastic waste generation

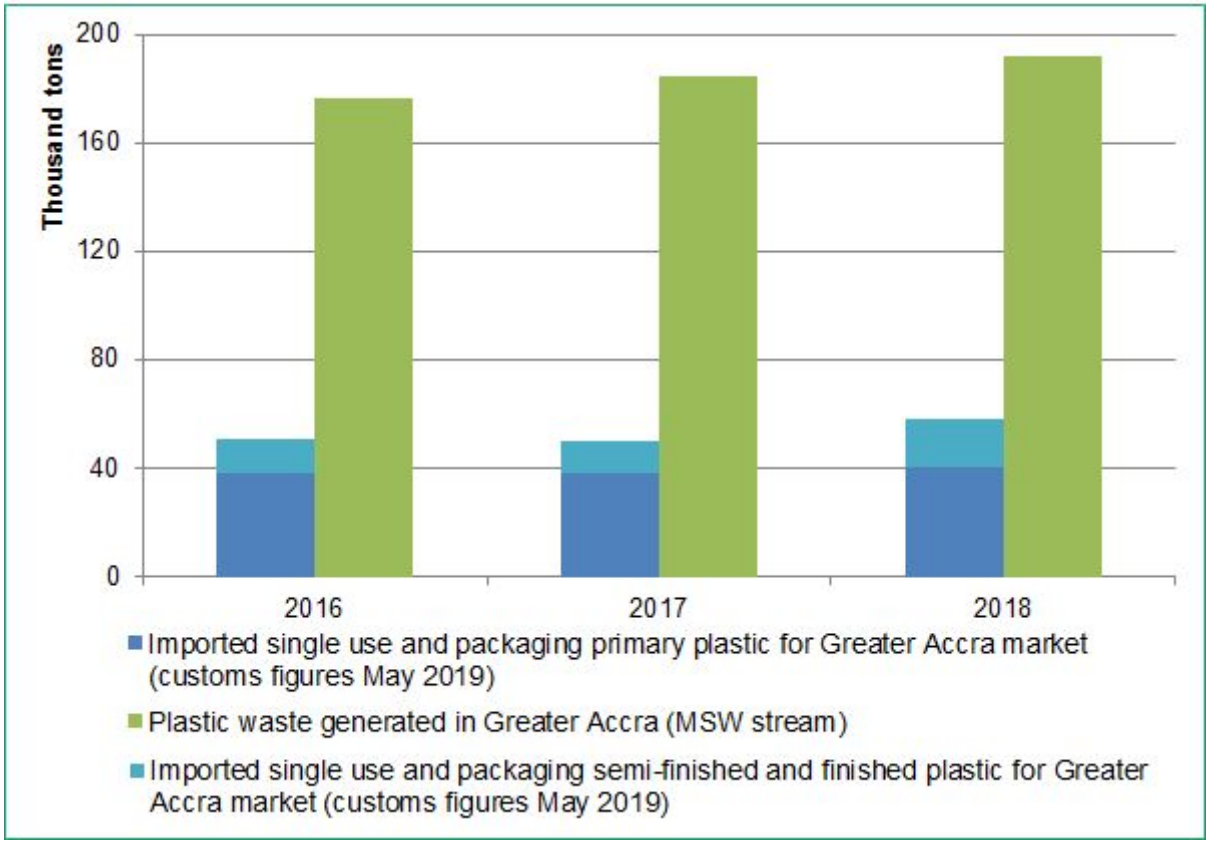
Based on data obtained from customs, the quantity of plastic pellets, for LDPE, HDPE,PP, PET and PS, imported in Ghana yearly for a further packaging transformation, is around 170,000 tonnes for the last 3 years for the whole country, and has been estimated between 34,000 tonnes and 45,000 tonnes per year for the Greater Accra region.

For packaging and single used semi-finished and finished plastic imported goods, the Consultant assessed that approximately 64,000 tonnes per year were imported in the country over the last 3 years, with 14,000 tonnes per year for the Greater Accra region. The main imported semi-finished and finished goods are plastic bag with almost half of the total imported products tonnage. It is significant as there is already a large local production of plastic bags. It would mean that the consumption of plastic bags is high in Ghana, as already visually assessed at the waste level in Accra.

On average, over the last three years, the estimated annual quantity of the five types of plastic polymer in the municipal solid waste stream in Greater Accra region can be estimated at 150,000 tonnes (out of 185,000 tonnes of total plastic[14]) .

From these figures, it can be assessed that the raw plastic imported in Ghana represents 21% of the origin of the plastic waste tonnage that is found in the MSW stream, when semi-finished and finished goods represent approximately between 6% and 9% of plastic waste tonnage from MSW stream.

*Figure 20: Plastic importation and waste figures from 2016 to 2018*




A significant gap is noticed between importation figures and the plastics waste. This difference can be explained by several reasons:

- Plastic waste tonnages are based on assumptions including a margin of error;

[14] When looking at the plastics found out in the waste stream, those same plastics (LDPE, HDPE,PP, PET and PS) represent 81% of all plastic waste

- Plastic waste tonnages include all kinds of plastic waste generated at a municipal scale, when importation figures are focus on single use and packaging plastic only. Even if single use and packaging plastic is globally predominant in the municipal stream, additional tonnes of plastic can be considered;
- When the figures for primary plastic are expected to be quite exhaustive, the ones for semi-finished and finished products made of plastic focus only on some specific streams, as plastic bags.

In conclusion, the results highlight the fact that plastic waste found in the MSW stream comes in a large proportion from finished imported goods which are not accounted in the above figures (around 70%). PET bottle containing dishwashing detergent from Vietnam or HDPE bottle containing a shampoo manufactured in South Africa are two examples of these products. Therefore, only 20% of products made of plastic which are found in the MSW stream are from locally manufactured goods.

# ANNEX

## C. Technical Note #4: Institutional Study

# Technical Note #4

## *Institutional Study*

*Project Ref.*: GHSP00505E

*Date*: 07/06/2019

| General Information | | | |
|---|---|---|---|
| *Project* | Accra Plastics Management Pilot | | |
| *Client* | Department for International Development (DFID) | | |
| *Objective* | To assess the institutional context in relation to waste and plastics management. | | |
| *Recipients* | DFID | | |
| *Author* | Annie Humu, Legal Expert | | |
| *Approved by* | Marie Gouttebroze | | |
| *Version* | V1 | *Date* | 7 June 2019 |

## Table of contents

## List of Acronyms

| | |
|---|---|
| **AMA** | Accra Metropolitan Assembly |
| **CSIR** | Council for Scientific and Industrial Research |
| **EFR** | Environmental Fiscal Reform |
| **EIA** | Environmental Impact Assessment |
| **EPA** | Environmental Protection Agency |
| **FDA** | Food and Drugs Authority |
| **LUPSA** | Land Use and Spatial Planning Authority |
| **MESTI** | Ministry of Environment, Science, Technology and Innovation |
| **MINT** | Materials in Transition |
| **MLGRD** | Ministry of Local Government and Rural Development |
| **MDAs** | Ministries, Departments and Agencies |
| **MMDAs** | Metropolitan, Municipal and District Assemblies |
| **MoFEP** | Ministry of Finance and Economic Planning |
| **MoTI** | Ministry of Trade and Industry |
| **MSME** | Micro-, Small-, Medium-Enterprises |
| **MSWR** | Ministry of Sanitation and Water Resources |
| **NEP** | National Environment Policy, 2010 |
| **NESSAP** | National Environmental Sanitation Strategy and Action Plan |
| **NGOs** | Non-Governmental Organisations |
| **SEA** | Strategic Environmental Assessment |
| **STI** | Science, Technology and Innovation |

# 1. Introduction

## 1.1. Objective of the Technical Note

The objective of this technical note is to present an analysis of the institutions that are responsible for solid waste management in Accra and Ghana, focusing on plastic waste management. The institutional analysis encompasses the roles, responsibilities and capabilities of relevant institutions like the Accra Metropolitan Assembly (AMA) and the Environmental Protection Agency. Since most of these institutions are responsible for the implementation of government policies, the discussion on the institutional framework will be done in conjunction with the policy framework on solid waste management, including plastic waste.

## 1.2. Methodology

In reviewing the institutional framework on solid waste and plastics in Ghana, interviews were conducted with experts working in the various institutions, who provided material gathered for the analysis on a condition of anonymity. They provided relevant policy documents some of which are drafts that are currently being reviewed by cabinet. The main policies that form the basis of the analysis are the National Environment Policy, 2010, the Draft National Plastics Management Policy and the Draft Environmental Fiscal Reform Policy. The major institutions to be discussed include the Ministry of Environment, Science, Technology and Innovation (MESTI), The Ministry of Local Government and Rural Development (MLGRD), The Ministry of Sanitation and Water Resources (MSWR), the Environmental Protection Agency (EPA), Metropolitan, Municipal and District Assemblies (MMDAs) among others.

## 2. The Policy Framework

A review of relevant policies on solid waste and plastic waste reveals that there have been fragmented policies and efforts spanning about three decades. These initiatives have been under the auspices of various government institutions, key among which are MESTI, MLGRD and EPA.

### 2.1. The National Environmental Policy, 2010

The Ministry of Environment, Science, Technology and Innovation (MESTI) is responsible for the National Environmental Policy (NEP). The NEP recognises that "*Ghanaians are entitled to an environment that is not harmful to their health and well-being and are enjoined to have the environment protected for the benefit of present and future generations through reasonable legislative and administrative measures. This is in adherence to the global principle of sustainable development.*"[1] NEP also encapsulates some important principles of international environmental. First, in consonance with the principle of prevention, Government is mandated to anticipate problems and prevent negative impacts on the environment and on people's environmental rights. Another important principle is the polluter pays principle, per which NEP recognises that those responsible for harm caused to the environment must bear the cost associated with mitigating such harm.[2]

The NEP specifically deals with waste management. NEP makes it imperative for waste to be minimised, and that waste at source be avoided. Additionally, recycling, separation at source, waste-to-energy practices and safe disposal of unavoidable waste are incumbent upon Government, municipal and district administrations.[3]

Waste management is further discussed under section 4.0 of NEP which focuses on sectoral environmental policies. Section 4.10 states the following policy objectives for waste management:

- "*To reduce and manage waste generated in urban areas as a result of residential and economic activity*
- *To regulate and monitor waste production, enforce waste control measures and consolidate waste management under metropolitan, municipal and district administrations*
- *To set targets to minimise waste generation at the different levels.*
- *To promote a hierarchy of waste management practices, namely reduction of waste, reuse, recycling and safe disposal as the last resort*
- *To promote the adoption of waste-to-energy practices*
- *To educate the general public on littering*
- *To provide incentives to adopt affordable and appropriate technologies in waste management.*
- *To promote and nurture sound partnerships between and among government, communities and the private sector in the development of an integrated sanitation delivery system and to foster the supplementary role of NGOs in the urban areas.*
- *To introduce effective policies and incentives to encourage waste producers to adopt cleaner production processes and minimise waste generation*".

Section 4.11 deals with pollution prevention and control and spells out the following policy objectives:

- "*To prevent, reduce and control pollution of any part of the environment resulting from any form of human activity especially toxic and other hazardous substances.*
- *To set targets to minimise waste generation and pollution at source.*
- *To regulate and monitor waste production, enforce waste control measures, and coordinate administration of integrated pollution control and waste management under a decentralised system....*
- *To enforce the guidelines for the location and management of sanitary landfill sites.*
- *To review and develop guidelines for waste disposal, public and industrial waste disposal systems*".

### 2.2. National Environmental Sanitation Strategy and Action Plan

[1] National Environmental Policy, 2010, Section 3.0
[2] Ibid, Sections 3.4.13-14 0
[3] Ibid section 3.4.15

The Ministry of Local Government and Rural Development is responsible for the National Environmental Sanitation Strategy and Action Plan, 2010 (NESSAP) which serves as the main policy on waste management in Ghana. The Preface to and the Executive Summary of NESSAP provide inter alia the following, as the purpose of NESSAP and MINT:

- Raising awareness for changing the sanitation behaviour
- Creating "green collar" jobs
- Reducing the costs of waste management for Metropolitan, Municipal and District Assemblies (MMDAs)
- Providing clear strategies and action plans to guide MMDAs
- Covering all aspects of sanitation
- Serving as a guide to all sector actors: Ministries, Departments and Agencies (MDAs), Private Sector Development Partners, NGOs, Traditional Authorities and the Media, to achieve incremental improvements over a long-term period (2008 – 2025).

77. Sustainable Financing and Cost Recovery – as a rule, the polluter pays principle will be applied in determining levies, fees and fines to meet the cost of services for waste management.

108 NESSAP's central philosophy is the *MINT* which entails changing perceptions on both solid and liquid wastes by adding value to waste at various stages of the production and consumption cycle.

118 NESSAP's 2010 Revised Environmental Sanitation Policy's broad principles include the following principles:

- "*Environmental sanitation services as a public good*
- *Environmental sanitation services as an economic good*
- *The polluter must bear the cost of polluting the environment*
- *Cost recovery must ensure value-for-money effectiveness and efficiency*
- *Equity and gender sensitivity must be improved*
- *Indigenous knowledge, diversity of religious and cultural practices must be acknowledged*
- *The precautionary principle must minimise activities that have the potential to negatively affect the integrity of all environmental resources;*
- *The principle of community participation and social intermediation*"

As part of its medium to long-term waste management strategy, NSSEP makes provision for the promotion of the use of biodegradable material and minimising the use of plastics.[4] NSSEP also envisages the use of biodegradable packaging materials as substitutes for plastics as part of achieving the policy objective of "*Reduction, Re-use, Recycling and Recovery* (4Rs)" under MINT[5]

From the foregoing, the MLGRD has in place a comprehensive medium to long term strategy in place to deal with solid waste and plastics waste management in Ghana. However, its role needs to be redefined in view of the creation of the Ministry of Sanitation and Water Resources.

## 2.3. The Draft National Plastic Management Policy, 2019

The Ministry of Environment, Science, Technology and Innovation (MESTI) is the lead institution responsible for the National Plastic Management Policy of the Government of Ghana. In discussing the National Plastic Management Policy, it is important to lay down a certain preamble i.e. as at the time of compiling this report, the Draft National Plastic Management Policy had been submitted to Cabinet, for which reason the key experts who spoke on the ground of anonymity were reluctant to discuss the Policy and strongly advised against commenting on same until such a time that Cabinet takes a decision on the matter. For this reason, it is important to note that this section of the report is tentative, pending Cabinet's decision on the Policy. It is therefore likely that the observations made on the Policy may no longer hold once Cabinet takes a decision on the Policy.

[4] Table 4.3 under Section 442 of NSSEP
[5] Ibid, paragraph 445

Section 1 of the Policy which serves the introduction, provides an overview of the policy. It provides among others that the Policy aims at comprehensively addressing the enormous challenges associated with the management of plastics in Ghana. In consonance with a number of the United Nations Sustainable Development Goals (SDGS), the main objectives of the policy are to:

- Improve the state of the environment and public health
- Reduce pressure on the utilisation of the country's national resources
- Minimise Ghana's dependence on imported finished products
- Contribute to the socio-economic development of Ghana by creating jobs particularly for vulnerable groups.

The Policy provides an integrated management system for the management of plastics premised on the following key activities:

- Behavioural change
- Strategic planning and cross-sectoral collaboration
- Resource planning towards a Circular economy; and
- Good governance, inclusive and shared accountability.

An important component of the policy is the Waste Hierarchy which recognises the waste phase in the lifecycle of plastics as the one that poses the highest threat to public health. For this reason and in conjunction with internationally recognised priorities, the Policy embraces the reuse, recycling and recovery of plastics with disposal as a last resort in the event that it cannot be avoided.

Section 1 provides an overview of plastics, their impacts on human health, the air, the marine environment, water, land etc. Also captured in this section are the effects of plastics on national development and the various efforts made from the late 19880's to deal with plastic waste in the country including attempts at banning plastics, plastic waste management, economic disincentives and the segregation of waste among others. Section 1.3.1 of the policy clearly provides that the Government has no immediate intention of placing a ban on plastics in view of the important role they play in the economy.

Per Section 1 of the Policy, "the aim of the Policy is to comprehensively manage plastics across their life cycle as a vehicle for sustainable national development." The policy likens plastics to a double-edged sword in view of the positive impacts of plastics on the economy, and paradoxically, their negative impacts on the environment and the economy. The foregoing provides the justification for a "Plastics Management Policy which sets the framework for the proper and sustainable management of plastics across their life-cycle, across the economy and across Ghana's diverse society."

Section 1.3.3 captures a positive outcome of the threat to ban the sale and distribution of sachet water in the Accra Metropolitan Assembly (AMA). As a result of that threat, the Plastic Waste Management Project was initiated by plastic film manufacturers in 2007 to raise funds for plastic waste management projects (defunct Plastic Waste Recycling Fund). The project was also responsible for the introduction of plastics waste guards to prosecute persons littering plastics.

Section 1.3.7 of the Policy reveals that the waste segregation action introduced by EPA in 2014 has not been much of a success, although it appears to be improving.

One can glean from Section 1.3.8 of the Policy that there have been several initiatives spanning approximately 3 decades to deal with plastics in Ghana but most of the initiatives have not been successful due mainly to luck of funds. Information asymmetry between the government and its stakeholders has also been an impediment to the success of those initiatives. Other factors identified by the policy that have negatively impacted the outcome of the various initiatives weak enforcement of applicable laws, lack of technological know-how, inadequate coordination between government agencies and relevant stakeholders among others.

Under Section 1.3.5 of the Policy, the Plastic Waste Recycling Fund provided for under the Customs and Excise (Duties and Other Taxes) (Amendment) Act, 2013 (Act 863) is discussed. The Policy seeks to address the non-establishment of the Fund to achieve the purpose of Act 836.

Section 1.3.6 of the Policy paints a glum picture of the National standards for use of Oxo-biodegradable additives in the production of flexible plastics below 20 microns as those plastics continue to be sued notwithstanding directives issued by MESTI and the National Standards for the use of oxo-biodegradable additives issued by EPA in 2018.

The Policy Orientation is tackled under Section 2, dealing inter alia with the vision, aim, objectives and guiding principles of the Policy. From Section 2.1, it is comforting to note that previous efforts at dealing with the plastic menace informed the process involved in arriving at the Policy. According to Section 2.2.1, the government's vision is "to grow the economy, create jobs, protect the environment, including the mitigation of climate change through the application of science, technology and innovation for sustainable development." The Aim of the Policy which is captured under Section 2.2.2 is to "comprehensively manage plastics to address current environmental challenges and also as a vehicle of sustainable development." The main policy objective as captured under Section 2.2.3 "is to develop a comprehensive blueprint on how to manage plastics and plastic waste in the country." Out of this broad objective, three specific objectives have been carved out, that is to:

- Assess options for the effective management of plastics
- Develop strategies to help the effective management of plastics
- Develop a communication and education strategy and plan for the implementation of the policy.

Section 2.24 provides 10 guiding principles which include the following:

- The precautionary principle
- The polluter pays principle
- The principle of accountability
- The principle of coordination.

Under Section 2.2.5 which deals with systemic pillars and cross-cutting issues, finance is identified as the major challenge to sustainable plastic management.

Section 2.2 encapsulates the scope of the policy, which is to serve as a guide to "all Governmental, statutory, industry, non-governmental and civic entities which are involved in , or which may seek to become involved in importation, manufacturing, use, management, recycling of plastics and particularly activities addressing adverse impacts posed by plastics on the environment and human health."

Section 3 of the policy spells out the Strategic Actions of the Policy which are based on the following focus areas:

- Behavioural change
- Strategic planning and cross-sectoral collaboration
- Resource mobilisation towards a Circular Economy, and
- Good governance, inclusiveness and shared accountability.

An important component of Section 3 is the Waste Hierarchy which recognises the waste phase in the lifecycle of plastics as the one that poses the highest threat to public health. For this reason and in conjunction with internationally recognised priorities, the Policy embraces the reuse, recycling and recovery of plastics with disposal as a last resort in the event that it cannot be avoided.

Strategic Actions

Section 3 enumerates 17 strategic actions for plastics management, including the following:

- The establishment of a National Communication and Education Strategy for behavioural change etc.
- Encouraging the use of alternatives for product applications that are unnecessarily short lived
- Establishing recycling targets at the national, regional and local levels
- Developing national, regional and local action plans for plastics management, with an emphasis on waste segregation
- Promoting local research and development in plastic management
- Encouraging and supporting locally appropriate recovery and recycling technologies and service models

- Establishing a Plastics Trading Platform and Resource Locator
- Developing a nationally coordinated Resource Mobilisation Strategy
- Institution of an Environmental Tax regime
- Establishment of Green Public Procurement guides
- Establishment of an Extended Producer Responsibility on consumer products
- Establishment of a Resource Recovery Secretariat to facilitate the implementation of the policy
- Development of a robust regulatory framework for plastics management
- Phasing out of the most hazardous plastics grades and product applications.

The roles of various stakeholders and the legal and regulatory frameworks are provided for in Section 4 of the Policy which is entitled Policy Context. Section 4.1.1 identifies relevant public sector institutions to include the following:

- Ministry of Environment, Science and Technology
- Ministry of Sanitation and Water Resources
- Ministry of Local Government and Rural Development
- Ministry of Finance
- Ministry of Education
- Ministry of Information
- Ministry of Gender, Children and Social Protection
- Ministry of Tourism, Arts and Culture
- Parliament
- National Development Planning Commission
- National Commission on Civic Education

Conspicuously missing from the list above is the Ministry of Health which, as indicated in the report on the regulatory framework, is a key partner for effective waste management in Ghana. The Specific roles to be played by the above-listed institutions will be discussed in Section 4 of this report.

## 2.4. Draft Environmental Fiscal Reform Policy

Like the National Plastics Management Policy, the Draft Environmental Fiscal Reform (EFR) Policy is currently before cabinet, for which reason a copy could not be made available by the key institutions responsible for the policy *viz.* The EPA and MoFEP. Again, experts at key government institutions spoke on the condition of anonymity and strongly advised against the commenting on the EFR Policy until Cabinet communicates its decision on the matter. For this reason, this section of the report is likely to be affected by the final version of the Environmental Fiscal Reform Policy. This section has recourse to a presentation on the Strategic Environmental Assessment (SEA) of the Environmental Fiscal Reform Policy made by the Environmental Protection Agency at the La Palm Royal Beach on 21st June, 2018.

- According to the EPA, the purpose of the EFR Policy is to “facilitate economic growth, build a climate resilient society, promote green technologies and innovation, low-carbon development, sustainable consumption and production, and practices that lead to the sustainable use of natural resources. Additionally, the (EFR) Policy provides strategic direction and coordination towards achievement of Sustainable Development Goals (SDGs).” According to the EPA, the scope of the SEA on the EFR Policy includes:
- Existing baseline information on Ghana’s environmental fiscal policy regime; taxes, incentives, subsidies and institutional arrangements
- Analyses of the fiscal policy to identify interventions for “win win” opportunities for both the environment and poverty reduction
- Capacity building for relevant stakeholder institutions.

