# Interim Guinea Current Commission

## REPORT OF THE

## ROUND TABLE FOR PRIVATE SECTOR: WASTE COLLECTION, DISPOSAL AND RECYCLING SYSTEMS

**VENUE: CSIR-STEPRI**

**ACCRA, GHANA, 19th -21st OCTOBER 2010**

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## 1. PREAMBLE

As part of the GCLME Project on "Combating Living Resources Depletion and Coastal Area Degradation in the Guinea Current Large Marine Ecosystem Through Ecosystem-Based Regional Actions", private sector companies in Ghana were identified and interviewed on their best practices, best available technologies, challenges and profit-oriented ventures in recycling the non-hazardous waste which they generate.

Based on an analysis of this information, a report was subsequently prepared on "The Collection, Disposal and Recycling Systems of Select Private Sector Companies in Ghana". This report was prepared with a view to making recommendations which could improve the functioning of these systems. In this regard, the report discusses the following salient points: the rationale for recycling non-hazardous waste by Ghana's private sector companies; the exact procedures which these companies use in recycling-from the moment the waste is generated to the moment it is collected, disposed and recycled; the sort of financial benefits which these companies derive from selling the reprocessed products; the challenges which they encounter; how they could overcome these obstacles; the kind of incentives which government provides to boost these activities; best recycling technologies which companies use/could potentially use and the success stories which they have to share.

During the round table meeting on this project, the Guinea Current Commission brought together the private sector companies which provided the information in the consultant report (The Collection, Disposal and Recycling Systems of Select Private Companies in Ghana), the government agencies of Ghana such as EPA and two of its District Assemblies-the Accra Municipal Assembly and the Sogakope District Assembly, which offered pertinent information on the enabling legislative framework, UNIDO and one private sector company each from five GCLME countries. These countries were Nigeria, Sierra Leone, Congo, Congo DRC and Côte d'Ivoire.

A Plan of Action which the network will implement with clear goals, methods and outcomes to promote waste management as an essential business in the GCLME Region was well-defined. The Plan of Action included roles and responsibilities of each member of the network, deadlines for accomplishing each envisaged task or role, modalities on regular mode of communication amongst members of the network and modalities on monitoring the implementation of the Plan of Action were also discussed.

**2. Opening Ceremony**

The UNIDO Round Table Meeting for the Private Sector on Waste Collection, Disposal and Recycling Systems was convened in the auditorium of the CSIR-Science and Technology Policy Research Institute in Accra from the 19th to the 21st October. UNIDO's round table created a platform for discussions with the Government of Ghana, some private sector companies in Ghana, as well as five GCLME countries; Côte d'Ivoire, Sierra Leone, Nigeria, Congo DRC and the Republic of Congo.

The three day meeting was aimed at enabling the private sector to become more actively involved in Waste Collection, Disposal and Recycling Systems in Ghana. Prior to this workshop, Dr. Yvonne Nana Afua Idun, a GCLME-UNIDO Consultant, conducted substantive research on this topic. Based on her findings, she prepared a report entitled, "Private Sector: Waste Collection, Disposal and Recycling Systems" (September 2010) and made the report available to all participants in the workshop for deliberations (See annex 3 for report).

The roundtable officially opened on Tuesday 19th October 2010. The opening ceremony was moderated by Mr. Napoleon Gbolonyo, the Administrative Officer of the Interim Guinea Current Commission (IGCC). The chairperson for the opening ceremony was Dr. Yvonne Idun. Present at the ceremony were the Executive Secretary of the Interim Guinea Current Commission, Dr. Stephen Maxwell Donkor; the UNIDO Representative to Ghana and Togo, Dr. Frank Bartels and Mr. Peter Derry, Deputy Director from the Ministry of Environment, Science and Technology, Ghana, who represented Ghana's Minister of Environment, Science and technology, Honourable Sherry Aryitey.

In her opening remarks Dr. Yvonne Idun welcomed participants to the workshop and highlighted the potentially devastating effects which waste could have on the environment-within a generic context and more specifically, in the case of Ghana. Given the increasing amounts of waste which are generated in Ghana and the adverse effects of such waste on the health of human beings as well as their environment, she said that UNIDO and the government of Ghana deem it prudent to focus on this area in their work. She stated that it is encouraging to note in recent times that the private sector has also been a proactive actor in this initiative. "Put together, all of these agencies are now promoting the recycling of waste, so as to add value to waste which becomes more valuable when reprocessed and could serve as raw material. More importantly, such an approach also helps Ghana to clean its environment and also, protect its citizens as well as its ecology from the harmful effects which wastes could have on them", she added.