Of the 7 thematic areas under the SEA of the EFR Policy, the most relevant is waste management which focuses on packaging, product and plastic tax and EFR incentives for municipal waste management. If approved and effectively implemented, the EFR Policy will remove a major impediment (lack of sustainable funding) to the effective management of waste in general and plastic waste in particular.

# 3. Institutional Framework

Section 4 of the Draft National Plastics Management Policy provides an overview of institutions germane to the management of plastics in Ghana. These include government ministries, academic and research institutions, the private sector, civil society, traditional authorities, faith-based organisations

## 3.1. Ministry of Environment, Science, Technology and Innovation (MESTI)

MESTI is the lead government institution mandated to deal with the environment, science, technology and innovation in Ghana. According to Section 4.1.1.1 of the Policy its mandate includes the integration of environmental issues into the policy planning and national development process. The EPA, the Land Use and Spatial Planning Authority (LUSPA) and the Council for Scientific and Industrial Research (CSIR) is one of the agencies established under MESTI in furtherance of its mandate. This section of the Policy acknowledges the role that other government ministries have to play in the implementation of the Policy and the need for MESTI to collaborate with them to ensure the application of science, technology and innovation (STI). Most importantly, MESTI will serve as the coordinating Ministry with direct responsibility over the Resource Recovery Secretariat created by the Policy.

## 3.2. Ministry of Sanitation and Water Resources (MSWR)

MSWR is a relatively new government Ministry established for the purpose of formulating and coordinating policies and programmes that will systematically lead to the development of Ghana's infrastructure requirements for sanitation among others. Section 4.1.1.2 of the Policy calls on MSWR to streamline issues of sustainable plastics management within its budget and medium-term Development Plans. Another key role the Policy urges MSWR to play is the adoption of ownership of the Policy's Strategic Actions pertaining to plastics waste management and water supply.

## 3.3. Ministry of Local Government and Rural Development (MLGRD)

MLGRD is responsible for decentralisation through the 16 regional administrations in Ghana which are further sub-divided into 260 Metropolitan, Municipal and District Assemblies (MMDAs). Section 4.1.1.3 of the policy requires MLGRD to mainstream the Policy within the local Government structure. Prior to the creation of MSWR MLGRD has always been a lead institution for waste management in Ghana, working through its waste Management and District Health Departments. The National Plastic Policy does not address the overlap of functions between MLGRD and MSWR. To ensure a smooth implementation of the National Plastics Management Policy, it is imperative for the Policy to take cognisance of the potential overlap in functions with respect to these two Ministries. A clear indication of the specific roles that each of this Ministries will play in the implementation of Policy would obviate potential turf wars that could adversely affect the implementation of the Policy.

## 3.4. Ministry of Finance and Economic Planning (MoFEP)

MoFEP is responsible for the formulation and implementation of sound fiscal and financial policies and the improvement of public financial management. Under Section 4.1.1.4 of the Policy, MoFEP is tasked with the effective mobilisation of funds from the public, private, domestic and foreign sources to support the implementation of the Policy. This Section of the Policy refers to a National Resource Mobilisation Strategy which provides details on MoFEP's task.

## 3.5. Ministry of Education

The Ministry of Education is listed under Section 4.1.1.5. As the government Ministry responsible for research, apprenticeship, skills development and capacity building, it has been identified as a key actor for the purpose of behavioural change and research and development in to innovative practices and technologies. It has been tasked to revise curricula to incorporate topics on sustainable plastics management among others.

## 3.6. Other Government Institutions

The Ministry of Information, Ministry of Gender, Children and Social Protection, Ministry of Tourism, Arts and Culture, Parliament, the National Development Planning Commission and the National Commission on Civic Education are other institutions that have been identified as having various roles to play in the implementation of the policy.

### 3.7. Academic and Research Institutions

Section 4.1.2.1 of the Policy targets University to fill behavioural, technical and professional gaps for effective plastics management in the economy.

### 3.8. The Private Sector

Section 4.1.3 of the Policy identifies the following actors in the private sector as having key roles to play in the management of plastics:

- The Private Enterprise Foundation
- Association of Ghana Industries
- Recycling Companies
- Accra Plastics Management Project
- Plastics Waste Collectors Association
- Micro-, Small-, Medium-Enterprises (MSME)

One key role the private sector is projected to play is the expansion of the plastics recycling industry.

### 3.9. Other Relevant Actors

Section 4.1 of the report also takes into account the diverse roles that other stakeholders like Civil Society Organisations, Traditional Authorities, Faith-based Organisations need to play to achieve the policy goals.

### 3.10. The Resource Recovery Secretariat

In conjunction with the National Plastics Management Policy, MESTI has also prepared the National Plastics Policy: Resource Secretariat: Initial Structure and Staffing (Resource Recovery Secretariat Document) as a guide to the establishment of a Resource Recovery Secretariat. In addition to the Resource Recovery Secretariat Document is the National Plastics Policy Implementation Plan and Budget: Programme and Budget. The Secretariat is projected to be responsible for the National Plastics Management Policy. Section 1 of the Resource Recovery Secretariat Document assigns the Resource Recovery Secretariat five (5) key strategic actions:

1. Encouraging behavioural change towards sustainable plastics management
2. Facilitating strategic planning and cross-sectoral collaboration
3. Accelerating innovation and transition towards a Circular Economy
4. Deploying means of resource mobilisation
5. Supporting good governance, inclusiveness and accountability.

Section 2 of the Resource Recovery Secretariat Document states that the mandate of the Secretariat is to achieve the aim and strategic actions of the National Plastics Management Policy. The Secretariat is to become “a permanent operational independent organisation.” The Resource Recovery Secretariat Document acknowledges the fact that the Resource Management Secretariat will need to engage a wide range of stakeholders cutting across various government institutions, the private sector, bilateral and multinational institutions and NGOs among others. Structurally, the Secretariat is expected to have a cross-sectoral Governing Board to represent the interests of the various stakeholders in the value chain and life cycle of plastics.

To align with the 5 key strategic actions of the Resource Recovery Secretariat Document, the Resource Recovery Secretariat Document proposes the following 5 Divisions for the Resource Recovery Secretariat:

1. Behaviour Change

2. Planning and Collaboration
3. Innovation
4. Resource Mobilisation
5. Good Governance.

Each of this Divisions is to be headed by a Director, under the leadership of an Executive Director, who together will serve as the Management Team of the Resource Management Secretariat.

Section 4 of the Resource Recovery Secretariat Document identifies government ministries, government agencies, traders, producers, waste management institutions, civil society and academia as key stake holders to be part of governance structure of the Resource Recovery Secretariat. Apart from the MESTI, the Resource Recovery Secretariat Document identifies the Ministry of Sanitation and Water Resources, MoTI, MoFEP and Ministry of Education as the Ministries to be represented under the proposed governance structure of the Resource Management Secretariat. Conspicuously missing are the MLGRD and the Ministry of Health which are indispensable stakeholders for waste management in Ghana.

The Environmental Protection Agency, the Department of Factories Inspectorate, the Ports and Harbours Authority, the Food and Drugs Authority and the Ghana Standards Authority are identified as the main government agencies that need to be represented on the governing structure of the Resource Management Secretariat.

The Resource Recovery Secretariat Document lists Local Government Waste Management Authorities, waste collectors, plastics collectors, recyclers and remanufacturers as key stakeholders.

Section 6 of the Resource Recovery Secretariat Document deals with financing and recommends the four approaches to resource mobilisation, the first three of which are premised on Strategic Actions 13, 12 and 11 respectively of the National Plastics Management Policy:

- The Plastic Waste Recycling Fund established under the Customs and Excise (Duties and Other Taxes) (Amendment) Act, 2013 (Act 863)
- Extended Producer Responsibility
- Plastic Certificate Trading Scheme
- Donors and Philanthropists.

The Resource Recovery Secretariat Document laments the fact that the Plastic Waste Recycling Fund has not been established although importers of some plastic products have been paying the tariff since 2013.

### 3.11. The Courts

Although the various policies identify lack of enforcement of applicable laws as a major obstacle to waste management in Ghana, they omit the judiciary and other dispute resolution institutions as part of the institutional framework for waste management in Ghana. In 2001 the government introduced automated court systems for the speedy resolution of a certain category of disputes as part of measure to boost investor-confidence in Ghana. This legal expert observed that environmental disputes had been omitted from the category of cases that could be initiated at the Fast Track Court, the automated division of the High Court and collaborated with the then President of the Greater-Accra Bar Association, Nii Osah Mills and the then Executive Director of EPA, Dr. Phillip Acquah to petition the Judicial Service to have environmental issues added to the category of cases that could be initiated at the Fast Track Division of the High Court. It is for this reason that environmental cases have since 2001 been initiated at the Fast Track Division of the High Court for the speedy resolution of disputes. The role of the judiciary is crucial for waste management in Ghana and should be acknowledged in the relevant policies on plastic wastes.

## 4. Conclusions and Recommendations

The various policies on waste management and plastics management are quite comprehensive to spur government action to effectively deal with plastics in Ghana. However, the specific roles of certain key institutions like MLGRD and MSWR need to be clearly defined to avoid an overlap of functions and turf fighting that could jeopardise the management of plastics in Ghana. Also, a major set-back to effective waste management and plastics management has been lack of sustainable funding and technological know-how. Also, the lack of enforcement mechanisms to ensure compliance with applicable laws requires effecting monitoring to encourage compliance and deter non-compliance through strict enforcement provisions that would deter both natural and artificial persons from flouting applicable laws. To enable Ghanaians adequately deal with the plastic menace, the various policies should have clear goals for the transfer of technology from foreign investors to indigenous stakeholders who will be playing various roles to promote a sustainable plastics industry in Ghana.

# ANNEX

## D. Technical Note #5: Regulatory Framework Study

SEURECA VEOLIA

# Technical Note #5

## *Study on the Regulatory Framework for waste and plastics management*

*Project Ref.*: GHSP00505E

*Date*: 07/06/2019

| General Information | | | |
|---|---|---|---|
| *Project* | Accra Plastics Management Pilot | | |
| *Client* | Department for International Development (DFID) | | |
| *Objective* | To assess the legal framework in relation to waste and plastics management. | | |
| *Recipients* | DFID | | |
| *Author* | Annie Humu, Legal Expert | | |
| *Approved by* | Marie Gouttebroze | | |
| *Version* | V1 | *Date* | 7 June 2019 |

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## List of Acronyms

| | |
|---|---|
| **AMA** | Accra Metropolitan Assembly |
| **EIA** | Environmental Impact Assessment |
| **EPA** | Environmental Protection Agency |
| **FDA** | Food and Drugs Authority |
| **L.I.** | Legislative Instrument |
| **PNDCL** | Provisional National Defence Council Law |

# 1. Introduction

## 1.1. Objectives of this Technical Note

The objectives of this Technical Note are to review and analyse the relevant Ghanaian legislation, applicable to the management of solid waste and plastics. This includes legislation that directly deals with plastics and solid waste issues, such as waste management, public health, environmental management and environmental taxation. It is therefore limited to the regulatory framework. The policy framework is discussed as part of the institutional framework submitted separately.

## 1.2. Methodology

The review of the regulatory framework on solid waste and plastics relies on primary sources of law currently in force in Ghana, *viz.* the 1992 Constitution of the Republic of Ghana, principal enactments and subsidiary legislation on the subject. Secondary sources used for the review include a text book on Ghanaian Environmental Law, public papers and the internet. Additionally, interviews were conducted with professionals whose roles interface in one way or the other with waste management in Ghana.[1]

## 1.3. Ghana's Legal System

Ghana is a unitary Republic which belongs to the Common Law Legal Tradition. Article 11 of the 1992 Constitution of the Republic of Ghana provides *inter alia* that the laws of Ghana include the 1992 Constitution, Enactments made by Parliament, Rules, Regulations and Orders made under a power conferred on the Constitution. Although the government appears committed to tackling plastic waste, [2] there are to date no laws that holistically deal with plastic waste in Ghana. The only law that directly deal with plastics is the Customs and Excise (Duties and Other Taxes) (Amendment) Act, 2013 (Act 863). The closest, the Government has come to passing laws to deal with plastics in Ghana is the directive issued by the Ministry of Environment, Science, Technology and Innovation (MESTI) requiring an oxo-biodegradable component in flexible plastics manufactured in or imported into Ghana. The directive took effect on 1st November, 2015.[3] It is therefore not surprising that Mr. Elias from the Ghana Wildlife Society recently identified the lack of laws and policies directly dealing with plastic wastes as a contributory factor to Ghana's plastic menace. [4] This lacuna necessitates a review of other laws that impinge on solid waste which *mutatis mutandis* could also apply to plastic waste in Ghana.

[1] Most of these professionals spoke on condition of anonymity.
[2] In his State of the Nation Address in February 2019, His Excellency the President of the Republic of Ghana discussed the plastic menace and the steps the Government intends to take to deal with the matter. Ghanaweb, General News of Thursday, 21 February 2019. Available at: https://www.ghanaweb.com/GhanaHomePage/NewsArchive/Full-Text-President-Akufo-Addo-s-SONA-2019-725124 Last visited, 14th April, 2019.
[3] Smith-Asante Edmund, Oxo-biodegradable directive in force: As technical committee meets on ban of plastic below 20 microns, Graphic online, General News of 11 Nov 2015. Available at: https://www.graphic.com.gh/news/general-news/oxo-biodegradable-directive-in-force-as-technical-committee-meets-on-ban-of-plastic-below-20-microns.html Last visited, 14th April, 2019.
[4] Elias,F *That Plastic could end up in your Food!* Ghanaweb, Opinions of Saturday, 2 March 2019. Available at: https://www.ghanaweb.com/GhanaHomePage/features/That-plastic-could-end-up-in-your-food-727547 Last visited, Sunday 14th April 2019.

## 2. The Regulatory Framework

In reviewing the existing regulatory framework on solid waste and plastic waste, due cognisance is taken of the hierarchy of laws in Ghana. This section begins with some relevant provisions of the 1992 Constitution of Ghana. This is followed by a review of relevant acts passed by Parliament and some subsidiary legislation passed by various Ministries under the executive branch of Ghana, to whom Parliament has delegated some of its legislative power.

### 2.1. The 1992 Constitution of Ghana

Article 36 (9) of the 1992 Constitution of the Republic of Ghana which forms part of the economic objectives under the Directive Principles of State Policy, imposes a duty on the State to "[…] *take appropriate measures needed to protect and safeguard the national environment for posterity and* […] *seek cooperation with other states and bodies for purposes of protecting the wider international environment for mankind.*" Notwithstanding that the Constitution does not expressly confer the right to a healthy environment on the people of Ghana,[5] the foregoing provision imposes a duty on the state to ensure that the quality of the environment is not adversely affected by plastic waste, to deprive both present and future generations of a clean and healthy environment.

Unlike the Constitutions of other jurisdictions, the Constitution of Ghana does not expressly confer the right to a healthy environment on citizens but rather imposes a duty on them to protect and safeguard the environment[6]. The Constitution of Ghana does however recognise other rights not explicitly provided for in the Constitution which are "… *inherent in a democracy and intended to secure the freedom and dignity of man*".[7]It goes without saying that the right to a healthy environment is inherent in a democracy and is germane to the freedom and dignity of man. It is thus safe to conclude that the Constitution of Ghana does recognise the right to a healthy environment.[8] A combination of the relevant constitutional provisions could provide a compelling reason for the Government to find lasting solutions to plastic waste in Ghana. This would enable people in Ghana enjoy their right to a clean and healthy environment.

### 2.2. The Environmental Protection Agency, Act, 1994 (Act 490)

The Environmental Protection Agency Act, 1994 (Act 490) was passed in 1994 to set up the Environmental Protection Agency (EPA) as the main statutory regulatory body, with the mandate to deal with environmental issues in Ghana. Pursuant to Section 2 of Act 490, the functions of the Agency include:

- Advising the minister on the formulation of policies on the environment and making recommendations for the protection of the environment
- Coordinating the activities of relevant bodies for the purposes of controlling the **generation, treatment, storage, transportation and disposal of industrial waste** *[emphasis by the author]*
- To secure by itself or in collaboration with any other person or body the control and prevention of discharge of waste into the environment and the protection and improvement of the quality of the environment
- Issuing environmental permits and pollution abatement notices for controlling the volume, types, constituents and effects of **waste discharges, emissions, deposits or any other source of pollutants** and of substances which are hazardous or potentially dangerous to the quality of the environment or a segment of the environment *[emphasis by the author]*

[5] For instance Article 39 of the 1995 Constitution of the Republic of Uganda provides that "Every Ugandan has the right to a clean and health environment." 1995 Constitution of the Republic of Uganda, available at: https://www.wipo.int/edocs/lexdocs/laws/en/ug/ug002en.pdf last visited on 14th April, 2019.
[6] Article 41 (k) of the constitution of Ghana.
[7] Article 33 (5) of the Constitution of Ghana.
[8] The National Environmental Policy, 2010 acknowledges the right to a clean and healthy environment in Ghana. See also Sarpong G.A. Ghanaian Environmental Law: International and National Perspective, 2018, Wildly, Simmonds & Hill Publishing, 62-71.

- To prescribe standards and guidelines relating to the pollution of air, water, land and any other forms of environmental pollution including the discharge of waste and the control of toxic substances[9]
- To ensure compliance with the laid down environmental impact assessment procedures in the planning and execution of development projects, including compliance in respect of existing projects
- To act in liaison and co-operation with government agencies, district assemblies and any other bodies and institutions to control pollution and generally protect the environment
- To perform any other functions conferred on it under this act or any other enactment
- To impose and collect environmental protection levies in accordance with this act and the regulations.

In 2002, EPA issued the Ghana Landfill Guidelines, and the Manual for the Preparation of District Waste Management Plans in Ghana.[10] The EPA has played a lead role in advising the Minister on the need for a national policy on plastics.[11]

To enhance EPA's mandate, Act 490 spells out some powers of enforcement and control, including the power to:

- Require a person responsible for an undertaking to submit an environmental impact assessment (EIA)[12]
- Issue an enforcement notice in respect of an undertaking which poses a serious threat to public health or the environment[13]
- Inspect premises to ensure compliance with relevant environmental laws[14]
- Request for information[15]

Thus, EPA could deal with plastic waste through the EIA procedure. EPA could also have recourse to enforcement notices, where plastic waste poses a serious threat to the environment or public health.

Section 62. empowers the Minister for Environment, Science, Technology and Innovation to promulgate regulations to deal *inter alia* with:

- The manufacture, importation, use, collection, storage, recycling, recovery or disposal of substances which may be hazardous to the environment
- The disposal of waste generally
- General matters for giving effect to act 490.

The Minister for Environment, Science, Technology and Innovation could therefore invoke Section 62 of Act 490 to promulgate regulations to deal with plastic waste in Ghana. Furthermore, The Environmental Protection Agency could be empowered by law to impose and collect plastic levies to manage plastic waste in Ghana. This could address concerns of the Ghana Plastic Manufacturers Association and other stakeholders in respect of the environmental excise tax which appears not to be addressing the plastic problem.[16]

## 2.3. Environmental Assessment Regulations, 1999 (L.I.1652)

One of the most important Regulations to have been passed to deal with environmental issues in Ghana is the Environmental Assessment Regulations, 1999 (L.I.1652). Pursuant to L.I. 1652, all undertakings likely to have an impact on the environment must be registered with the EPA. The EPA must issue a valid permit in respect

[9] This function overlaps with the respective mandate of the Standards Authority and the Food and Drugs Authority. This may be a contributory factor to the requirement of Section 4 of Act 490 that Standards Authority be represented on the EPA Board.
[10] Baddo C., *The challenges of waste management in Ghana: EPA's perspective,* Online Today, Feature Article of 8 July, 2014. Available at: https://www.todaygh.com/challenges-waste-management-ghana-epas-perspective/ Last visited, 14th April, 2019.
[11] According to the Ministry of Energy, the National Policy on Plastics is currently being reviewed by Cabinet and cannot be made public until it is finally approved by Cabinet..
[12] Section 12 of Act 490
[13] Section 13 of Act 490. Section 14 empowers the Minister responsible for the Environment to take appropriate steps to ensure compliance with an enforcement notice.
[14] Section 15 of Act 490
[15] Section 27 of Act 490
[16] 3news.com, Business News of Friday, 9 June 2017, Groups demand the over GHC100 million accrued from environmental tax. Available at: https://www.ghanaweb.com/GhanaHomePage/business/Groups-demand-the-over-GHC100-million-accrued-from-environmental-tax-546435 Last visited, 14 April 2019.

of that undertaking before such an undertaking can be commenced in Ghana. Depending on the nature of the undertaking, the process ranges from mere registration and permitting[17] to a thorough environmental impact assessment if the potential effect on the environment is high[18]. EPA can use EIA as an effective tool for dealing with the life cycle of plastics in Ghana. For instance, Section 11 of the First Schedule to L.I. 1652 requires manufacturers of plastics and plastic products to register with and obtain an environmental permit from the environmental protection agency. Section 15 of the Second Schedule to L.I. 1652 requires an environmental impact assessment to be conducted for the construction of municipal solid waste treatment and waste disposal facilities including the construction of recycling facilities, landfill sites and waste depots among others.

## 2.4. Local Governance Act, 2016 (Act 936)

Article 240 of the 1992 Constitution of Ghana provides for a decentralised system of governance. This has led to the promulgation of some laws to deal with local government in Ghana. Article 241 (3) of the Constitution of Ghana provides that, a District Assembly[19] shall be the highest political authority in the district, and shall have deliberative, legislative and executive powers.

The regulatory framework for local governance has undergone extensive reforms, leading up to the promulgation of the Local Governance, Act, 2016 (Act 936).Among others, District Assemblies are responsible for the development, improvement and management of the environment in their respective districts.[20] Health Officers of District Assemblies are also responsible for sanitary inspection under the Public Health Act, 2012 (Act 851).[21] Additionally, District Assemblies have been assigned some waste management functions under the Criminal Offences Act, 1960 (Act 29).[22]

Section 181 of Act 936 empowers District Assemblies to make bye-laws in furtherance of a function under Act 936 or any other enactment. The following bye-laws have been passed by the Accra Metropolitan Assembly:

- Accra Metropolitan Assembly (Sanitation) Bye-laws, 2017
- Accra Metropolitan Assembly (Environmental Protection) Bye-laws, 2017

Under AMA's Sanitation Bye-laws, AMA or its registered agent has the sole preserve of dealing with solid wastes within its area of authority. Section 11 of the AMA Sanitation Bye-laws proscribes the indiscriminate dumping of solid waste in open spaces, drains, etc. District Assemblies have a major role to play in dealing with solid wastes and plastics in Ghana. They could pass bye-laws to tackle the plastic problem in Ghana.

## 2.5. Local Government (Departments of District Assemblies) Commencement Instrument, 2009 (L.I 1961)

The Local Government (Departments of District Assemblies) Commencement Instrument, 2009 (L.I 1961) was passed under the Local Government Act, 1993, (Act 462) which was repealed by Act 936. Regulation 1 of L.I. 1961 establishes a number of Departments under District Assemblies[23], including the following:

- Waste Management Department
- District Health Department.

The District Health Department is responsible inter alia for promoting and encouraging good health and sanitation in the District.[24]:

[17] Regulation 1 of L.I.1652
[18] Regulation 3 of L.I. 1652
[19] Per Regulation 7.of the The Local Government (Departments of District Assemblies) Commencement Instrument, 2009 (L.I 1961) a "District Assembly" includes Metropolitan and Municipal Assemblies.
[20] Section 12 of Act 936
[21] Section 14 of Act 936.
[22] Section 13 of Act 936 mandates the District Assembly to carry out and execute Section 296 of Act 29, in respect of throwing rubbish in the street.
[23] See Schedule 1 to L.I. 1961
[24] Regulation 4 od L.I. 1961

Regulation 5 of L.I. 1961 mandates the Waste Management Department to provide facilities, infrastructural services and programmes for effective and efficient waste management for the improvement in environmental sanitation, protection of the environment and the promotion of public health.

The functions of the Waste Management Department include:

- Receiving and providing adequate treatment and effective disposal of solid waste;
- Treating and disposing of solid waste
- Inspecting and maintaining sanitary facilities in the metropolis
- Advising the Assembly on recycling and other uses of waste materials

Act 936 and L.I. 1961 confer enough powers on District Assemblies to tackle solid waste and plastics in Ghana.

## 2.6. Accra Metropolitan Assembly (Sanitation) Bye-laws, 2017

Pursuant to Section 181 of Act 936, the Accra Metropolitan Assembly (AMA) passed the Accra Metropolitan Assembly (Sanitation Bye-laws), 2017. Under these Bye-laws, AMA or its registered agent has the sole preserve of dealing with solid wastes within its area of authority. Section 11 of the AMA Sanitation Bye-laws proscribes the indiscriminate dumping of solid waste in open spaces, drains, etc.

## 2.7. Standards Authority Act, 1973 (NRCD 173)

The Standards Authority Act, 1973 (NRCD 173) was enacted for the purpose of promulgation standards to ensure high quality of goods and for related matters.[25] Section 1 of NRCD 173 establishes the Standards Authority. The aims and functions of the Standards Authority are found in Sections 2 and 3 of NRCD 173 respectively. The aims of the Authority are *inter alia* to establish and promulgate standards with the object of ensuring high quality of goods produced in Ghana, whether for local consumption or for export; and to promote standards in public and industrial welfare, health and safety. Among other functions, the Standards Authority is responsible for:

- Assisting government departments, local authorities and any other public bodies in the preparation of the specifications required by them
- Prohibition of the sale or manufacture of goods in the national interest
- Cooperating with representatives of industry, a government department, a local authority or any other public body for the adoption of standards.

Therefore, the Standards Authority has to power to ban plastics to serve the national interest. Alternatively, the Standards Authority could collaborate with EPA, local authorities and other relevant stakeholders for the adoption of standards that could form the basis of a life cycle approach to the management of plastics in Ghana.[26]

## 2.8. The Customs and Excise (Duties and Other Taxes) (Amendment) Act, 2013 (Act 863)[27]

From 2010, the Government of Ghana started to impose taxes on the import of plastics, at a rate of 20% which over the years was reduced to 15%. The Customs and Excise (Duties and Other Taxes) (Amendment) 2013 (Act 863) was promulgated among others for the purpose of reviewing the environmental excise tax on plastic and plastic products downwards to 10%.[28] Act 863 requires at least 50 % of the revenue accruing from plastics listed under chapters 39 and 63 of the Harmonised Systems and Customs Tariff Schedule 2012 to be

[25] Long Title of NRCD 173/
[26] The Ghana Standards Authority, Catalogue of Ghana Standards, 2018 contains some standards on some plastics.
[27] Act 863 repeals Tariff No. 6 of the Customs and Excise (Duties and Other Taxes) Act, 2012 (Act 840) pursuant to which the tax on plastics stood at 15 %
[28] Long Title of Act 863

paid into a designated Plastic Waste Recycling Fund. Chapter 39 lists a wide range of plastics and plastic products, including various forms of polymers. Chapter 63 lists a few plastic products.

The Plastic Waste Recycling Fund is to be dedicated to the recycling of plastic waste, production of plastic waste bins and bags and the production of biodegradable plastics.[29]

The Minister Responsible for Local Government and Rural Development is required to act in consultation with the Minister responsible for Finance to specify how the moneys accruing from the fund should be used.[30] To adequately deal with plastic waste in Ghana, an inter-sectoral Committee could be set up, comprising representatives of key government agencies like EPA, Ministry of Local Government and the Ghana Plastic Manufacturers Association. Such a Committee could issue guidelines for the setting up and administration of the Plastic Waste Recycling Fund.

## 2.9. Public Health Act, 2012 (Act 851)

The purpose of the Public Health Act, 2012 (Act 851) is to "*revise and consolidate the law relating to public health to prevent disease, promote, safeguard, maintain and protect the health of humans and animals and to provide for related matters*." Act 851 also establishes the Foods and Drugs Authority (FDA)[31]. The salient provision of Act 851 that deals with wastes is section 56 which provides as follows:

"*A person who*

*(a) within the area of authority of a District Assembly or any other public place or space causes or permits to be placed a carrion, filth, dirt, refuse, or rubbish, or any other offensive or otherwise unwholesome matter, on a street, yard, an enclosure, or open space except at the places set apart by the local authority or the environmental health officer for that purpose, or*

*(b) causes or contributes to the creation of a nuisance in a public place which is part of or which adjoins a dwelling-house,* […] *commits an offence and is liable on summary conviction to a fine of not more than two hundred and fifty penalty units, or to a term of imprisonment of not more than three years or to both*."

Part 7 of Act 851 deals with food and drugs and Section 80 establishes the FDA for the purpose of providing and enforcing standards for the sale of food and other products. Among others, the FDA is mandated to ensure adequate and effective standards for food, cosmetics, household chemicals and medical devices; monitor through the District Assemblies and any other agency of State compliance with the provisions of Part 7 of Act 851[32].

## 2.10. The Renewable Energy Act, 2011 (Act 831)

The purpose of the Renewable Energy Act, 2011 (Act 831) is to "provide for the development, management, utilisation, sustainability and adequate supply of renewable energy for generation of heat and power and for related matters."[33] Section 2 of Act 831 defines "renewable energy" to include landfill gas and any other energy source designated in writing by the Minister for Energy. Section 51 of the Act defines "biogas" to include gas produced by the biological breakdown of municipal waste and green waste. Section 51 also defines industrial waste as "waste produced as a result of the industrial activity in a factory, mill or mine but that is neither hazardous nor toxic …" Municipal waste is also defined in Section 51 of Act 831 to include "waste that arises from domestic activity and is predominantly household, commercial waste collected within a municipal area in … solid form but excludes industrial hazardous or toxic waste." Act 831 provides a legal basis for the use of waste as energy in Ghana.

## 2.11. 2015 Directive On Flexible Plastics

[29] Section 3 of Act 863
[30] Section 4 of Act 863
[31] Section 175 of Act 863 repeals the Food and Drugs Act, 1992 (PNDCL 305B)
[32] Section 82 of Act 851
[33] Long title of Act 831.

In July, 2015, the Ministry of Environment, Science, Technology and Innovation (MESTI) followed the recommendation of a Committee that had been Commissioned in 2010 to advise MESTI on tackling plastic waste in Ghana to issue a number of directives on flexible plastics. Among others, stocks of flexible plastics were to have been cleared by October, 2015; all flexible plastics produced in the country were required to have biodegradable components by November, 2019; and all flexible plastics below 20 microns produced in the country and those imported were to be banned by November, 2019.[34]

[34] Press Release of the Ministry of Environment, Science, Technology and Innovation on Plastic Waste Management in Ghana, 27th July, 2015.

## 3. Conclusion and Recommendations

A review of the existing regulatory framework reveals that there is no major legislation dealing with plastic waste in Ghana. Apart from the Customs and Excise (Duties and Other Taxes) (Amendment) Act, 2013 (Act 863) the closest, MESTI's 2015 oxo-directive which requires an oxo-biodegradable component in plastics manufactured in or imported into Ghana is the main step the Government of Ghana has taken to directly deal with plastics in Ghana. There are however fragmented laws on waste management that fall under different agencies. The main laws that deal with solid waste in Ghana are the Environmental Protection Agency Act,1994 (Act 490) and the Local Governance Act, 2016 (Act 936) and subsidiary legislation passed under those respective laws.

To expeditiously deal with plastic waste, there needs to be a comprehensive law that would consolidate and enhance the existing regulatory framework on solid waste in general and plastic waste in particular. This requires expedited action on the adoption of a national plastic policy, which is currently being considered by cabinet. Once approved by cabinet the national plastic policy would pave the way for the much-needed regulatory reforms to holistically deal with the problem of plastics in Ghana.

## References

**National Constitutions**

The 1992 Constitution of the Republic of Ghana

**Enactments**[35]

Criminal Offences Act, 1960 (Act 29)

Customs and Excise (Duties and Other Taxes) (Amendment) Act, 2013 (Act 863)

Environmental Protection Agency, Act, 1994 (Act 490)

Local Governance, Act, 2016 (Act 936)

Public Health Act, 2012 (Act 851)

Standards Authority Act, 1973 (NRCD 173)

Environmental Assessment Regulations, 1999 (L.I.1652)

The Local Government (Departments of District Assemblies) Commencement Instrument, 2009 (L.I 1961)

Accra Metropolitan Assembly (Sanitation) Bye-laws, 2017

Accra Metropolitan Assembly (Environmental Protection) Bye-laws, 2017

**Text**

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Ghana Standards Authority, Catalogue of Ghana Standards, 2018

Smith-Asante Edmund, Oxo-biodegradable directive in force: AS technical committee meets on ban of plastic below 20 microns, Graphic Online, General News of 11 Nov 2015. Available at: https://www.graphic.com.gh/news/general-news/oxo-biodegradable-directive-in-force-as-technical-committee-meets-on-ban-of-plastic-below-20-microns.html Last visited, 14th April, 2019.

3news.com, Business News of Friday, 9 June 2017, Groups demand the over GHC100 million accrued from environmental tax. Available at: https://www.ghanaweb.com/GhanaHomePage/business/Groups-demand-the-over-GHC100-million-accrued-from-environmental-tax-546435 Last visited, 14 April 2019.

Nana Addo Danquah Akuffo-Addo, State of the Nation Address, February 2019

[35] These laws have been listed in hierarchical and alphabetical order.

## ANNEX

### E. Summary of Plastics Management Initiatives

## Annex F: Summary of Plastics Management Actors

Numerous initiatives were identified during the APMP, led either by private companies, institutions, NGOs or international organisations. The table below provides a brief description of each initiative/project.

| Name of the company / of the initiative and leading organisation | Description | Type of polymer | Category/ies (some belong to more than one category as they perform different activities) |
|---|---|---|---|
| Accra Compost And Recycling Plant (ACARP) - subsidiary of the service provider ZoomLion | Recycling and compost plant based in Adjen Kotoku. Sorting of mixed MSW, production of compost, baled PET, HDPE pellets and LDPE pellets | PET, HDPE, LDPE | 6. Collector/Aggregator: sorting centre<br>7. Recycler (pellets) |
| APMP - an initiative funded by the DFID | Catalyst to initiate, enhance and fund pilot projects. Integrator to coordinate the efforts of the various initiatives. Early action of the GPAP. | All types | Project funded by an international organisation (DFID) |
| Blowplast | Major plastics importer, producer and manufacturer (water sachets, bottled water, bags etc.).<br>Production of plastic bags made of recycled LDPE and HDPE (water sachets are often mixed composition).<br>For PS, the company re-processes only its own post-production waste. | LDPE, HDPE, PS | 1. Importer<br>2. Producer (plastic bags made of r-LDPE and r-HDPE)<br>3. Manufacturer |
| Cash-It! Recycling Plant - project implemented by Asase Foundation (NGO) | Cash-It recycling plant based in Katamanso. Buying HDPE and LDPE from women waste pickers. LDPE not yet recycled, production of HDPE flakes. | HDPE, LDPE | 6. Collector/Aggregator: sorting centre<br>7. Recycler (flakes) |
| Charkieh Plastics & Packaging | Manufacturer of PP buckets and basins based in Jamestown. Use of both virgin and recycled pellets for the production.<br>Production of r-LDPE and r-HDPE plastic bags. | PP, LDPE, HDPE | 3. Manufacturer (long-lasting plastic buckets / basins made of r-PP)<br>2. Producer (of plastic bags) |

| | | | |
|---|---|---|---|
| Coliba | Start-up implementing plastics collection points for PET and HDPE (over 40) in Accra (#iRecycle project). Creation of a mobile application to facilitate plastics collection performed with tricycles. Settling of 8 aggregators in different communities. Production of PET flakes, exported to Canada. Collected HDPE is sold locally. | PET, HDPE | 6. Collector/Aggregator: company doing plastics collection<br>7. Recycler (flakes) |
| Environment 360 (NGO) | Implementation of the Pick-It Sorting Centre in Tema. Education and sensitisation of waste pickers. Development of plastics residential collection in Tema. Development of a plastic collection system in Jamestown and Old Fadama (areas close to the beaches where plastics are accumulating). Collection of plastics via collection points (bins) in Accra.<br>Production of PET flakes, exported to Europe (Germany). Other materials at Pick-It Sorting Centre (HDPE, LDPE) are sold locally. | PET, HDPE, LDPE, PP | 6. Collector/Aggregator: sorting centre<br>7. Recycler (flakes) |
| Ezov Environmental Services | Recycling company based in Pokuase. Production of flakes from PET, HDPE and PP. Some are used in Ghana, some are exported (Turkey). Collected plastics include containers of hazardous waste (agri chemical products). | HDPE, PP, PET | 7. Recycler (flakes) |
| FinePack | Major producer of plastics packaging. Recycling of its own post-production waste, and some of its client post-production waste into pellets, directly used for new production. No recycling of post-consumer plastic waste. | LDPE, HDPE, PP & Composite | 1. Importer<br>2. Producer (films, packaging, some made of recycled pellets) |

| | | | |
|---|---|---|---|
| GPAP - an initiative hosted by the World Economic Forum | Private-public platform with the aim to enhance stakeholders collaboration in order to translate political and corporate commitments into tangible strategies and investible action plans. The GPAP will officially launch its project in Ghana in August 2019. | All types | Project hosted by an international organisation (WEF) |
| GRIPE - led by ten members: Dow Chemical, Nestle, FanMilk, Unilever, Coca-Cola, PZ Cussons, Voltic, Diageo, KGM, FinePack | Industry-led coalition to integrate sustainable solutions, particularly for plastics. The GRIPE supports the following projects: #iRecycle, Pick-it, Cash-It. | All types | 3. Manufacturers - initiative formed by large manufacturers |
| Lynamps | Company collecting PET from specific organisations (churches, schools, companies, event center, etc.). Production of PET flakes. | PET | 6. Collector/Aggregator: company doing plastics collection<br>7. Recycler (flakes) |
| #iRecycle - implemented by Coliba, supported by Total and Voltic | Implementation of plastics collection points (over 40) in Accra for PET and HDPE, located at Total fuel stations. HDPE is sold locally. Production of PET flakes, exported to Canada. | PET and HDPE | 6. Collector/Aggregator: company doing plastics collection<br>7. Recycler (flakes) |
| Jekora Ventures | Service provider implementing source segregation at some schools and institutions (EPA) with the support of the AMA. Collection of segregated plastics, sold locally to companies or sorting centres. Production of compost. | All types | 6. Collector/Aggregator: service provider doing plastics collection |
| National Waste Source Segregation Program - implemented by Jekora Ventures with EPA support | Education, collection, sorting and recycling of plastics in Ministerial enclaves and some selected schools - pilot stage of the program. | All types | Institutions (EPA)<br>6. Collector/Aggregator: service provider doing education / sensitisation about source segregation |

| | | | |
|---|---|---|---|
| Nelplast | Production of pavements bricks made of 20-40% recycled plastics, all types. | All types | 3. Manufacturer (long-lasting pavement bricks made of all plastic types, incl. composite plastics) |
| Pick-It Sorting Centre - implemented by Environment 360 and FanMilk | Sorting centre in Tema. Education and sensitisation about source segregation in communities (Tema). Buying and sorting PET, HDPE, LDPE, PP. | PET, HDPE, LDPE, PP | 6. Collector/Aggregator: sorting centre |
| Plastic Punch (NGO) | Organisation of event to clean the beaches. Awareness raising and education of communities. Creation of a mobile application on marine life protection. | All types | 6. Collector/Aggregator: collection of MSW accumulated on the beaches |
| Pyramid Recycling | Company based in Darkuman. Buying LDPE, PP and HDPE from waste pickers working on landfills, transporting to aggregation site. Production of LDPE pellets and cables, sold locally or regionally (Burkina Faso). Production of PP flakes and pellets. Production of HDPE pellets. | PP, HDPE, LDPE | 3. Manufacturer (long-lasting plastic cables made of r-LDPE)<br>6. Aggregator<br>7. Recycler (pellets and flakes) |
| rePATRN | Company buying PET and exporting flakes to Germany. | PET | 7. Recycler (flakes) |
| SpacePlast | Large producer of plastics (20 000 T / Year) Buying LDPE, PP and HDPE from aggregators and production of LDPE, PP and HDPE pellets. r-LDPE used for plastic bags production. r-PP used for raffia bags production. Manufacturing of 'butas' (kettles) with r-HDPE. | LDPE, PP, HDPE | 1. Importer<br>2. Producer (plastic bags made of r-LDPE, raffia bags made of r-PP)<br>3. Manufacturer (long-lasting kettles made of r-HDPE)<br>7. Recycler (pellets) |
| Universal Plastic Products and Recycling (UPPR) - | Buying of HDPE. Production of waste bins (120L, 240L) with r-HDPE (flakes) and virgin HDPE pellets. | HDPE | 3. Manufacturer (long-lasting plastic bins made of r-HDPE) |

| | | | |
|---|---|---|---|
| subsidiary of ZoomLion | | | |
| Waste Recovery Platform - led by the UNDP | Creation of a platform to gather actors involved in waste and plastics management. Support to research and businesses. Focus on various subjects including communication, advocacy, policy, data sustainability. Creation of a website and mobile application. | All types | International organisation (UNDP) |

## ANNEX

### F. Fees for municipal solid waste in AMA

Republic of Ghana

# LOCAL GOVERNMENT BULLETIN

*Published by Authority*

No. 1 FRIDAY, 5TH JANUARY 2018

SUMMARY OF CONTENTS



## GENERAL

### IMPOSITION OF RATES FOR THE YEAR 2018
### ACCRA METROPOLITAN ASSEMBLY

**BASIC RATE**

*Part VIII of the Local Government Act 1993 (Act 462)*

The making and levying of the following rates for Financial Year 1st January, 2018 to 31st December, 2018 has been approved by the rating authority.

*Under section 146 (1), (3a & b), (4) and (5) and (3) of the Local Governance Act, Act 936 of 2016 (Act 936 with Amendment 940)*

A basic rate of GH¢3.00 flat for both men and women payable by all persons of or above the age of 18 and up to 70 years who reside within or own immovable property within the area of authority of the Accra Metropolitan Assembly.

**PROPERTY RATE**

| *Rating Zones* | *Rate Impost* | *Minimum Rate GH¢* | *Areas Affected* |
|---|---|---|---|
| **RES. CLASS 1A** | 0.0036 | 360 | Achimota Forest Residential, Roman Ridge, Airport West Residential, Airport Residential, East Legon, Ambassadorial Enclave, Ridge. |
| **RES. CLASS 1B** | 0.00288 | 270 | Zoti, Abelenkpe, Dzorwulu, North Dzorwulu, Nungua Newtown, East Legon Extension, West Legon, Ringway Estates, Nyaniba Ako Adjei Area, Airport Hills,Tesano 1, Golf Hill. |
| **RES. CLASS 2A** | 0.0027 | 180 | South Odorkor, Dansoman SSNIT, New Dansoman Estates, Latebiokorshie, Candle Factory, Mamprobi, Dansoman Estate, Kanda Estates, Nima Akuffo Addo, Asylum Down, Naaflajo, Okpoi Gonno, Greda Estates, Beach Front, Regimanuel Grey, Adogon, New Achimota. |

| No | Description | | Approved Fees For 2018 GH¢ Gp |
|---|---|---|---|
| B | Solid Waste Collection | | |
| i. | *Industrial/Commercial* | | |
| | 120 to 240 Litre (Special Containers) .. .. | | 165.00 per month |
| | 1,100 litres .. .. | | 600.00 per month |
| | 3,200 litres .. .. | | 1,400.00 per month |
| | 7,000 litres .. .. | | 1,900.00 per month |
| | 1,2000 litres .. .. | | 3,200.00 per month |
| | 2,3000 litres .. .. | | 4,875.00 per month |
| | 2,3000 litres .. .. | | 1,218.00 per ~~month~~ trip |
| | 1,2000 litres .. .. | | 800.00 per trip |
| | 1,0000 litres .. .. | | 670.00 per trip |
| | 7,000 litres .. .. | | 546.00 per trip |
| | Special Container (7m3) | per trip | |
| | Construction Waste | per trip | |
| | Educational Institutions | per month | |
| | Factory Service - On Call | per trip | |
| | Factory Service - Regular Service | per month | |
| | Industrial Waste | per trip | |
| | Hospitals/Clinics | per month | |
| | Skip Loader Service | per trip | |
| ii. | ***Hiring of refuse Containers Commercial Rate*** | | |
| | ***(Hotels, Restaurants, etc.)*** | per trip | |
| | CAT A - 23m³ Container | | |
| | CAT B - 12m³ to 15m³ Container | | |
| | CAT C - 120 litre to 240 litre Bin | | |
| iii. | ***Solid Waste Dumping*** | | |
| | CAT A - Domestic waste | per tonne | |
| | CAT B - Commercial waste | per tonne | |
| | CAT C - Industrial waste | per tonne | |
| | CAT D - Port waste | per tonne | |
| | CAT E - Construction Waste | per tonne | |
| | CAT F - Destruction of goods | per tonne | |
| C | **Solid Waste Collection Services (Domestic)** | (per month) | |
| i. | ***Communal Collection Service*** | | |
| | CAT A - Pay-as-you-dump | | |
| | CAT B - Pay-as-you-dump | | |
| | CAT C - Others | | |
| ii. | ***Door to Door Collection Service*** | | |
| | CAT A - 1st Class Residential Area | | 110.00 per month - 220¢/on. |
| | CAT B - 2nd Class Residential Area | | 70.00 per month - 140¢/on. |
| | CAT C - 3rd Class Residential Area | | 30.00 per month 60¢/on. |
| iii. | ***Sewage Maintenance Fees*** | | |
| | CAT A - Public Toilets | | 10.00 per month |
| | CAT B - Domestic Toilets | | 10.00 per month |
| | CAT C - Institutional Toilets | | 10.00 per month |
| | ***Road Block*** | | |
| | CAT A - Collector Accesses | | 350.00 per day |
| | CAT B - Local Accesses | | 160.00 per day |
| vi. | *License to operate Refuse Truck* .. .. | | 400.00 per year (per tank) |
| v. | *Registration of Tricycles for Refuse Collection* .. | | 200.00 per year |

## ANNEX

### G. Plastic Production / Manufacturing Survey

# Plastic production survey

This survey is part of the *Accra Plastics Management Pilot* - a public initiative of the UK Government in collaboration with the Government of Ghana- which aims at targeting plastic pollution and ocean pollution in Accra and its surroundings. The key beneficiaries of this pilot are the Ministry of Environment, Science, Technology and Innovation (MESTI) and the private sector.