Dr. Idun informed participants that UNIDO believes that with this network, a more co-ordinated approach to recycling the various forms of waste which are generated from diverse sectors-including the industrial, agricultural, medical and household sectors would be defined. Coupled with previously successful projects which UNIDO has implemented, the present meeting and proposed network are some of the outcomes of the UNIDO project on the "Combating Living Resources Depletion and Coastal Area Degradation in the Guinea Large Marine Ecosystem Through Ecosystem-Based Regional Actions".

She concluded her remarks by emphasizing the significance of the three day workshop, urging participants to share their views and co-operate with the Network which this roundtable is aimed at establishing. Dr. Idun advocated that by adopting such a coordinated approach to working on waste management, the problems of waste could be more easily resolved in this country.

Dr. Stephen Maxwell Donkor, Executive Secretary/Regional Co-ordinator of the Interim Guinea Current Commission/GCLME project then made his welcoming address. He also indicated that the aim of the current workshop is to set up a network for participants to discuss best practices, challenges and solutions which could be replicated in other countries.

In his welcoming note, Dr. Donkor said the round table meeting has offered UNIDO, the Government of the Republic of Ghana, private sector companies in Ghana, Côte d'Ivoire, Sierra Leone, Nigeria, the Republic of Congo and the Democratic Republic of Congo a platform to deliberate on strengthening the role of the private sector in the collection, disposal and recycling of wastes. He shed a great deal of light on the effects of waste on countries in the Guinea Current region and stated that discussions would therefore be held with a view to establishing a partnership amongst these parties for more work is carried out to promote the recycling of different forms of waste, an activity which could result in the derivation of income, creation of more jobs and sufficient levels of environmental protection. "Hence, through this initiative, UNIDO aims at working with the private sector and the Government of Ghana to enable Ghana and some other African countries to fulfill *inter-alia*, certain international obligations such as MDG 7 on environmental sustainability", Dr. Donkor stated.

Dr. Bartels subsequently made his statement. He spoke on the role of UNIDO in helping to enhance the efforts of the private sector in waste management. According to Dr. Bartels, the private sector generates over 45% of employment in developing countries. He commended the effort of some private companies

in Ghana (such as Cyclus Plastic Recycling and Zoomlion) which are involved in waste collection. Dr. Bartels then confirmed that UNIDO would continue to provide support to the Government of Ghana and the private sector to promote environmental goals and meet certain international obligations.

He said in light of these positive benefits which waste could yield for Ghanaians on the one hand and the detriments which could have on human and ecological health on the other hand, UNIDO in its pursuit of sustainable development and poverty reduction goals contemplates establishing a network with the government of Ghana and other private sector companies in Africa to promote the recycling of waste to a greater extent in Ghana and GCLME countries.

He specifically informed the participants that UNIDO has established a recycling processing centre project in Dar-es-Salaam in Tanzania in collaboration with the Ministry of Industries, Trade and Marketing, TIRDO and other stakeholders. He confirmed, "UNIDO will collaborate with any organisation in Ghana in this direction under the auspices of the Ministry of Trade and Industries and the Association of Ghana Industries".

He also informed participants on the upcoming World Industrialization Day, under the theme: "Competitive Industries for the Development of Africa". This theme he said is highly relevant to the round table meeting as competition increases the innovative ideas which promote development and the modern industry must consider as a matter of importance, recycling of industrial waste. Dr. Bartels called for the institutionalisation of a formal network of private industries involved in the recycling of non-harzadous waste.

In her keynote address read by Mr. Peter Derry, Honourable Sherry Aryitey categorized the forms of waste which are currently generated in the country. She said that the Government of Ghana is making efforts in tackling waste in the country but added that Government cannot perform this task all by itself. According to the Minister the role which the private sector plays in i the collection and treatment of waste could not go unnoticed. Hence, international organizations need to encourage and strengthen these workings of the private sector. He added that the involvement of the private sector in this area will further boost the efforts of the Government in tackling waste problems in the country. Furthermore, job creation and good health were some of the benefits which Ghana could derive from investing in the waste management business. She concluded her address by reaffirming Ghana's support to UNIDO, GCLME and the private sector in managing the country's waste.