Kindly note that the results of this survey will be kept **CONFIDENTIAL**. We wish to have data about your production of plastics / use of plastics packaging as part of our effort to map and assess plastics. The results will serve for a Baseline Study that will benefit all stakeholders. The Baseline Study will provide a comprehensive view of the plastic sector in Accra (prices, quantities, machineries, available recycling processes in Ghana etc.). It should help to understand the main challenges faced by the plastic actors and to identify improvements for plastic production / collection / sorting / recycling / processing.

**No data for one company will be communicated. All data for companies will remain confidential. The results of the study will be presented as a total sum and/or average.**

*For more information, please contact Mr. David Dupré La Tour (05 40 50 81 33; david.dupre-la-tour.ext@seureca.com) or Mrs. Mathilde Gourion Retoré (05 41 25 76 22; mathildegourionretore@seureca.com)*

## 0/ GENERAL INFORMATION

| | | | |
|---|---|---|---|
| Name of the company | | Creation Year | |
| Address (**please specify the neighbourhood**) | | | |
| Website | | | |
| Contact (Full Name) | | Position | |
| Contact email | | Phone | |

Total number of employees:

You use:

- ❑ PET *(go to page 3)*
- ❑ LDPE *(go to page 5)*
- ❑ HDPE *(go to page 7)*
- ❑ PP *(go to page 9)*
- ❑ PS *(go to page 11)*
- ❑ Composite plastics, also called 'complex' and others, specify: ..... *(go to page 13)*

For each type of plastic used in your production, please complete the relevant survey questions (one set of questions per plastic type) at the page indicated above. "General Questions" concern all companies and plastics types (page 2).

**0/ GENERAL QUESTIONS**

Would you say that your company is concerned about plastic pollution? If yes : could you describe the current actions taken and future projects envisaged by your company to fight plastic pollution? (policy, goals, achievements etc.)

Is your company willing to invest in recycling? What will be the amounts and the goals of this investment?

What is your company's opinion on an EPR (Extended Producer Responsibility) system?

What is your company's opinion on the oxo-biodegradable additive?

**1/ PET**

Quantity of PET production / Year:

**1.1/ ORIGIN OF THE PET**

- ❏ Self-preform production
- ❏ Buying preforms
- ❏ Other (for ex: importation of finished PET products), please specify:

If more than one origin, indicate the % of each in the production (or quantities in tons/year):
% Self Preforms % Buying Preforms % Other

OPTION 1: Self Preform Production
In this case, do you buy virgin PET pellets? Or rPET Pellets ? (*rPET means recycled PET)
To whom? (Name & Country)
Please indicate the proportion of virgin and rPET pellets and the amounts in Tons / Year.

Do you pay 10 % environment tax on these importations?

OPTION 2: Buying Preforms
To whom?
Is it local supplier?
Please name and give its address.
Or international supplier?
Please name and give country of production.
Do you pay 10 % taxes on importation of these preforms?

OPTION 3: Other, please specify: .....
Is it local supplier?
Please name and give its address.
Or international supplier?
Please name and give country of production.
Do you pay 10 % taxes on importation?

**1.2/ PET POST-PRODUCTION WASTE**

Quantity of PET post-production waste/ Year:

- ❏ Given for free
- ❏ Sold
- ❏ Recycled by the company
- ❏ Disposed for waste collection
- ❏ Other, please specify:

If more than one option, indicate the % of each:
% Given for free % Sold % Self-recycled % Disposed % Other

Please complete the table:

| | **"For free"** | **"Sold"** | **"Disposed"** |
|---|---|---|---|
| Name of the company receiving the post-prod waste | | | |
| Contact of the company (contact name, phone, email) | | | |

| | | | |
|---|---|---|---|
| Company registered with the EPA (yes/no) | | | |
| Do you have traceability of this waste (yes/no)<br>● Name of the landfill where the waste is disposed | | | |
| Use of the waste:<br>● Exported / Stays in Ghana<br>● End product made of this waste | | | |
| Selling price (GHS/Ton) or Cost of the collection service | NA | | |
| Quantity (tons) | | | |

**1.3/ DISCUSSION**

How do you ensure it is not reused?

What does your company do to fight PET plastic pollution? (recycling, projects, lightweighting etc.)

Does your company envisage to implement a deposit system (like in Germany) to improve the collection of PET? (*The client pays for the packaging when buying a product and gets a refund when bringing back the packaging to a shop)*

- What would be according to you or your company, a good price for this deposit?

How much rPET are you willing or able to use in your production (in %)? Is it a goal in your company's sustainability policy?

**2/ LDPE**

Quantity of LDPE production / Year:

**2.1/ ORIGIN OF THE LDPE**

- ❏ LDPE pellets
- ❏ Buying LDPE films
- ❏ Other (for ex: importation of finished LDPE products), please specify:

If more than one origin, indicate the % of each in the production (or quantities in tons/year):
% LDPE pellets % LDPE Films % Other

OPTION 1: LDPE pellets
In this case, do you buy virgin LDPE pellets? Or rLDPE Pellets ? (*rLDPE means recycled LDPE)
To whom? (Name & Country)
Please indicate the proportion of virgin and rLDPE pellets and the amounts in Tons / Year.

Do you pay 10 % environment tax on these importations?
Do you add oxo-biodegradable additive to these films? (Yes: indicate the quantities / No: explain the reasons)

OPTION 2: Buying LDPE films
To whom?
Is it local supplier?
Please name and give its address.
Or international supplier?
Please name and give country of production.
Do you pay 10 % taxes on importation of these LDPE films?
Are these films already made with the add oxo-biodegradable additive? (No: explain the reasons)

OPTION 3: Other, please specify: .....
Is it local supplier?
Please name and give its address.
Or international supplier?
Please name and give country of production.
Do you pay 10 % taxes on importation?
Are these LDPE products already made with the add oxo-biodegradable additive? (No: explain the reasons)

**2.2/ LDPE POST-PRODUCTION WASTE**

Quantity of LDPE post-production waste/ Year:

- ❏ Given for free
- ❏ Sold
- ❏ Recycled by the company
- ❏ Disposed for waste collection
- ❏ Other, please specify:

If more than one option, indicate the % of each:
% Given for free % Sold % Self-recycled % Disposed % Other

Please complete the table:

| | **"For free"** | **"Sold"** | **"Disposed"** |
|---|---|---|---|
| Name of the company receiving the post-prod | | | |

| | | | |
|---|---|---|---|
| waste | | | |
| Contact of the company (contact name, phone, email) | | | |
| Company registered with the EPA (yes/no) | | | |
| Do you have traceability of this waste (yes/no)<br>● Name of the landfill where the waste is disposed | | | |
| Use of the waste:<br>● Exported / Stays in Ghana<br>● End product made of this waste | | | |
| Selling price (GHS/Ton) or Cost of the collection service | NA | | |
| Quantity (tons) | | | |

**2.3/ DISCUSSION**

How do you ensure it is not reused?

What does your company do to fight LDPE plastic pollution? (recycling, projects, lightweighting etc.)

How much rLDPE are you willing or able to use in your production (in %)? Is it a goal in your company's sustainability policy?

**3/ HDPE**

Quantity of HDPE production / Year:

**3.1/ ORIGIN OF THE HDPE**

- ❏ HDPE pellets
- ❏ Buying HDPE bottles / caps / flasks / films
- ❏ Other (for ex: importation of finished HDPE products), please specify:

If more than one origin, indicate the % of each in the production (or quantities in tons/year):

% HDPE pellets % HDPE bottles / caps / flasks % Other

OPTION 1: HDPE pellets

In this case, do you buy virgin HDPE pellets? Or rHDPE Pellets ? (*rHDPE means recycled HDPE)
To whom? (Name & Country)
Please indicate the proportion of virgin and rHDPE pellets and the amounts in Tons / Year.

Do you pay 10 % environment tax on these importations?
Do you add oxo-biodegradable additive to HDPE films? (Yes: indicate the quantities / No: explain the reasons)

OPTION 2: Buying HDPE bottles / caps / flasks

To whom?
Is it local supplier?
Please name and give its address.
Or international supplier?
Please name and give country of production.
Do you pay 10 % taxes on importation of these bottles / caps / flasks?
Are HDPE films already made with the add oxo-biodegradable additive? (No: explain the reasons)

OPTION 3: Other, please specify: .....

Is it local supplier?
Please name and give its address.
Or international supplier?
Please name and give country of production.
Do you pay 10 % taxes on importation?
Are HDPE products already made with the add oxo-biodegradable additive? (No: explain the reasons)

**3.2/ HDPE POST-PRODUCTION WASTE**

Quantity of HDPE post-production waste/ Year:

- ❏ Given for free
- ❏ Sold
- ❏ Recycled by the company
- ❏ Disposed for waste collection
- ❏ Other, please specify:

If more than one option, indicate the % of each:

% Given for free % Sold % Self-recycled % Disposed % Other

Please complete the table:

| | **"For free"** | **"Sold"** | **"Disposed"** |
|---|---|---|---|
| Name of the company receiving the post-prod waste | | | |

| | | | |
|---|---|---|---|
| Contact of the company (contact name, phone, email) | | | |
| Company registered with the EPA (yes/no) | | | |
| Do you have traceability of this waste (yes/no)<br>● Name of the landfill where the waste is disposed | | | |
| Use of the waste:<br>● Exported / Stays in Ghana<br>● End product made of this waste | | | |
| Selling price (GHS/Ton) or Cost of the collection service | NA | | |
| Quantity (tons) | | | |

**3.3/ DISCUSSION**

How do you ensure it is not reused?

What does your company do to fight HDPE plastic pollution? (recycling, projects, lightweighting etc.)

How much rHDPE are you willing or able to use in your production (in %)? Is it a goal in your company's sustainability policy?

**4/ PP**

Quantity of PP production / Year:

**4.1/ ORIGIN OF THE PP**

- ❑ PP pellets
- ❑ Buying PP films
- ❑ Other (for ex: importation of finished PP products), please specify:

If more than one origin, indicate the % of each in the production (or quantities in tons/year):
% PP pellets % PP films % Other

OPTION 1: PP pellets
In this case, do you buy virgin PP pellets? Or rPP Pellets ? (*rPP means recycled PP)
To whom? (Name & Country)
Please indicate the proportion of virgin and rPP pellets and the amounts in Tons / Year.

Do you pay 10 % environment tax on these importations?
Do you add oxo-biodegradable additive to the films produced? (Yes: indicate the quantities / No: explain the reasons)

OPTION 2: Buying PP films
To whom?
Is it local supplier?
Please name and give its address.
Or international supplier?
Please name and give country of production.
Do you pay 10 % taxes on importation of these films?
Are these films already made with the add oxo-biodegradable additive? (No: explain the reasons)

OPTION 3: Other, please specify: .....
Is it local supplier?
Please name and give its address.
Or international supplier?
Please name and give country of production.
Do you pay 10 % taxes on importation?
Are these PP products already made with the add oxo-biodegradable additive? (No: explain the reasons)

**4.2/ PP POST-PRODUCTION WASTE**

Quantity of PP post-production waste/ Year:

- ❑ Given for free
- ❑ Sold
- ❑ Recycled by the company
- ❑ Disposed for waste collection
- ❑ Other, please specify:

If more than one option, indicate the % of each:
% Given for free % Sold % Self-recycled % Disposed % Other

Please complete the table:

| | **"For free"** | **"Sold"** | **"Disposed"** |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Name of the company receiving the post-prod waste | | | |
| Contact of the company (contact name, phone, email) | | | |
| Company registered with the EPA (yes/no) | | | |
| Do you have traceability of this waste (yes/no)<br>● Name of the landfill where the waste is disposed | | | |
| Use of the waste:<br>● Exported / Stays in Ghana<br>● End product made of this waste | | | |
| Selling price (GHS/Ton) or Cost of the collection service | NA | | |
| Quantity (tons) | | | |

**4.3/ DISCUSSION**

How do you ensure it is not reused?

What does your company do to fight PP plastic pollution? (recycling, projects, lightweighting etc.)

How much rPP are you willing or able to use in your production (in %)? Is it a goal in your company's sustainability policy?

**5/ PS**

Quantity of PS production / Year:

**5.1/ ORIGIN OF THE PS**

- ❑ PS pellets
- ❑ Buying PS packaging
- ❑ Other (for ex: importation of finished PS products), please specify:

If more than one origin, indicate the % of each in the production (or quantities in tons/year):

% PS pellets % PS packaging % Other

OPTION 1: PS pellets

In this case, do you buy virgin PS pellets? Or rPS Pellets ? (*rPS means recycled PS)
To whom? (Name & Country)
Please indicate the proportion of virgin and rPS pellets and the amounts in Tons / Year.

Do you pay 10 % environment tax on these importations?

OPTION 2: Buying PS packaging

To whom?
Is it local supplier?
Please name and give its address.
Or international supplier?
Please name and give country of production.
Do you pay 10 % taxes on importation of these films?

OPTION 3: Other, please specify: .....

Is it local supplier?
Please name and give its address.
Or international supplier?
Please name and give country of production.
Do you pay 10 % taxes on importation?

**5.2/ PS POST-PRODUCTION WASTE**

Quantity of PS post-production waste/ Year:

- ❑ Given for free
- ❑ Sold
- ❑ Recycled by the company
- ❑ Disposed for waste collection
- ❑ Other, please specify:

If more than one option, indicate the % of each:

% Given for free % Sold % Self-recycled % Disposed % Other

Please complete the table:

| | **"For free"** | **"Sold"** | **"Disposed"** |
|---|---|---|---|
| Name of the company receiving the post-prod waste | | | |
| Contact of the company (contact name, phone, email) | | | |

| | | | |
|---|---|---|---|
| Company registered with the EPA (yes/no) | | | |
| Do you have traceability of this waste (yes/no)<br>● Name of the landfill where the waste is disposed | | | |
| Use of the waste:<br>● Exported / Stays in Ghana<br>● End product made of this waste | | | |
| Selling price (GHS/Ton) or Cost of the collection service | NA | | |
| Quantity (tons) | | | |

**5.3/ DISCUSSION**

How do you ensure it is not reused?

What does your company do to fight PS plastic pollution? (recycling, projects, lightweighting etc.)

How much rPS are you willing or able to use in your production (in %)? Is it a goal in your company's sustainability policy?

**6/ Composite plastics also called 'complex': PET-PE / ALU-PE / PET-PA-PE / etc.**

Quantity of Composite plastics production / Year: PET-PE ALU-PE PET-PA-PE
Others, specify the type and quantities: ..... ..... .....

**6.1/ ORIGIN OF THE COMPOSITE PLASTICS**

- ❑ Self-production, if so, specify the type: .....
- ❑ Buying, specify the type: .....
- ❑ Other (for ex: importation of finished products with composite plastics), please specify:

If more than one origin, indicate the % of each in the production (or quantities in tons/year):
% Self-production % Buying % Other

OPTION 1: Self-production
In this case, do you buy virgin pellets? Or recycled pellets ?
Do you make the co-extrusion yourself?
To whom do you buy pellets? (Name & Country)
Please indicate the proportion of virgin and recycled pellets and the amounts in Tons / Year.

Do you pay 10 % environment tax on these importations?

OPTION 2: Buying composite
To whom?
Is it local supplier?
Please name and give its address.
Or international supplier?
Please name and give country of production.
Do you pay 10 % taxes on importation of these composites ?

OPTION 3: Other, please specify: .....
Is it local supplier?
Please name and give its address.
Or international supplier?
Please name and give country of production.
Do you pay 10 % taxes on importation?

**6.2/ COMPOSITE POST-PRODUCTION WASTE**

Quantity of composite post-production waste/ Year: PET-PE ALU-PE PET-PA-PE
Others, specify the type and quantities: ..... .....
.....

- ❑ Given for free
- ❑ Sold
- ❑ Recycled by the company
- ❑ Disposed for waste collection
- ❑ Other, please specify:

If more than one option, indicate the % of each:
% Given for free % Sold % Self-recycled % Disposed % Other

Please complete the table:

| | **"For free"** | **"Sold"** | **"Disposed"** |
|---|---|---|---|
| Name of the company receiving the post-prod waste | | | |

| | | | |
|---|---|---|---|
| Contact of the company (contact name, phone, email) | | | |
| Company registered with the EPA (yes/no) | | | |
| Do you have traceability of this waste (yes/no)<br>● Name of the landfill where the waste is disposed | | | |
| Use of the waste:<br>● Exported / Stays in Ghana<br>● End product made of this waste | | | |
| Selling price (GHS/Ton) or Cost of the collection service | NA | | |
| Quantity (tons) | | | |

**6.3/ DISCUSSION**

How do you ensure it is not reused?

What does your company do to fight composites plastic pollution? (recycling, projects, lightweighting etc.)

How does your company forecast to get rid of complexes in the near future?

How much recycled plastics are you willing or able to use in your production (in %)? Is it a goal in your company's sustainability policy?

## 7/ CONCLUSION

We thank you very much for taking the time to answer our survey. Please share with us your comments if you have any:

David Dupré La Tour and Mathilde Gourion-Retoré

## ANNEX

### H. Plastic Recycling Survey

# Recycling Survey

This survey is part of the *Accra Plastics Management Pilot* - a public initiative of the UK Government - which aims at targeting plastic pollution and ocean pollution in Accra and its surroundings. For more information, please contact Mr. David Dupré La Tour (05 40 50 81 33) or Mrs. Mathilde Gourion Retoré (05 41 25 76 22)

Kindly note that the results of this survey will be kept CONFIDENTIAL. These results will serve for a Baseline Study that will benefit all stakeholders. The Baseline Study will provide a comprehensive view of the plastic sector in Accra (main buyers, sellers, prices, quantities, machines etc.). It should help to understand the main challenges faced by the plastic actors and to identify improvements for plastic collection / sorting / recycling / processing. **The results of the study will be presented as a total sum and/or average. No specific data for one company will be communicated.**

## 0/ DESCRIPTION OF THE COMPANY

| | | | |
|---|---|---|---|
| Name of the company | | Creation Year | |
| Address (**please specify the neighbourhood**) | | | |
| Website | | | |
| Contact (Full Name) | | Position | |
| Contact email | | Phone | |

Is your company registered?

Do you have a permit from the EPA (Environmental Protection Agency)?

- If yes, which one(s)?
- If not, do you plan to have one?

Total number of employees

If you do not employ waste pickers as employees but buy from them, please indicate approximately the number of waste picker you work with:

## 1/ WASTE COLLECTION

Do you collect household solid waste?
Which zones do you operate in?
Are you a service provider accredited by AMA?
If you are a solid waste collector, do you do:

- Source segregation
- Segregation at sorting centre / transfer stations
- Other (**please specify**)

## 2/ PLASTICS COLLECTION

The source from which you collect / get the plastic:

| **TYPE OF PLASTIC COLLECTED** | **SOURCE**<br>**(**Ex: Waste pickers - **residential** areas / **landfill**, **NAME** of the company / Centre that sells, Own collection system etc.) |
|---|---|
| PET | |
| Water sachets (both LDPE & HDPE) | |
| LDPE (excl. water sachets) | |
| PP buckets, basins, various | |
| PP Rafias (50 Kgs rice or sugar, or maize bags) | |
| PP Chairs | |
| HDPE Bottles | |
| HDPE Gallons (yellow, white etc.) | |
| HDPE Crates | |
| PS packaging | |
| Other plastic waste<br>***Please specify***<br>..... | |

The way you collect / get the plastics:

| **PLASTICS COLLECTION MEANS** | **Yes/ No** | **EQUIPMENT QUANTITIES**<br>(How many you have / hire) |
|---|---|---|
| Superbags | | |
| Tricycle | | |
| Car | | |
| Truck | | |
| Ordinary bags | | |
| Mosquito nets | | |
| Bins<br>**Specify the type of bins if source segregation** (bottles, cardboard etc.)<br>..... | | |
| Other means<br>**Please specify** | | |

| | | |
|---|---|---|
| ..... ..... | | |

**3/ PLASTICS RECYCLING**

| **TYPE OF PLASTIC** | **Recycling Process** (ex: wash, crush, aglo, extrude, press, mould) | **End products** (ex: flakes, pellets, cables, bassins etc.) **Please specify the color of the end product. If various production, specify the % of each** (for ex: 30% flakes, 70% of pellets) of |
|---|---|---|
| PET | | |
| Water sachets (both LDPE & HDPE) | | |
| LDPE (excl. water sachets) | | |
| PP buckets, basins, various | | |
| PP Rafias (50 Kgs rice or sugar, or maize bags) | | |
| PP Chairs | | |
| HDPE Bottles | | |
| HDPE Gallons (yellow, white etc.) | | |
| HDPE Crates | | |
| PS packaging | | |
| Other plastic waste ***Please specify*** ..... ..... | | |

Machines and methods used:

| **MACHINE / METHODS** | **EQUIPMENT QUANTITIES** If you rent a machine or this service, **please specify** |
|---|---|
| Washing Line | |
| Handwashing | *Not applicable* |
| Dryer machine | |

| | |
|---|---|
| Dry outside | *Not applicable* |
| Crusher | |
| Aglo Machine | |
| Extruder | |
| Press Machine | |
| Moulds | |
| Others<br>**Please specify**<br>.....<br>..... | |

What is the size of your plant (square meters / acres etc.)?

**3/ PLASTICS MARKET**

| **TYPE OF PLASTIC** | **QUANTITIES (Tons per month)** | **BUYING PRICE (GHS/KG)**<br>**Please specify** the quality of the product for each price (clean or not, sorted or not, label and caps removed or not etc.) | **SELLING PRICE (GHS/KG)**<br>If different prices per end product (ex: flakes, pellets etc.) **please specify** |
|---|---|---|---|
| PET | | | |
| Water sachets (both LDPE & HDPE) | | | |
| LDPE (excl. water sachets) | | | |
| PP buckets, basins, various | | | |
| PP Rafias (50 Kgs rice or sugar, or maize bags) | | | |
| PP Chairs | | | |
| HDPE Bottles | | | |
| HDPE Gallons (yellow, white etc.) | | | |
| HDPE Crates | | | |
| PS packaging | | | |
| Other plastic waste<br>***Please specify*** | | | |

| | | | |
|---|---|---|---|
| ..... ... | | | |

How did you manage the drop of prices two/three years ago? How did it affect your business?

**4/ CLIENTS**

| **TYPE OF PLASTIC** | **SELLING TO** *(Name of the company / Name of the Offtaker / Name of the shop etc.)* | **END USE** (For ex: Company 1 produces black bags, Company 2 uses flakes to make pellets and sell them abroad / locally etc.) | **CONTACT** *(If you agree, please share the name and contact detail -phone/ email- of your client so that we can include him/her in our study. Thank you)* |
|---|---|---|---|
| PET | | | |
| Water sachets (both LDPE & HDPE) | | | |
| LDPE (excl. water sachets) | | | |
| PP buckets, basins, various | | | |
| PP Rafias (50 Kgs rice or sugar, or maize bags) | | | |
| PP Chairs | | | |
| HDPE Bottles | | | |
| HDPE Gallons (yellow, white etc.) | | | |
| HDPE Crates | | | |
| PS packaging | | | |
| Other plastic waste ***Please specify*** ..... ... | | | |

**5/ DISCUSSION**

What are your main challenges? (ex: cash flow, machines, transportation, finding sufficient quantities etc.). Please explain why:

- 
- 
- 
- 
- 

What improvements could be good for your company and the plastic sectors? (ex: bank loan, government support, better collection, stakeholders collaboration, source segregation, sensitization etc.). Please explain your ideas.

What do you think of the prices of the different plastics?

Are you in contact with the service providers companies collecting waste? Do these authorize / help you to collect in their zones? How?

Is zoning collection of waste an advantage or a difficulty for you?
If a difficulty, how could it be solved?

Do you think the government should support the recycling sector? And AMA / TMA?

- If yes, what type of support?

Do you think that big companies such as Coca Cola or Unilever that put packaging on the market should have a role to play in recycling? If so, how?

Is your company you part of (**specify the name of the organisation)**:

- An association
- A Union
- A Cooperative
- Other, **please specify:**

Thank you very much for taking the time to answer our questions. Your responses will be treated confidentially. Do you have any comment / suggestion you would like to share in this study?

**6/ PICTURES**

If the survey is followed by a site visit, insert pictures under this section.

# ANNEX

## I. Technical Note #7: Plastic Pollution Study

*Project Ref.*: APMP

*Date*: 22/08/2019

# Technical Note #8

## *Plastic Pollution on the Beach and Coastline*

| General Information | | | |
|---|---|---|---|
| *Project* | Accra Plastics Management Pilot | | |
| *Client* | Department for International Development (DFID) | | |
| *Objective* | To provide information of waste pollution and more particularly plastics on the beach / coastline in Accra and Tema | | |
| *Recipients* | DFID | | |
| *Author* | David Dupré La Tour, Team Leader<br>Mathilde Gourion-Retoré, Project Coordinator | | |
| *Approved by* | Marie Gouttebroze | | |
| *Version* | V1 | *Date* | 22 August 2019 |

### Table of contents

## 1. Introduction

The objective of this Technical Note is to provide information on the waste found in polluted areas of Accra and Tema on the beach and along the coastline. Indeed, many plastic pollution hotspots have been identified near the ocean, as illustrated on the map below (1; 2; 4; 5; 7; 10).

*Figure 1: Plastic Pollution Hotspots in Accra and Tema*


The APMP team participated in a cleaning-event that took place on the Maritime Academy beach. The APMP team provided a scale and recorded data about the waste collected. The obtained data is presented in this Technical Note. It does not aim to be exhaustive and cannot be considered as accurate due to its limitations (one-day cleaning, items collected on a voluntary basis), but rather intends to provide some perspective on the waste found in polluted area, and is complementary to Technical Note #7 – Plastic Pollution Study.

In addition to the results of the cleaning event, this Technical Note also summarises the results of a study conducted in 2013 by I. Pokua Himans. These results were already presented in the Baseline Study submitted by the APMP team in July 2019, and are included in this Technical Note to provide reference on the subject.

## 2. Beach Clean Up Event

On 27 July 2019, the APMP team took part in a beach clean-up event (pro bono) and supported the data monitoring. These events are organised by the local NGO Plastic Punch and are conducted once a month (minimum). At least 30 people took part in the cleaning. The APMP team was in contact with the NGO Plastic Punch and offered to participate in the clean-up and to record the quantities. The APMP team provided a scale.

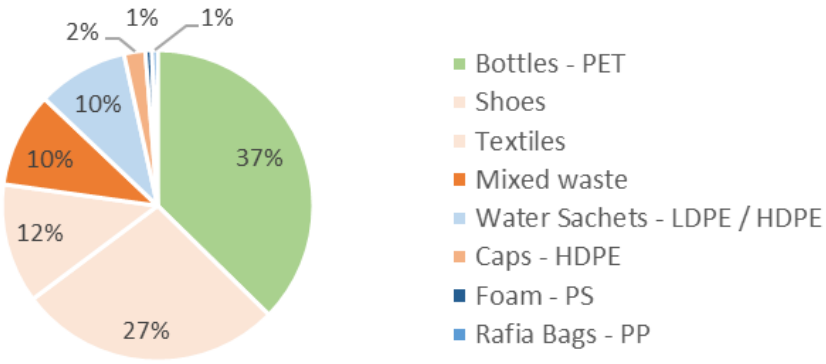
The cleaning events are organised as follows:

1. Participants join a bus early morning (7am.) that takes them to the place to be cleaned
2. Each participant is provided with raffia bags and gloves
3. Participants are requested to collect only one type of item (bottles, water sachets, shoes, etc.) so that the waste is sorted and can be send to the right destination (disposal site or recyclers)

4. Participants carry the bags to a gathering point, where a truck (Zoomlion on 27/07) picks the recyclables and other materials. The APMP team weighted the bags at this gathering point.
5. Students from a close school (around 30 on 27/07) join the cleaning around 11am., supervised by members of Plastic Punch and are provided with the same equipment and instructions
6. Around 1pm., Plastic Punch offer to the children and participant a meal
7. Participants go back to Accra by bus.

**In total, 1,957.7 kilogrammes were collected.** It should be noted that this total weight includes important quantities of sand and does not include tyres (around 25 were collected). The following items were collected:

*Figure 2: Plastic Punch Cleaning Event Quantities (27/07/2019)*




It is noticeable that PET is the first type of plastic found on the beach in weight, followed by LDPE/HDPE water sachets and HDPE caps. It should be noted that these results present limitations. In particular, the collection of items is on the voluntary basis; each participant will fill a bag. Therefore, it can under represents some items more difficult to collect (such as plastic bags, that are teared and mixed with different items and will be put with “mixed waste”) or over represent easily collectable items (bottles).

Despite those bias, it was interesting to assess that:

- Despite their increase collection, PET bottles are still found in huge quantity in the beach, and more globally in the environment,
- Water sachets are globally well collected and recycled in Accra as it was assessed during the Baseline Study. Nevertheless, numerous water sachets can still be found in the environment due to the important number of sachets produced – the collection chain for these plastic can therefore be improved.
- Even if not directly concern by this study, the amount of shoes found on the beach (incl. flip-flops, made in PVC) was very important.

*Figure 4: Truck carrying PET - Tyres to be removed*

*Figure 3: Numerous water sachet and plastic bags mixed with sands (difficult to collect)*

*Figure 6: Sorting of waste, mixed with sand (long process)*

*Figure 5: David Dupré La Tour (picture 1) and Mathilde Gourion-Retoré (picture 2) at the beach clean-up*

*Figure 7: Results of the clean-up event (before and after, Maritime Academy Beach).*

## 3. Waste Characterisation

In 2013, a study was conducted at four beaches along the Accra-Tema coastline with a net system for a period of sixteen weeks (I. Pokua Himans, 2013). This study provides reliable data on waste entering the sea in Ghana.

A total of 18,241 items of marine debris were collected (297 kg). Of these, 93% of items were found to have originated from the land. Plastics accounted for around 70% of the total debris (by number of items) and 36% by the total weight. Black plastic bags (13.24%), water sachets (8.3%), plastic cups, wrappers and containers (6.76%) and bottles (3.94%) represent the most significant items by weight.

The table below (I. Pokua Himans, 2013) summarises the main items found during the study.

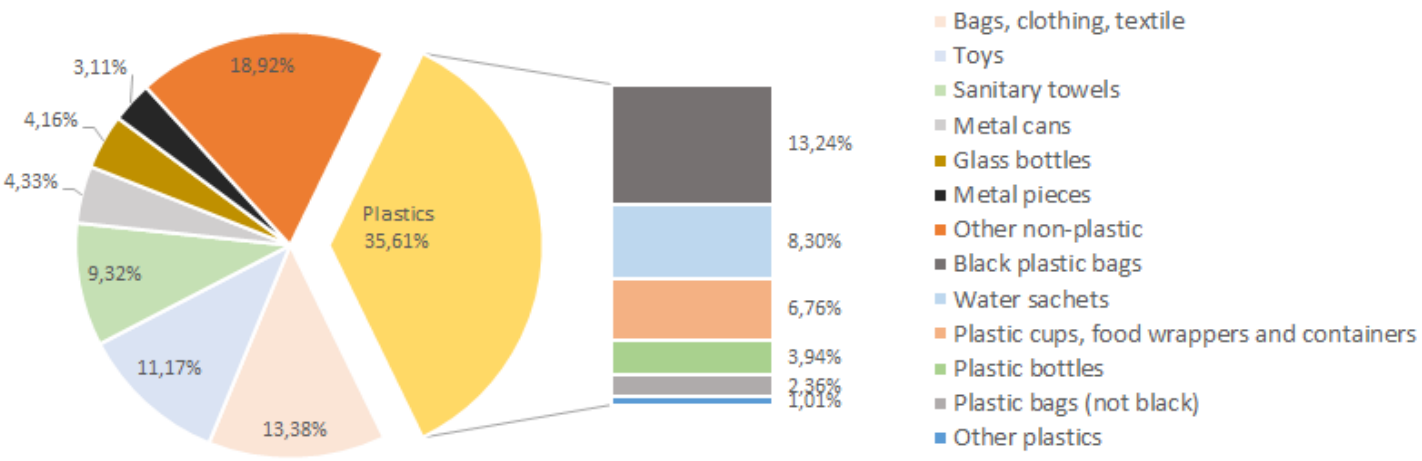
*Table 1: Characterisation of marine litter (2013)*

| Type of litter | Proportion by number of items | Proportion by weight |
|---|---|---|
| **Plastics** | | |
| Black plastic bags | 12.55% | 13.24% |
| Water sachets | 14.29% | 8.30% |
| Plastic cups, food wrappers and containers | 18.45% | 6,76% |
| Plastic bottles | 7.39% | 3.94% |
| Other plastic bags | 5.65% | 2.36% |
| Plastic plates and spoon | 4.22% | 0.92% |
| Caps, lids | 4.02% | 0.05% |
| Plastic straws | 3.18% | 0.04% |

| **Total plastic items** | **69.75%** | **35.61%** |
|---|---|---|
| **Other materials found in significant quantities (weight)** | | |
| Toys | 0.19% | 11.17% |
| Sanitary towels | 0.19% | 9.32% |
| Bags | 0.13% | 8.16% |
| Clothing/textile | 2.24% | 5.22% |
| Metal cans | 2.74% | 4.33% |
| Glass bottles | 1.15% | 4.16% |
| Metal pieces | 0.94% | 3.11% |

The graph below illustrates the results (by weight) of the study.

*Figure 8: Marine Litter Characterisation (Himans, 2013)*

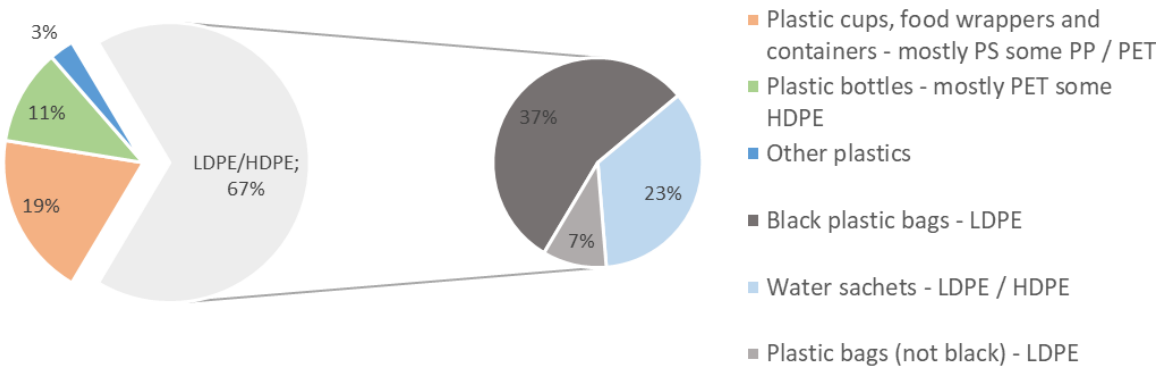



The study is not specifying the types of plastics. Nevertheless:

- Black plastic bags are known in Ghana to be made of recycled LDPE
- Water sachets are made of LDPE and/or HDPE
- Plastic bags (not black) are made of virgin LDPE
- Plastic cups, food wrappers and containers in Ghana are usually made of PS, some of them are in PP or PET (but it is less common)
- Plastic bottles are usually made of PET.

Therefore, the following rough estimations can be obtained:

*Figure 9: Plastics in Marine Litter (Himans, 2013)*




## References

- Pokua Himans, I. (2013). Assessment of marine debris and water quality along the Accra-Tema coastline of Ghana. *Ugspace.ug.edu.gh.* Available at: http://ugspace.ug.edu.gh/bitstream/handle/123456789/5326/Irene%20Pokua%20Himans_Assessment%20of%20Marine%20Debris%20and%20Water%20Quality%20Along%20the%20Accra-Tema%20Coastline%20of%20Ghana_2013.pdf?sequence=1

## ANNEX

### J. Technical Note #8: Plastic Pollution at the Beach and Coastline

*Project Ref.*: APMP

*Date*: 22/08/2019

# Technical Note #8

## *Plastic Pollution on the Beach and Coastline*

| General Information | | | |
|---|---|---|---|
| *Project* | Accra Plastics Management Pilot | | |
| *Client* | Department for International Development (DFID) | | |
| *Objective* | To provide information of waste pollution and more particularly plastics on the beach / coastline in Accra and Tema | | |
| *Recipients* | DFID | | |
| *Author* | David Dupré La Tour, Team Leader<br>Mathilde Gourion-Retoré, Project Coordinator | | |
| *Approved by* | Marie Gouttebroze | | |
| *Version* | V1 | *Date* | 22 August 2019 |

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## 1. Introduction

The objective of this Technical Note is to provide information on the waste found in polluted areas of Accra and Tema on the beach and along the coastline. Indeed, many plastic pollution hotspots have been identified near the ocean, as illustrated on the map below (1; 2; 4; 5; 7; 10).

*Figure 1: Plastic Pollution Hotspots in Accra and Tema*


The APMP team participated in a cleaning-event that took place on the Maritime Academy beach. The APMP team provided a scale and recorded data about the waste collected. The obtained data is presented in this Technical Note. It does not aim to be exhaustive and cannot be considered as accurate due to its limitations (one-day cleaning, items collected on a voluntary basis), but rather intends to provide some perspective on the waste found in polluted area, and is complementary to Technical Note #7 – Plastic Pollution Study.

In addition to the results of the cleaning event, this Technical Note also summarises the results of a study conducted in 2013 by I. Pokua Himans. These results were already presented in the Baseline Study submitted by the APMP team in July 2019, and are included in this Technical Note to provide reference on the subject.

## 2. Beach Clean Up Event

On 27 July 2019, the APMP team took part in a beach clean-up event (pro bono) and supported the data monitoring. These events are organised by the local NGO Plastic Punch and are conducted once a month (minimum). At least 30 people took part in the cleaning. The APMP team was in contact with the NGO Plastic Punch and offered to participate in the clean-up and to record the quantities. The APMP team provided a scale.

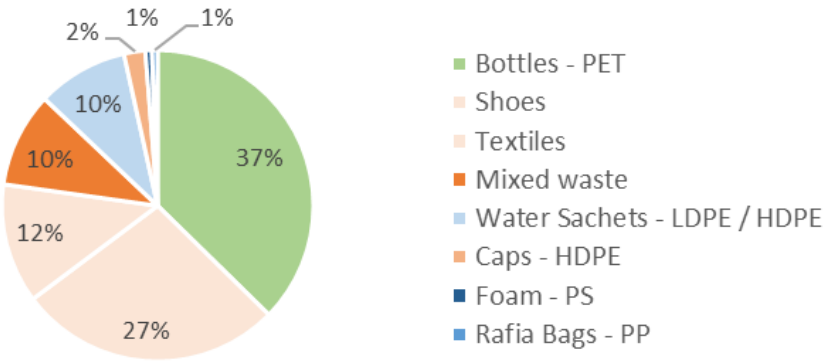
The cleaning events are organised as follows:

1. Participants join a bus early morning (7am.) that takes them to the place to be cleaned
2. Each participant is provided with raffia bags and gloves
3. Participants are requested to collect only one type of item (bottles, water sachets, shoes, etc.) so that the waste is sorted and can be send to the right destination (disposal site or recyclers)

4. Participants carry the bags to a gathering point, where a truck (Zoomlion on 27/07) picks the recyclables and other materials. The APMP team weighted the bags at this gathering point.
5. Students from a close school (around 30 on 27/07) join the cleaning around 11am., supervised by members of Plastic Punch and are provided with the same equipment and instructions
6. Around 1pm., Plastic Punch offer to the children and participant a meal
7. Participants go back to Accra by bus.

**In total, 1,957.7 kilogrammes were collected.** It should be noted that this total weight includes important quantities of sand and does not include tyres (around 25 were collected). The following items were collected:

*Figure 2: Plastic Punch Cleaning Event Quantities (27/07/2019)*




It is noticeable that PET is the first type of plastic found on the beach in weight, followed by LDPE/HDPE water sachets and HDPE caps. It should be noted that these results present limitations. In particular, the collection of items is on the voluntary basis; each participant will fill a bag. Therefore, it can under represents some items more difficult to collect (such as plastic bags, that are teared and mixed with different items and will be put with “mixed waste”) or over represent easily collectable items (bottles).

Despite those bias, it was interesting to assess that:

- Despite their increase collection, PET bottles are still found in huge quantity in the beach, and more globally in the environment,
- Water sachets are globally well collected and recycled in Accra as it was assessed during the Baseline Study. Nevertheless, numerous water sachets can still be found in the environment due to the important number of sachets produced – the collection chain for these plastic can therefore be improved.
- Even if not directly concern by this study, the amount of shoes found on the beach (incl. flip-flops, made in PVC) was very important.

*Figure 4: Truck carrying PET - Tyres to be removed*

*Figure 3: Numerous water sachet and plastic bags mixed with sands (difficult to collect)*

*Figure 6: Sorting of waste, mixed with sand (long process)*

*Figure 5: David Dupré La Tour (picture 1) and Mathilde Gourion-Retoré (picture 2) at the beach clean-up*

*Figure 7: Results of the clean-up event (before and after, Maritime Academy Beach).*

## 3. Waste Characterisation

In 2013, a study was conducted at four beaches along the Accra-Tema coastline with a net system for a period of sixteen weeks (I. Pokua Himans, 2013). This study provides reliable data on waste entering the sea in Ghana.

A total of 18,241 items of marine debris were collected (297 kg). Of these, 93% of items were found to have originated from the land. Plastics accounted for around 70% of the total debris (by number of items) and 36% by the total weight. Black plastic bags (13.24%), water sachets (8.3%), plastic cups, wrappers and containers (6.76%) and bottles (3.94%) represent the most significant items by weight.

The table below (I. Pokua Himans, 2013) summarises the main items found during the study.

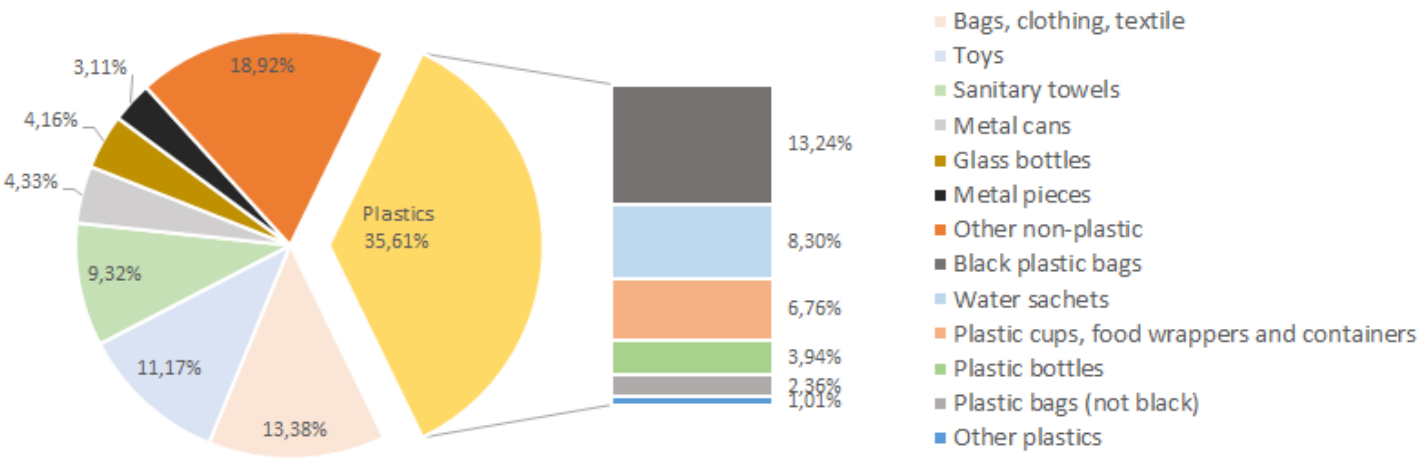
*Table 1: Characterisation of marine litter (2013)*

| Type of litter | Proportion by number of items | Proportion by weight |
|---|---|---|
| **Plastics** | | |
| Black plastic bags | 12.55% | 13.24% |
| Water sachets | 14.29% | 8.30% |
| Plastic cups, food wrappers and containers | 18.45% | 6,76% |
| Plastic bottles | 7.39% | 3.94% |
| Other plastic bags | 5.65% | 2.36% |
| Plastic plates and spoon | 4.22% | 0.92% |
| Caps, lids | 4.02% | 0.05% |
| Plastic straws | 3.18% | 0.04% |

| **Total plastic items** | **69.75%** | **35.61%** |
|---|---|---|
| **Other materials found in significant quantities (weight)** | | |
| Toys | 0.19% | 11.17% |
| Sanitary towels | 0.19% | 9.32% |
| Bags | 0.13% | 8.16% |
| Clothing/textile | 2.24% | 5.22% |
| Metal cans | 2.74% | 4.33% |
| Glass bottles | 1.15% | 4.16% |
| Metal pieces | 0.94% | 3.11% |

The graph below illustrates the results (by weight) of the study.

*Figure 8: Marine Litter Characterisation (Himans, 2013)*

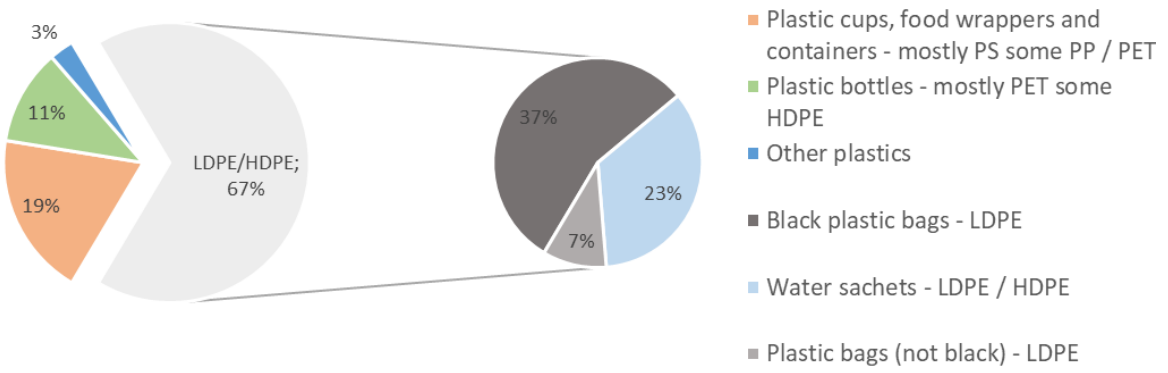



The study is not specifying the types of plastics. Nevertheless:

- Black plastic bags are known in Ghana to be made of recycled LDPE
- Water sachets are made of LDPE and/or HDPE
- Plastic bags (not black) are made of virgin LDPE
- Plastic cups, food wrappers and containers in Ghana are usually made of PS, some of them are in PP or PET (but it is less common)
- Plastic bottles are usually made of PET.

Therefore, the following rough estimations can be obtained:

*Figure 9: Plastics in Marine Litter (Himans, 2013)*




## References

- Pokua Himans, I. (2013). Assessment of marine debris and water quality along the Accra-Tema coastline of Ghana. *Ugspace.ug.edu.gh.* Available at: http://ugspace.ug.edu.gh/bitstream/handle/123456789/5326/Irene%20Pokua%20Himans_Assessment%20of%20Marine%20Debris%20and%20Water%20Quality%20Along%20the%20Accra-Tema%20Coastline%20of%20Ghana_2013.pdf?sequence=1

## ANNEX

### K. Technical Note #9: Plastic Pollution Assessment at Korle Lagoon and Odaw River

SEURECA VEOLIA

# Technical Note #9

## *Assessment of Plastic Pollution in the Odaw River and Korle Lagoon*

*Project Ref.*: Accra Plastics Management Pilot

*Date*: 30/09/2019

| General Information | | | |
|---|---|---|---|
| *Project* | Accra Plastics Management Pilot | | |
| *Client* | Department for International Development (DFID) | | |
| *Objective* | To assess plastic pollution in the Korle Lagoon and Odaw River | | |
| *Recipients* | DFID | | |
| *Author* | Dr. Anthony A. Duah, Environmental Consultant<br>Ing. Gabriel Appiah, Civil Engineer & Hydrological Consultant | | |
| *Approved by* | Marie Gouttebroze, Seureca, Project Manager | | |
| *Version* | V1 | *Date* | 30 September 2019 |

*Korle Lagoon, Accra (2019)*

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## List of Acronyms

| | |
|---|---|
| **AMA** | Accra Metropolitan Assembly |
| **EMA** | Environmental Management Associates |
| **ESMF** | Environmental and Social Management Framework |
| **GAMA** | Greater Accra Metropolitan Area |
| **KLERP** | Korle Lagoon Ecological Restoration Project |
| **MMDAs** | Metropolitan, Municipal and District Assemblies |
| **MOWH** | Ministry of Works & Housing |

# 1. INTRODUCTION

This Technical Note presents the results obtained during the plastic waste assessment in the Odaw River and Korle Lagoon.

## 1.1. Scope

The Desktop Study on the Odaw river and the Korle Lagoon shall be in a form of a general presentation of the Odaw river and Korle Lagoon including maps, cross section of the Korle Lagoon, flow velocities, water levels, tide, discharge and the seasonal variations in time and any other relevant information.

The field study mainly involved the observation of the Korle Lagoon from the two bridges across the Lagoon. During the observation, the consultant did a floating plastic count at two selected points, A and B. He also obtained a video footage of floating plastic at the two locations on the Lagoon and also did a 'single point' depth measurements in the lagoon at two locations, 1 and 2. He also did a flow observation at the two locations and generally observed the accumulated plastics on the banks of the river and the lagoon in the whole area.

# 2. PRESENTATION OF THE ODAW RIVER AND KORLE LAGOON

## 2.1. Background

The Korle Lagoon is one of the most polluted water bodies in Ghana today. This has arisen because of the increasing population and lack of requisite sanitary and waste disposal facilities as well as non-enforcement of existing regulations on environmental management and conservation.

Historically, Accra started as a village south-east of the Korle Lagoon in the 16$^{th}$ Century (EMA, 1995). Thus the older parts of the city occur in the lower catchment areas of the Lagoon which have now turned into low or poor class residential localities with high population densities. The Central Business District is also currently located close to the eastern banks of the Korle and constitutes an important source of municipal wastes. Furthermore, there are 3 industrial zones located in the catchment of the Lagoon (EMA, 1995) from which wastes are discharged untreated. For decades the drains of Accra have been used as open sewers and convenient disposal points for all solid and liquid wastes, due to a highly inadequate sewerage and formal garbage collection service. The continuous degradation has resulted in most parts of the Korle Lagoon being permanently deoxygenated and subsequent loss of marine and brackish water living resources most of which have socio-cultural importance in the lives of the local people. Flooding is also a common occurrence in the low-lying areas leading to loss of life and property.

## 2.2. Physical Description of the Project Area

The project focus area is the Odaw Basin. The Odaw River and its tributaries Nima, Onyasia, Dakobi and Ado have a total catchment area of 250 km$^2$ and drain the major urbanized areas of Accra, including Accra Metropolitan Assembly, Ga East, Ga West and Adentan Municipal Assemblies further upstream. The AMA and Ga East Municipal Assembly alone occupy about 65% of the basin area (MOWH, 2018). Figure 1 shows the Odaw river basin and its tributaries within the GAMA and Figure 2 shows the Odaw basin and the demarcated MMDAs.

The basin lies in the coastal Savannah zone. There are two rainy seasons. The average annual rainfall is about 730mm, which falls primarily during the two rainy seasons. The first begins in May and ends in mid-July. The second season begins in mid-August and ends in October. Due to climate change, rain usually falls in high intensity short duration storms and gives rise to local flooding where drainage channels are obstructed. The intensity of rainfall has been observed to increase over the years as a result of climate change. This coupled with increased runoff due to rapid urbanization has compounded the already precarious flooding situation within the basin. There is very little variation in temperature throughout the year. The mean monthly temperature ranges from 24.7°C in August (the coolest) to 28°C in March (the hottest) with annual average of 26.8°C. As the area is close to the equator, the daylight hours are practically uniform throughout the year. Relative humidity is generally high varying from 65% in the mid-afternoon to 95% at night. The predominant

wind direction in Accra is from the WSW to NNE. Wind speeds normally range between 8 to 16 km/hr. High wind gusts occur with thunderstorm activity, which pass in squall along the coast. The maximum wind speed recorded in Accra is 107.4 km/hr (58 knots). Strong winds associated with thunderstorm activity often cause damage to property and mostly removing roofing materials (MOWH, 2018).

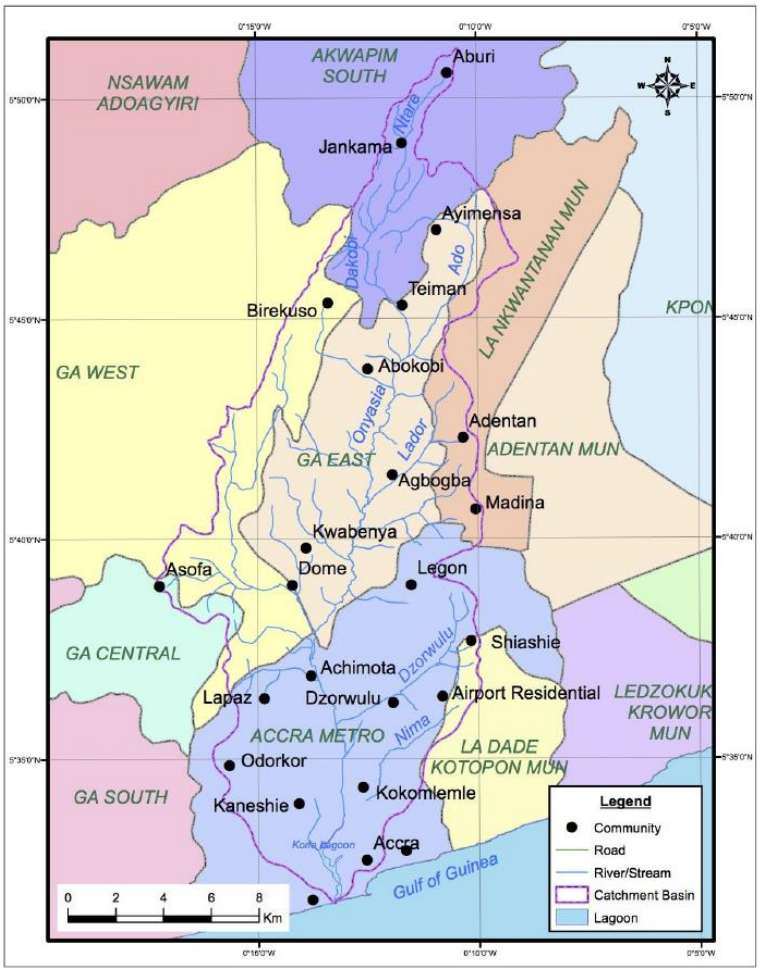
*Figure 1: Map of GAMA showing the Odaw Basin*


## 2.3. The Odaw Basin

The Odaw stream runs in the north-south direction originating in the northern area of Accra from a range of hills known as the Akwapim ranges. It outfalls into the Gulf of Guinea in the South. The total length of the stream from the sea to the furthest point on the catchment is about 30km. The basin has a catchment area of about 250km$^2$.

The lower section of the basin, i.e. 0km-2km has two lagoons namely lower and upper lagoons and a 1.2km length of canal. This section is densely populated including informal settlement of Old Fadama and has barely has no vegetative cover. The average lagoon width is about 150m and the canal width is 40m. The Odaw discharges through the upper and lower lagoons before its final outflow into the sea.

*Figure 2: The Odaw River basin with the demarcation of the respective Assemblies*



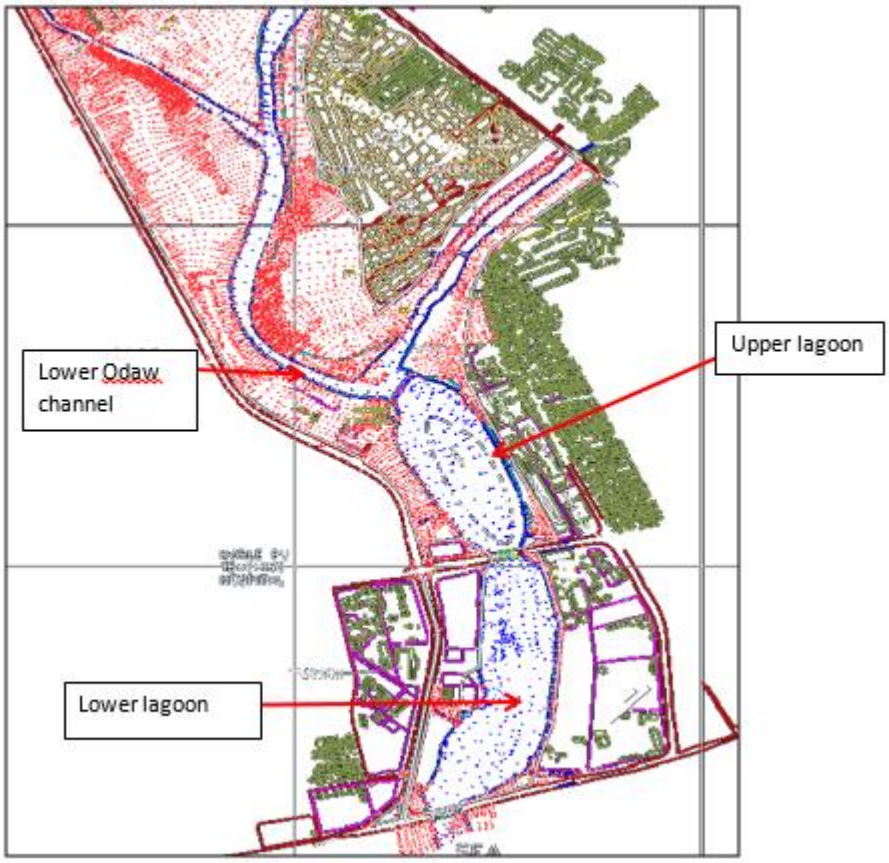

From 2km-8km upstream stretch of the basin the channel has concrete bed and banks and is also in a heavily urbanized area and has no vegetative cover. The channel in this zone has an average width of 36m. The channel from 8km-20km is regarded as midstream and is also highly urbanized. The channel and its tributaries within this zone have an earth bed and banks and have seen some level of channel realignments due to periodic channel deepening and widening to accommodate flood flows. The average channel width is about 20m and the areas along the channels have sparse vegetative cover. The channel between the 20km-30km portion is the upstream section and remains in its natural state and is characterized by slopes of the Akwapim hills, and shallower earth channel depths. This zone has thick vegetative cover.

The main tributaries of the Odaw are Agbogba stream, Haatso stream Domi-Taifa stream, Apenkwa stream, Mukose stream, Onyasia, Nima, Kaneshie, The Rivers and streams are partly concrete lined drains such as the Nima drownstream of the Onyasia and the Odaw between Achimota and Abossey Okai.

## 2.4. The Korle Lagoon

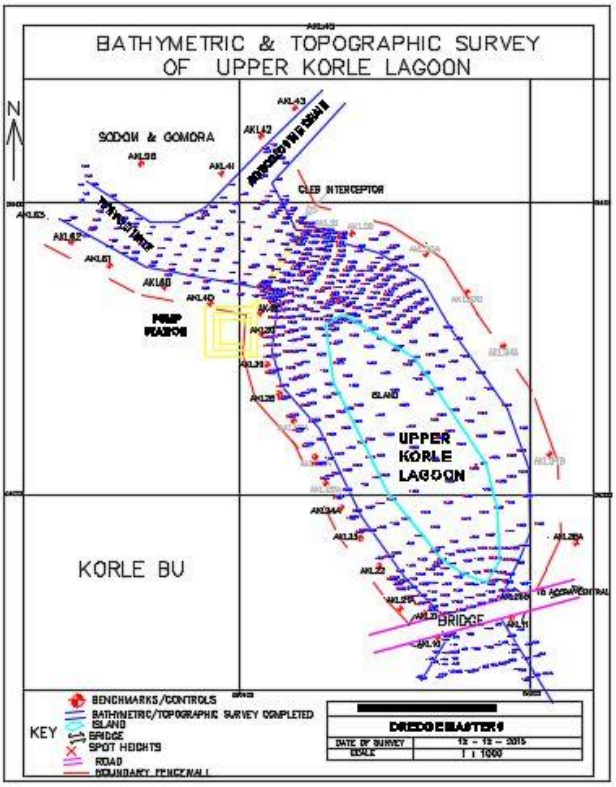
The Korle lagoon has on the average 7.72m water depth including dead water storage of 3.97.0m. The daily water depth varies according to the tidal inflow and inland flood. The lagoon has two portions, the upper and the lower portions (see details of cross section on the Upper and Lower Korle lagoon as shown in figure 3) The upper lagoon has a central island built out of accumulated silt and covered with vegetation.

*Figure 3: Korle Lagoon showing the upper and lower sections*




The lagoons serve as temporary repository of flood from the upstream Odaw channel. When the tides coincide with the upstream high flows the lagoons are supposed to accommodate the flood until the tides recede. However, this activity is hindered due the heavy siltation of the lagoons.

### 2.4.1. Cross sections (water depths) in the Korle lagoon




Bathymetric survey conducted on the upper lagoon show elevations at cross sections as presented in figure 4 and 5 below.

*Figure 4: Bathymetric and topographic survey of the Upper Lagoon*

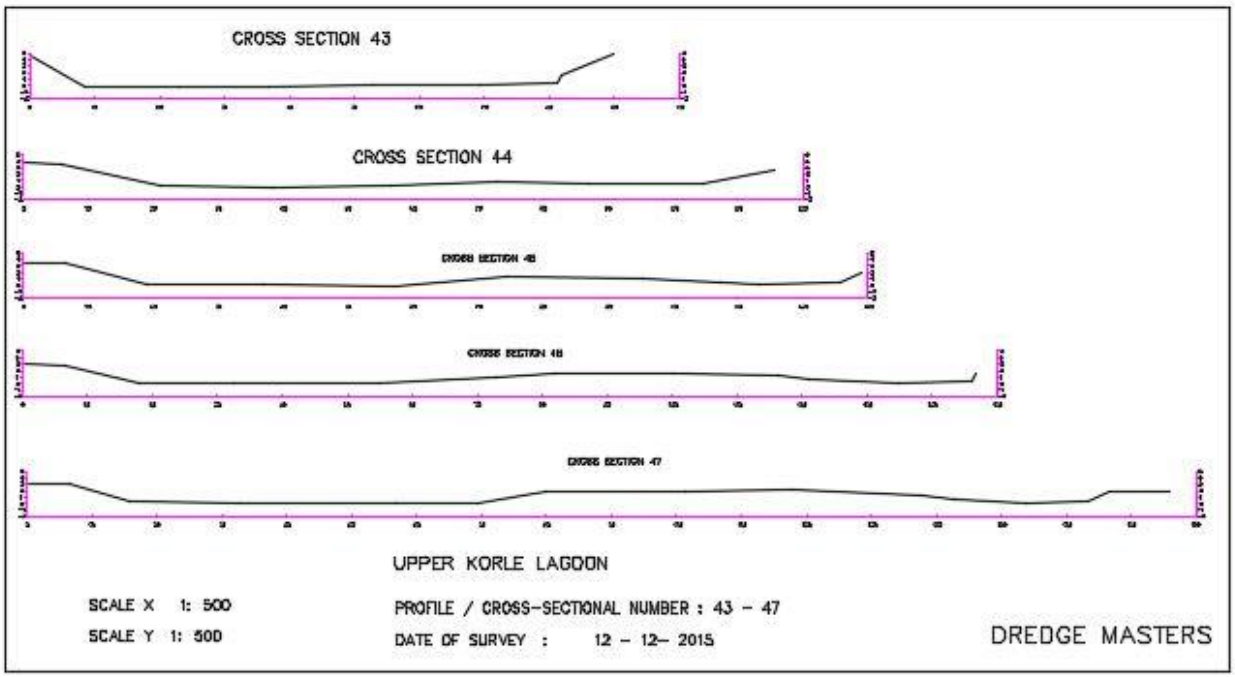
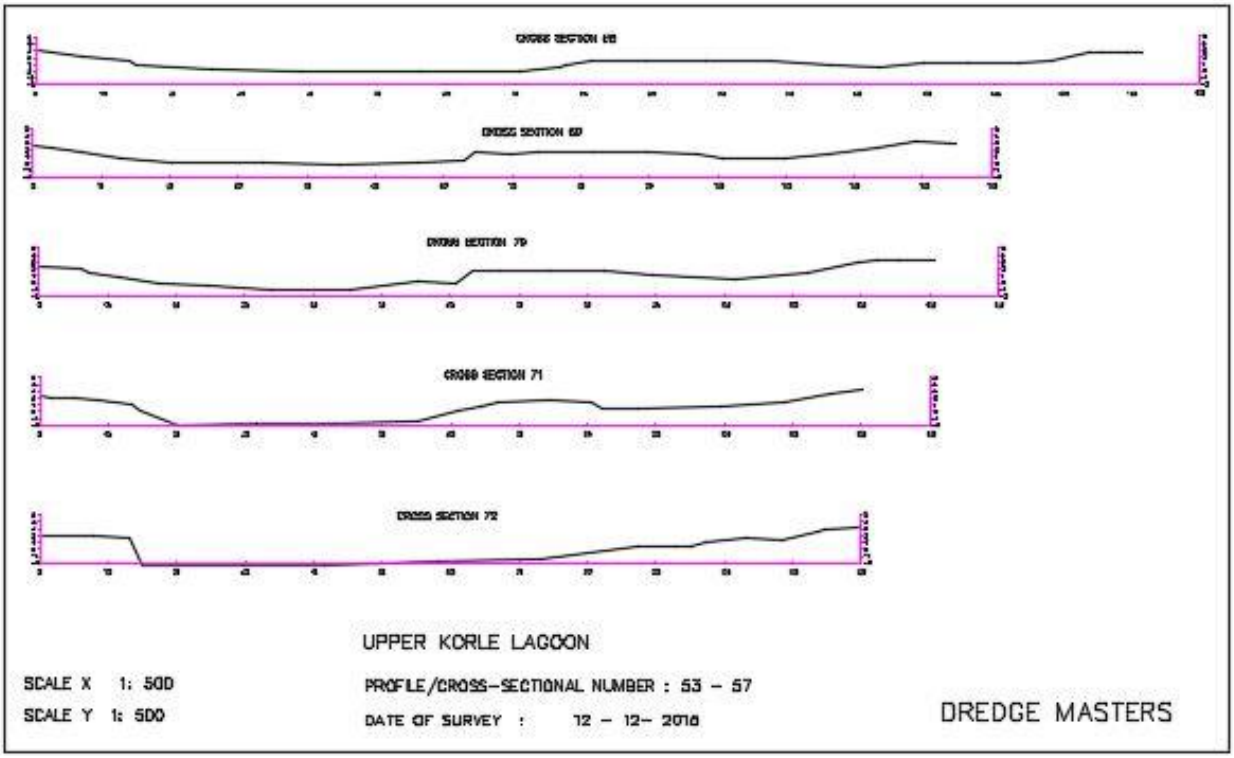



*Figure 5: Some cross sections from the Upper Lagoon topographic survey*




2.4.2. Flow velocities, water levels, tide, discharges

There are no flow measurements on the Odaw and the Korle lagoon. The designed flood flow of 321$m^3$/s for a return period of 25years was used as in flow into the lagoon. During low flows this velocity can reduce to as low as 3$m^3$/s.

2.4.3. Use of the river

The upstream portion of the Odaw river is used for agricultural purposes. Vegetable farming is common in the suburbs scattered along the river. The water quality of the Odaw downstream of the lagoon appears very polluted (looks very black) and hence it's not used for any activity.

2.4.4. Intensity of boat usage

Boat usage on the lagoon is only confined to the lower lagoon. Fishing boats used on the sea are usually anchored (take shelter) in the lagoon (figure 6). There is however no boat activity in respect of recreation on the lagoon nor the Odaw River.

*Figure 6: The lagoon is usually used as anchorage for fishing boats*

2.4.5. Records on floating plastics

Due to the poor waste management in the city, large quantities of plastic waste is trapped within the Odaw, and the Korle Lagoon. The presence of an intercepting weir built between the upper lagoon and the lower odaw canal aggravates the collection of the plastic waste in the lagoon. The pictures below show the presence of plastic waste on the Odaw at the intercepting weir.

*Figure 7: Floating plastic waste are trapped at the lower Odaw channel at the intercepting weir*

*Figure 8: Floating plastic waste at the Lagoon interceptor weir*

*Figure 9: Floating plastic waste overtopping the  Lagoon interceptor weir*

*Figure 10: Dredging of plastic waste from the Lagoon interceptor weir*

Obeng, L. (1980) indicated in 1980 that the polluted Odaw River represented sanitation, climate and socio-economic cost.

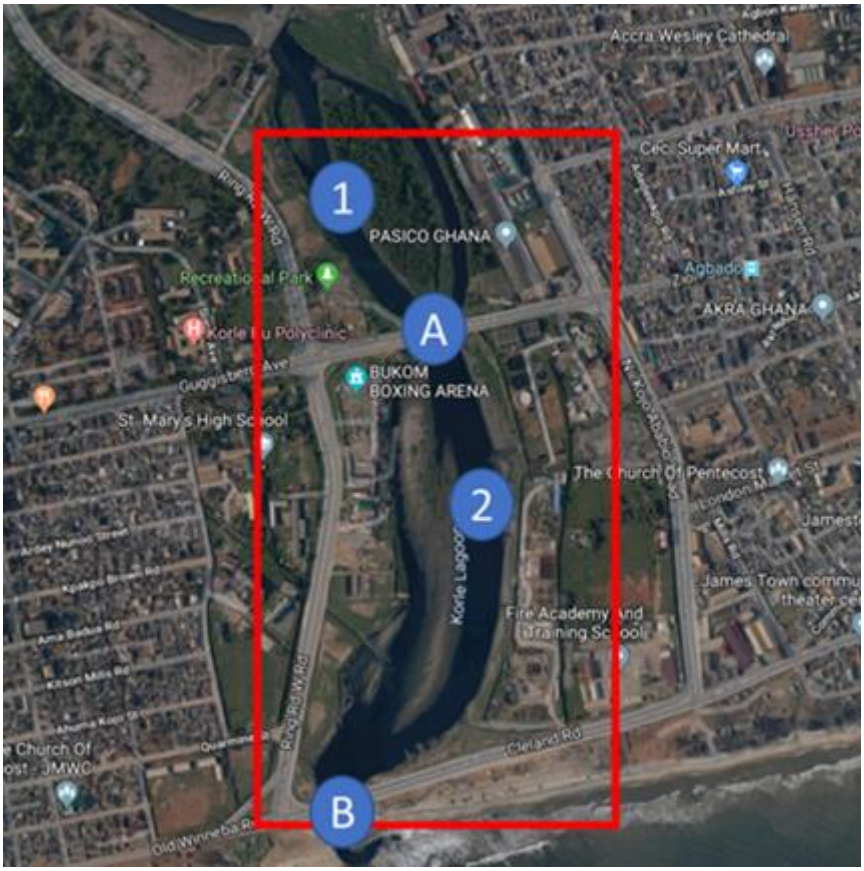
# 3. POLLUTION ASSESSMENT

The current pollution assessment of the Odaw river and the Korle lagoon was done during the field study which was conducted on September 6, 2019. The observations from selected points and

## 3.1. Methodology

The methodology adopted for the field study to assess the level of pollution in the Korle lagoon especially by floating plastics was conduct a day's field assessment at the project site through observation from the two bridges, i.e. site A and B in figure 11 below. We also conducted a count of floating plastics from the two sites. Single depth measurements were also made at site 1 and 2 in figure 11 to determine the water depth at the time. Pictures and video coverage of the current pollution levels were also made along with the general observation of the extent of pollution at the site. Results of counts and measurements are outlined below.

*Figure 11: Upper and lower sections of Korle Lagoon showing observation sites*




The floating plastics observation was done using a timer and camera. This was done from the bridges (site A and B) using the bridge as a cross section facing downstream.

The single point measurements were done using a canoe, eco-sounder, graduated timber board and tape measure at Site 1 and 2.

## 3.2. Results

The field study was undertaken during the low tide in the lagoon. At site A, a count of floating plastics was made for a period of 30 minutes and 23 counts was made within the cross section. It was observed that most floating objects were stagnated on the surface of the water along the silted edges of the lagoon. At site B, the count yielded 138 pieces of floating plastics within the period of 30 minutes. Dredging activities in the Korle Lagoon was going on between the two bridges, i.e. between site A and site B during the field study by Dredge Masters. Dredged materials were heaped at the banks between the two sites. Flow at the observation sites was very low. Most plastics get stacked upstream at the interceptor weir. During the rainy season when the

water level in the lagoon rises due to floods some of the plastics overflow the interceptor weir and enter the lagoon (figure 9). Table 1 is the results of floating plastic counts and depth measurements made on site during the field study.

*Table 1: Results of field measurements*

| Site | Latitude (Northings) | Longitude (Easterns) | Elevation (m) | Floating Plastic count (30min) | Depth measure-ment (m) |
|---|---|---|---|---|---|
| A | 05.53752° | 0.21971° | 8 | 23 | - |
| B | 05.53086° | 0.22124° | 11 | 138 | - |
| 1 | 05.53880° | 0.22130° | 5 | - | 12. |
| 2 | 05.53396° | 0.22029° | 12 | - | 0.6 |

### 3.3. Conclusion

Assessment of plastic waste pollution as well as the general state of pollution in the Odaw river and Korle lagoon has been done. It can be concluded that poor drainage is the major problem, which affects many parts of the urban areas in the respective MMDAs especially in the Metropolis (AMA). Natural features such as the underlying geology, soil conditions and localized topographic features create some drainage problems. Development should never have been permitted in most flood prone areas; however, poor control over physical development has given rise to urban land encroachment especially in areas demarcate for flood control. The majority of the problems are created by the high rate of urbanization (4.2%) of the urban areas and its impact on increase surface water runoff and flooding in low lying areas (MOWH, 2018). The inadequate drainage and poorly designed channels in many parts of the Odaw basin have given rise to serious flood problems. These problems are compounded by choked drains mainly by plastic waste. Plastic waste has become a real source of pollution within the basin and elsewhere in the country. Whiles the government consider the banning of certain types of plastics the country needs to embrace the use of plastics in innovative technologies in order to rid the cities and communities of plastic waste.

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Obeng L.E., 1980. *Environmental management and the responsibility of the privileged*. The J.B. Danquah memorial lectures series 13, February 1980. Ghana Academy of Arts and Sciences, Accra.

Ministry of Works & Housing, 2018. Draft Environmental and Social Management Framework (ESMF) for the Greater Accra Resilient and Integrated Development project, 2018.

# ANNEX – PICTURES FROM THE FIELD STUDY

*Figure 12: Pictures from the Observation Site A*

*Figure 13: Pictures from Observation Site B*

*Figure 14: Single depth measurement from a boat*

*Figure 15: Plastic waste trapped at the interceptor weir*

# ANNEX

## L. Plastic Characterisation for the Revolution Ocean Foundation

SEURECA VEOLIA

# Plastic Waste Characterization Campaign

## Plastic Revolution Foundation

REV Ocean

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## List of Acronyms

| | |
|---|---|
| **g** | gram |
| **kg** | kilogram |
| **MSW** | Municipal Solid Waste |
| **NGO** | Non Governmental Organisation |
| **PPE** | Personal Protective Equipment |

## List of Figures

# 1 Introduction

As part of its action in Ghana, the Plastic Revolution Foundation has funded a plastic characterization study to gather more information on the plastic content in the waste stream in Accra.

The Consultants in charge of this study have done a literature review, that provide sensible data regarding waste generation in Accra, and the main types of materials (organics, plastic, paper…) that compose the household waste stream. Some data exists regarding the waste plastic stream. However, the reliability regarding the exact stream of each plastic within the household waste cannot be assured, and it has been recommended to run a detailed waste characterization that will focus on the plastic stream, to clearly identify:

- the total share of plastic waste within the Municipal Solid Waste (MSW) stream
- the share of the different types of plastics

This characterization has been prepared following the recommendations of the "Methodology for the Analysis of Solid Waste (SWA-Tool)" developed by the European commission and the French methodology CARADEME developed by the French Environment & Energy Management Agency (ADEME).

# 2 Objectives

The Consultant conducted the waste characterization campaign on the MSW stream including waste from households and waste from small commercial activities, collected in the same way.

# 3 The campaign

The characterization focuses on Accra and Tema plastic waste generation. The plastic waste is collected together with the MSW stream (no segregation at source) in three ways:

- Compactor truck: mostly in medium and high income areas, official services
- Skip truck: mostly in medium and low income areas, official services
- Motor-tricycle (bola-taxi): mostly in medium and low income areas, informal services

In order to obtain a social representativity of the plastic waste generation habits, the characterization is undertaken on waste collected in these three ways.

## 3.1 Areas of characterization

Four areas of sorting were used during the campaign:

- Tema: Kpone disposal site and next to Pick-it sorting center;
- Accra: Nsumia disposal site and a transfer station in Accra.

The disposal sites are too far for the bola-taxis and thus sorting/transfer stations are used as sorting areas instead.

## 3.2 Team and equipment

The team for the campaign includes:

- 10 waste pickers: they belong to the waste pickers association of Kpone disposal site in Tema. They deal with the manual sorting of waste through the several steps of the protocol;
- 2 local supervisors: they are part of Environment 360 NGO, a local partner of Seureca in Ghana. They manage the waste pickers, find the sorting area location, identify the waste loads and supervise the weighing of samples;
- 1 international supervisor: she/he is part of Seureca. Her/his job is to train the local team at the beginning of the campaign, check the quality of the sorting and follow-up with the figures.

The team mobilized the following equipment for the campaign:

- Fourteen A3 posters of each plastic stream including several pictures: they are displayed in the sorting area and they help the team in the identification of waste during the sorting process.


Figure 1: A3 posters of plastic waste examples

- Two weighing scales: the first one, accurate at 1 kg, is used for the weighing of 500 kg MSW samples and the plastic fraction out of it. The second one, accurate at 50 g, is used for the weighing of each plastic waste stream out of the total plastic fraction.

Figure 2: Weighing scales pictures

- A canopy to protect the team from the sun and the rain
- Tarpaulins for the sorting of waste
- Big bags and raffia bags for waste transportation, weighing and storage
- Two 120 liters bins for the weighing of 500 kg MSW out of the load
- A shovel for waste mixing and bins fill-in
- A 10 m3 skip for waste storage after the sorting
- A tablet with a digital form to record the data

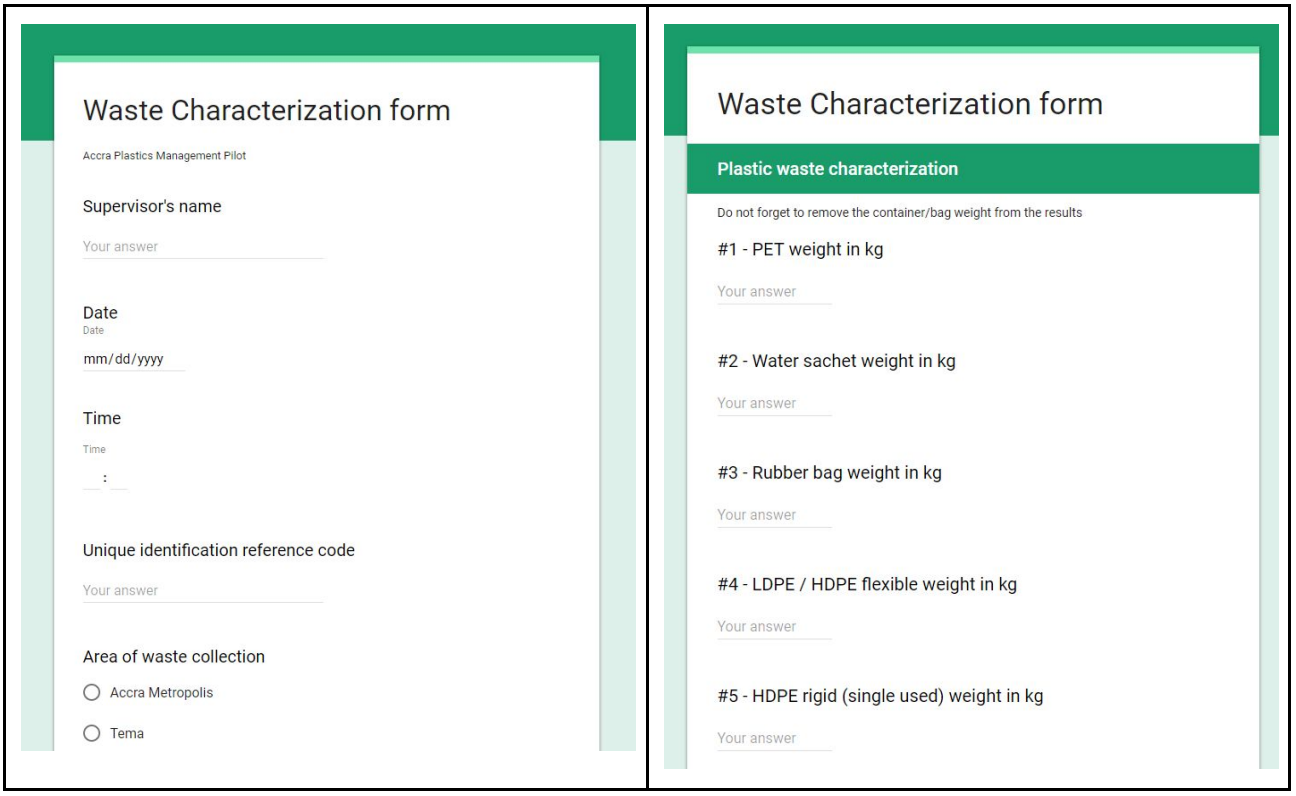


Figure 3: Extracts of the digital forms to fill the data in the database

The team purchased additional Personal Protective Equipment (PPE) as well.

## 3.3 Campaign schedule

Two parameters impacted the initial characterization campaign schedule:

- the origin of the waste: the disposal sites for the waste differ according to the location;
- the type of collection: the motor-tricycles do not dump waste at the same location than the trucks.

The team had to find four sites: two in Tema and two in Accra for trucks and motor-tricycles. The impacts on the schedule were significant as highlighted on the figure below:

| # | TASK TITLE | MOBILIZATION | | | | | TEMA | | | | | | | | ACCRA | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | WEEK 0 | | | | | WEEK 1 | | | | | WEEK 2 | | | | | WEEK 3 | | | | | WEEK 4 | | | | |
| | | M | T | W | R | F | M | T | W | R | F | M | T | W | R | F | M | T | W | R | F | M | T | W | R | F |
| 1 | Local coordination and team mobilization | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Sorting area set-up | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Training | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Compactor trucks caracterization | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | Skip trucks caracterization | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | Motor-tricycle caracterization | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | Data consolidation and analysis | | | | | | | | | | | | | | | | | | | | | | | | | |

Figure 4: Waste characterization schedule

In total, the team did 18 days of characterization for 13 days of local coordination and team mobilization (some days in parallel).

## 3.4 A typical sorting day

A typical sorting day includes the sorting of three samples. The process for each sample is detailed below:

1. Identification of a load at the site entrance
2. Collection of the load identification data: company's name, type of vehicle, collection route

3. Randomly picking of 500 kg of mixed waste from the total load (when the load has been dumped)
4. Sorting of this sample in two fractions: plastic from one side and other waste on the other side
5. Weighing of plastic fraction
6. Sorting of plastic fraction in fifteen categories
7. Weighing of each category

For each weighing step, the team withdraw the weight of the bin / bag from the displayed figure.

Figure 5: Pictures of the waste characterization protocol's steps

The pictures of each plastic category are displayed below for illustration purpose:

1 - PET

2 - LDPE Water Sachet

3 - LDPE Rubber Bag

4 - LDPE

5 - HDPE Single Use

6 - HDPE Other

7 - PP Raffia Bag

8 - PP Single Use

No sample

9 - PP Other

10 - Expanded PS

11 - PS

12 - PVC

13 - Multi-layers plastic

14 - Multi-layers plastic & metal

15 - Other

Figure 6: Plastic waste categories pictures

When the waste picker has a doubt on a material, he seeks for the local/international supervisor's advice. The supervisor undertakes random checks on the sorting quality. The supervisor takes pictures and highlights the sorting mistakes to the waste pickers for the learning curve.

## 3.5 Challenges & solutions during the campaign

The team faced several challenges during the campaign. They are summarized in the table below:

| Challenges | Solutions |
|---|---|
| Weighing accuracy: the first weighing scale purchased by Seureca's local partner was accurate at 1 kg only (analog), which is not accurate enough for the study's needs. | Seureca purchased a second scale accurate at 50 g (digital) at the beginning of the campaign. |
| Weighing accuracy: the first samples showed disparities between the detailed weights figures and the consolidated figures. | The supervisor added a procedure to check the "0" of the analog scale before the start of the weighing. |
| Sorting mistakes: several sorting mistakes were found in the first samples. | The international supervisor did the sorting of the plastic with the waste pickers, to check on-the-job and show in live the mistakes to avoid. |
| Waste disposal: where store the waste once the characterization is done? | The local supervisor manages to get a 10 m3 skip next to the sorting area. |
| Motor-tricycle case: they do not dump at the disposal sites. How organize the characterization of waste brought by the motor-tricycle? | The local supervisor and the international supervisor negotiated with local sorting centers / transfer stations which are supplied by motor-tricycles to be able to proceed to the sorting next to their installations. |

Figure 7: Challenges and Solutions during the campaign

Thanks to the team's reactivity on the challenges presented above, no critical issues have been identified for the figures' reliability. The range of uncertainty is presented below, together with the presentation of the results.

## 4 The results

The results are presented, as well as the corresponding ranges of uncertainty. A comparison with the figures of another characterization campaign conducted in 2015 is proposed as well.

### 4.1 Results of the characterization campaign

The plastic waste fraction in the MSW is 6.5%[1] in average. The MSW samples used for the campaign come from waste brought at the final disposal site, meaning at the end of the collection process. The real plastic waste fraction figure in the MSW at source is expected to be higher. This low figure can be easily explained by the impact of the informal sector - the waste pickers - before and during the solid waste collection. Several tons of metal and plastic waste are already sorted out of the flow before reaching the final disposal site.

The results per plastic waste stream are presented below, for both Tema and Accra.

[1] 7.3% for Tema and 5.6% for Accra

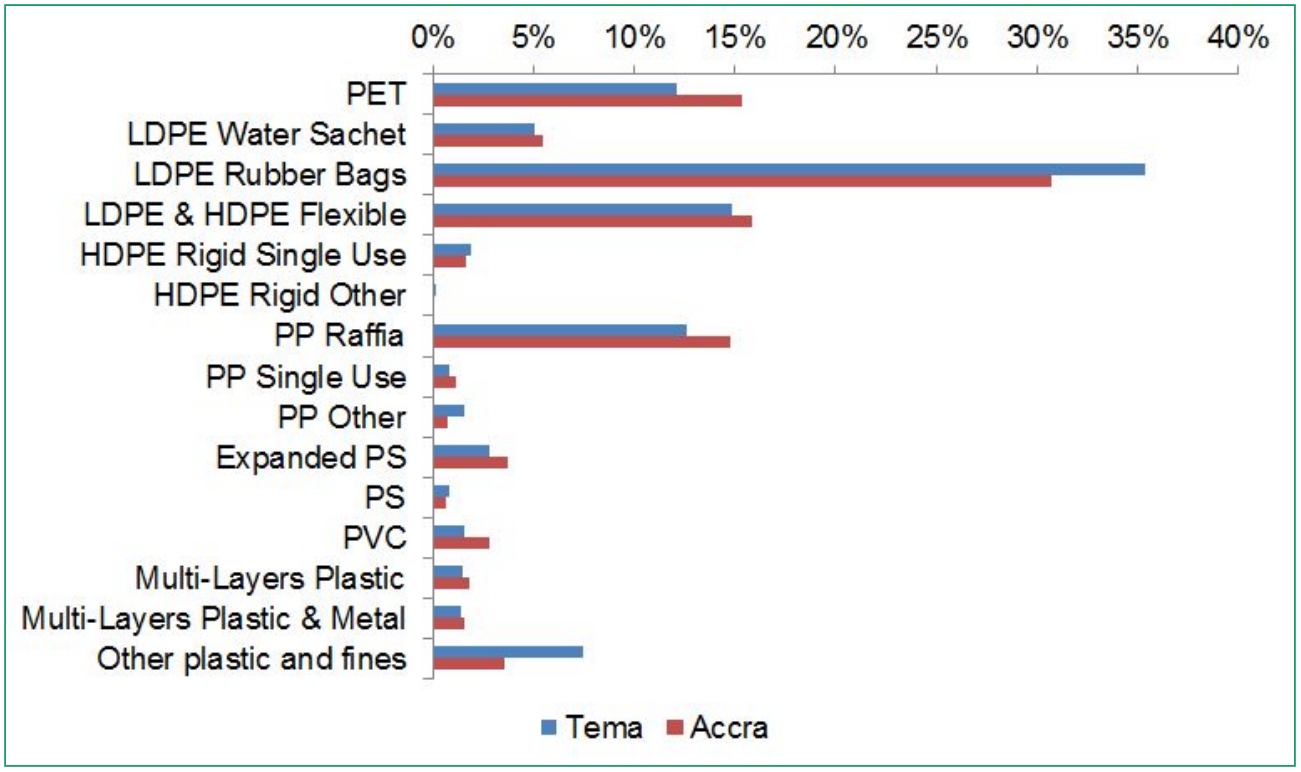


Figure 8: Plastic waste characterization figures for Tema and Accra

The figures are roughly consistent between Tema and Accra, with the same top five:

- The LDPE Rubber Bags and the PP Raffia are mainly used for solid waste storage and transportation purposes. The Consultant decided to include them in the results anyway, as they are part of the potential feedstock.
- LDPE & HDPE Flexible comes in third position. It is mainly composed of packaging waste, as films.
- PET comes in fourth position. It is mainly composed of bottles of water and other drinks.
- LDPE Water Sachets comes in fifth position. Based on previous surveys, the Consultant is aware that a significant part of the initial generated tonnage of water sachets is already collected by the waste pickers before the collection[2]. However, the significant figure after collection is explained by a high consumption of water sachets in the study area, and by the fact that the waste pickers do not open all the rubber bags and other raffia bags.

The other plastic waste streams are in minority. PET, LDPE, HDPE (flexible) and PP (raffia bags) count for more than 80% of the total of the plastic waste collected.

In order to analyse the impact of the life level on the plastic waste generation, the figures are also presented according to the type of collection:

[2] The water sachets are locally recycled in rubber bags

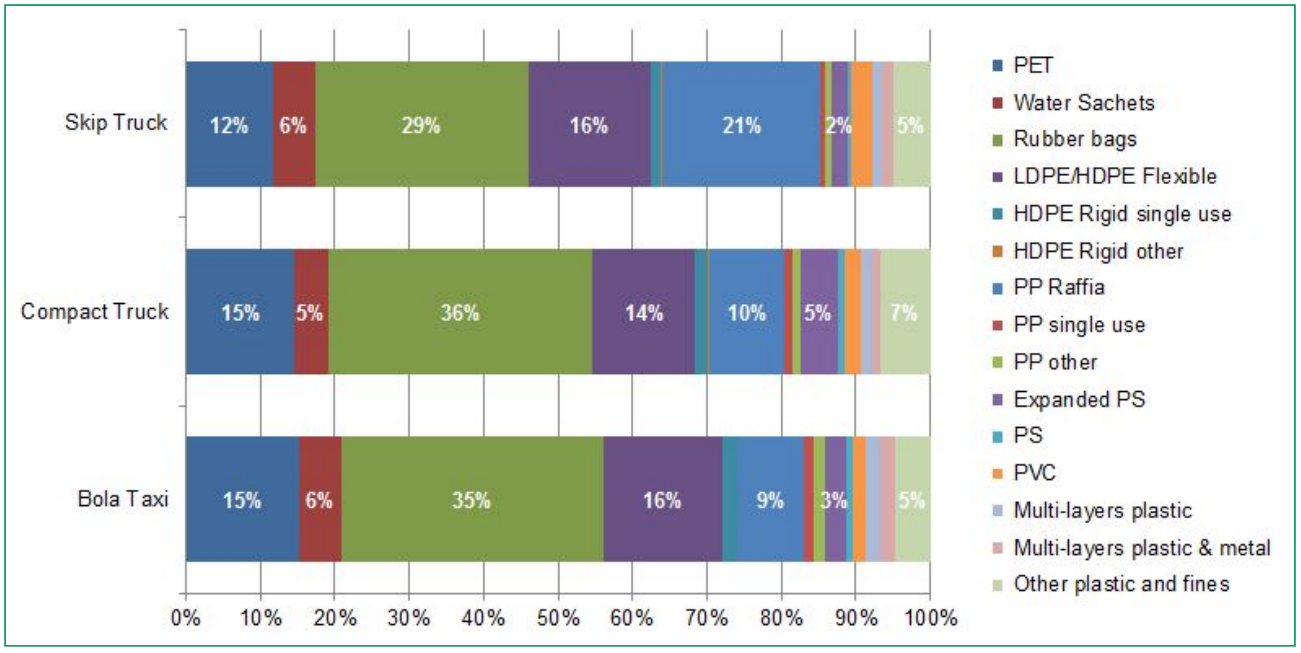


Figure 9: Plastic waste figures: comparison of results according to the type of collection

Only figures above 5% are displayed on the graph above. The main lessons are:

- The PET fraction and Water Sachets are quite consistent over the several types of collection and therefore not related to the population social class.
- The Rubber bags fraction is higher in compact trucks and bola taxis samples than for the skip truck collection. Compact trucks and bola taxis are used for door-to-door collection, which is aligned with a significant use of rubber bags.
- The PP Raffia bags fraction is higher in skip trucks samples than for other types of collection. Raffia bags are mostly used as bag for the transportation of waste from the house/shop to the skip, instead of the use of Rubber bags as illustrated by the figures (principle of communicating vessels).
- The expanded PS fraction is higher in compact trucks samples than for other types of collection. Expanded PS is mostly used for take-away food packaging for lunch at the offices. It gives indications on inhabitants' habits in medium and high class areas, as well as the probable location of the tertiary activities in these areas.

However, despite these small disparities, the results are globally homogeneous between the several types of collection.

The consolidated characterization figures per plastic waste polymer and for both areas are displayed below:

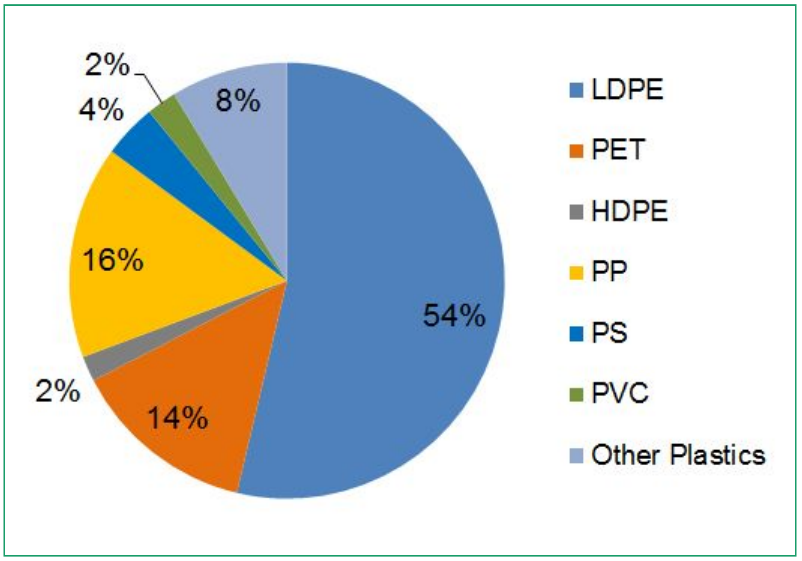


Figure 10: Consolidated plastic waste figures for Tema and Accra

There is a high fraction of PET in the waste stream – it confirms that the market is still weak in Ghana at this date. In addition of PET, opportunities exist for LDPE, PP and PS if the demand is created.

## 4.2 Ranges of uncertainty

Two kinds of uncertainty are presented: the inconsistencies of the consolidated figures due to operational mistakes, and the dispersion of the figures for each kind of plastic.

### 4.2.1 Inconsistencies during the consolidation

For each figure, The Consultant did the calculation of a range of uncertainty according to the comparison of the consolidated plastic waste figures per stream, and the total batch of plastic waste before the characterization. These results are presented below:

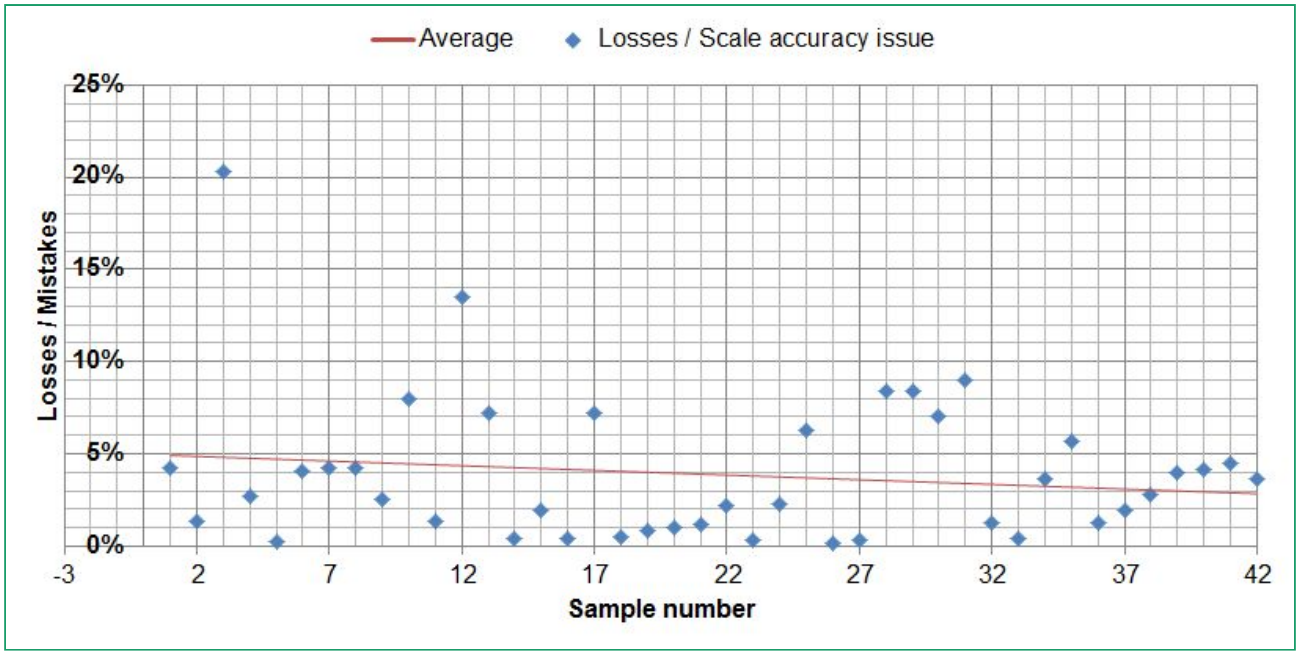


Figure 11: Range of plastic waste figures uncertainty

The figures are classified according to the sample number (sorted in time) and the range of Losses / Mistakes. For example, the sample # 20 presents a range of losses / mistakes of 1%. The range of Losses / Mistakes can be explained by several factors:

- Accuracy issue with one of the scales
- Mistake of weight figure reading
- Mistake of waste pickers sorting
- Mistake of data writing in the database

Two figures are very high (above 10%) and can be questioned. Several others are between 5% and 10%. However, the mistake average for all the samples is at 3.85%, which is an acceptable range of uncertainty. The linear tendency of the uncertainty (in red) decreases with the number of samples, and therefore with the time. It is representative of the learning curve of the campaign.

#### 4.2.2 Figures dispersion

The figures presented in the previous chapters are based on averages. However, the reliability of an average result can be questioned according to the dispersion of the values on both sides. When the values are close to each others, the average figure is reliable. Otherwise, the result should be taken with caution.

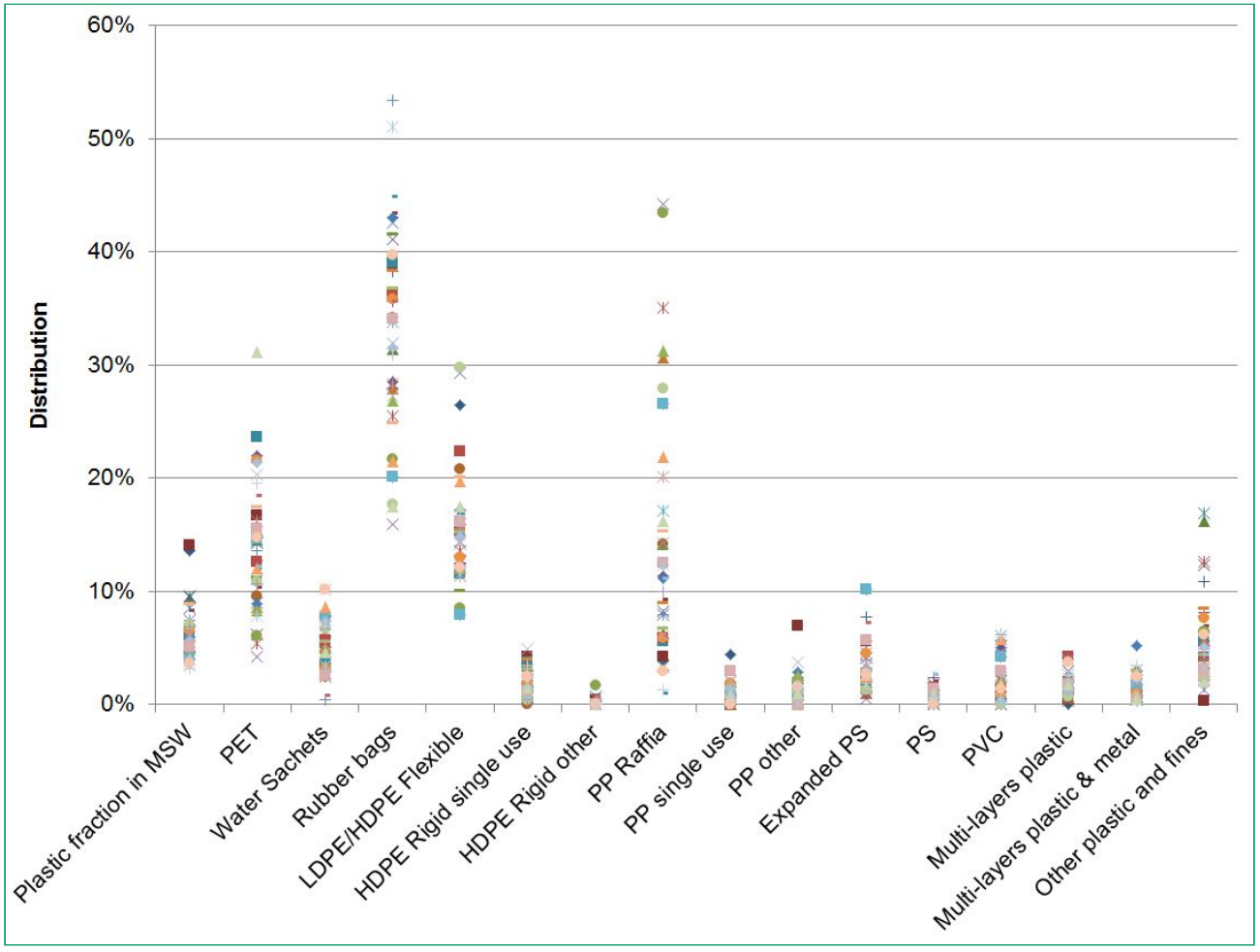


Figure 12: Dispersion of the samples per plastic category

Each symbol corresponds to one sample. For example, the fraction of plastic in the Municipal Solid Waste flow is quite stable: between 3% and 10%[3]. On the other hand, the fraction of rubber bags is very scattered, from 15% to 53%. The average value, 33%, is not much reliable.

[3] the two values above 10% are not included

## 4.3 Comparison with 2015 study figures

The Consultant compares the results of the campaign with a characterization campaign undertaken in 2015 on household solid waste[4]. The objective is to put the figures in perspective and validate the main results. However, the scope of the two campaigns is not exactly the same, and the comparison is thus limited to few components.

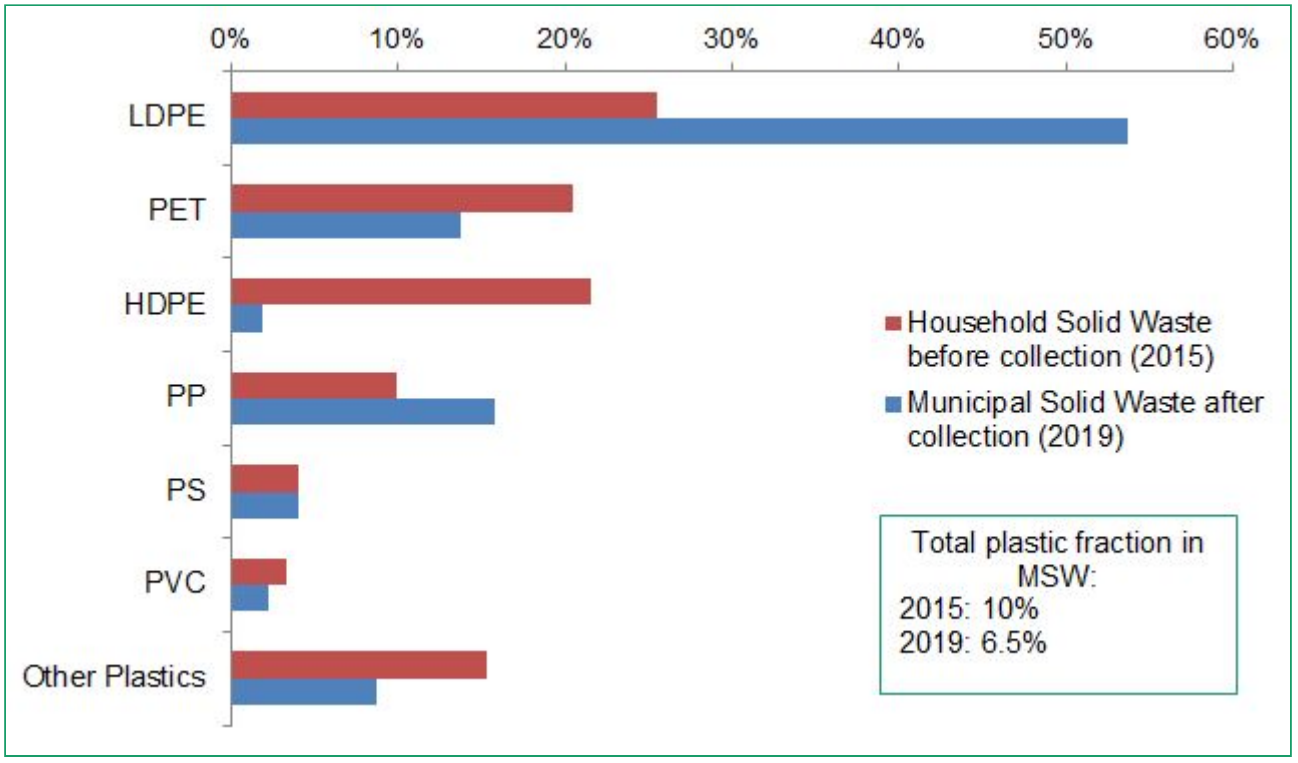


Figure 13: Plastic waste figures comparison between 2015 and 2019 characterization campaigns

The significant difference in LDPE and PP figures is due to the waste storage and transportation bags impact. It represents more than 60% of the LDPE polymer in 2019 campaign. Without these bags, the following figures are obtained:

[4] Miezah, K., Obiri-Danso, K., Kádár, Z., Fei-Baffoe, B. and Mensah, M. (2015). Municipal solid waste characterization and quantification as a measure towards effective waste management in Ghana. Waste Management, 46, pp.15-27.

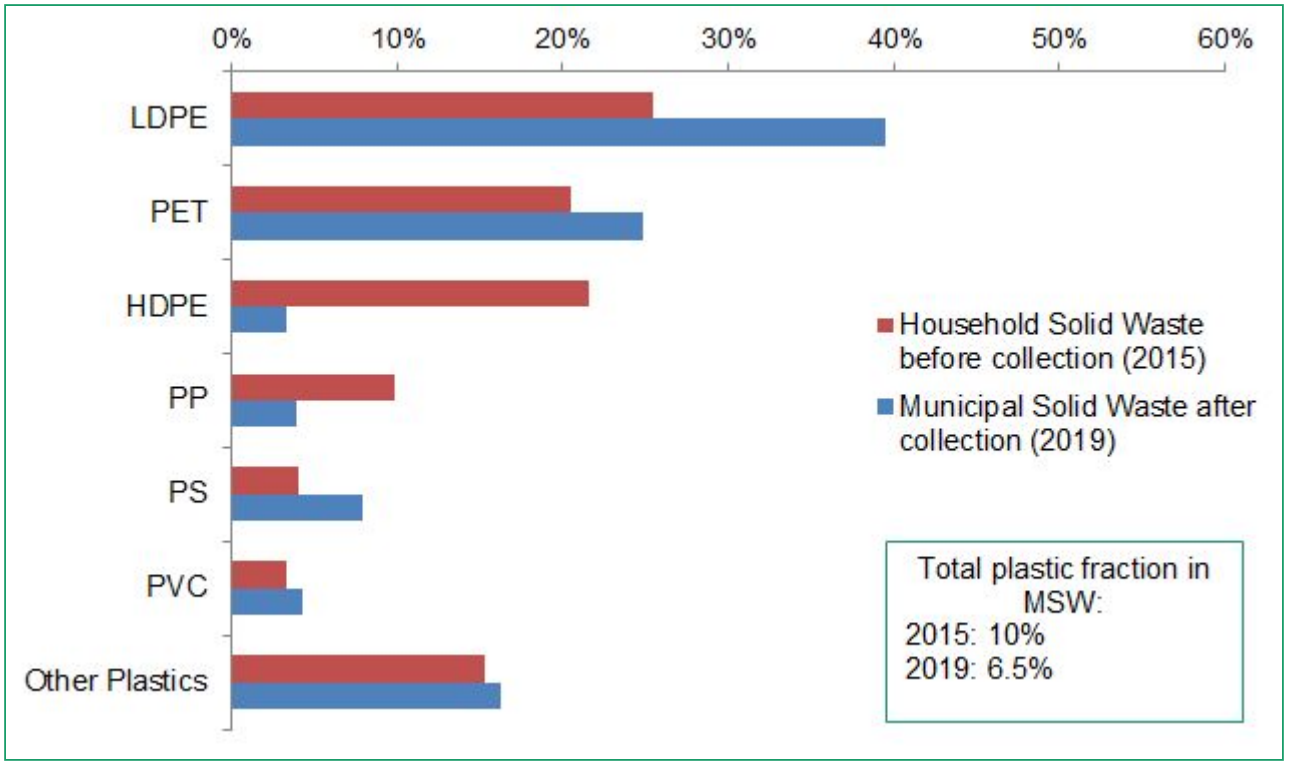


Figure 14: Plastic waste figures comparison between 2015 and 2019 characterization campaigns without bags

Significant disparities are still noticed between the two sets of data. Possible explanations are suggested below :

- MSW includes several waste producers between “households” and “small shops, restaurants and offices”. 2019 figures include all MSW, when 2015 ones are for households only;
- Waste pickers sort out valuable waste before/during the collection as HDPE products which present a high value on the local recycling market;
- The plastic classification can differ between the two campaigns. For example: HDPE can refer to HDPE flexible and/or HDPE rigid;
- Moisture level in LDPE after collection is not negligible[5];

In conclusion, these differences give important information on the local recycling market situation.

[5] *Visual observation only, the Consultant did not have the resources (budget, equipment availability and timing) to undertake moisture analysis.*

## 5 Analysis and discussions

The main lessons of the characterization campaign are listed below:

- The characterization confirms that a significant fraction of plastic waste (3% out of 10%) seems to be already sorted and recycled;
- HDPE fraction is very low (2%) when compared with 2015 figure (22%). HDPE is likely to be already highly recycled (high value on the market).
- There is a high fraction of PET in the waste stream – it confirms that the market is still weak in Ghana for the moment;
- In addition of PET, business opportunities exist for LDPE, PP and PS if the demand is created.