## 3. TECHNICAL SESSION

During the technical session participants introduced themselves and gave a profile of companies in which they were representing. The mandate of their companies as well as the scope and coverage of their activities were also elaborated.

The session which was chaired by Dr. Stephen Maxwell Donkor , comprised twelve presentations from representatives of waste management companies from Ghana, Nigeria, Congo, Congo DRC, Côte D'Ivoire and Sierra Leone and the South Tongu District Assembly. (For full list of contact details of these participants, see annex 7 ).

### *3.1 Overview of Project and Thematic Focus of Workshop, Dr. S.M. Donkor and Dr. Yvonne Idun*

Dr. Stephen Maxwell Donkor gave an overview of the Guinea Current Large Marine Ecosystem project (GCLME) and the thematic focus of the workshop. He briefed participants on the importance of the ecosystem in the region and its benefits. He enlightened participants on the activities within the region. He said the term Guinea has been important to global history. He explained the genesis of the project and how it has evolved from a scientific phase to a project phase. He said that the importance of the GCLME was very crucial since cities like Monrovia and Lagos (the capital towns of Liberia and Nigeria, both of which are GCLME countries) were at the risk of sea level rise due to pollution along the coast. In Ghana, Keta was also at the risk of sea level rise and algal rises. Population increases along the coast have led to increase in the disposal of waste in these areas and said there was the need to have a structure to manage the waste. Hence the need for the public-private sector partnership. He further added that the focus of the workshop was to institutionalise a self-sustaining network to promote waste management systems in the Guinea Current region.

Dr. Yvonne Idun then spoke briefly on her report on Waste Collection, Disposal and Recycling Systems, which was the thematic focus of the workshop. She said though waste management was a problem, recycling yielded benefits. A case study in Kenya revealed how several communities in this country had resorted to reprocessing waste into fertilizer, which they sold for profit. This served as a means of creating jobs, generating income and reducing poverty in such communities. She said a strong network of all stakeholders would help address issues of waste management in the country. There was therefore the need to communicate by all means necessary to strengthen the waste management network.

Dr. Idun discussed some problems which she encountered during her research on the current topic. These included delays from some companies in providing relevant feedback to her points of inquiry. Thankfully though, she managed to collect all available data after persistent follow-ups. She expressed her appreciation to waste management companies which assisted her in the collection of data for the report. She urged participants to make the group as lively as possible.

Mr. Joseph Brie N'gata, the private sector representative from Côte D'Ivoire drew the chairman's attention to the fact that Dr. Idun's report was available in only English and therefore not suitable for French speaking participants.

Dr. Idun assured the Ivorian representative and other francophone participants that the document would be translated into French within the course of the discussions.

### 3.2. *Waste Collection, Disposal and Recycling Systems in Africa: Perspectives from Participants (15 minute presentation each)*

**Presentations**

While discussing the information in the Report on "The Collection, Disposal and Recycling Systems of Ghana's Private Sector Companies", participants were given 10-15 minutes each to share their experiences in recycling non-hazardous waste and made relevant recommendations for charting the way forward to creating a self-sustaining Network of Waste Management Companies and support organizations.

#### 3.2.1 Council for Industrial and Scientific Research

***The Wealth Potential of Waste***

Dr. William Owusu Oduru, a Research Scientist at the Centre for Scientific and Industrial Research in Ghana (CSIR). His presentation was on Wood Plastic Composite Material (WPC) technology, which is, mixing wood dust and plastic, while using a coupling agent. He said that wood dust and plastic waste are in abundance in Ghana due to several wood and plastic factories established the country. He explained

the adverse effects which these waste could have on the environment and human lives if not properly disposed off or put to some good use.

In charting the way forward, Dr. William Oduru stated that from research and experience a promising construction material can be fabricated from waste plastics and wood dust using a very high local content technology. Coconut oil or oleic acids are viable coupling agents in the fabrication of WPCs with reasonable strength that surpasses the International code council's minimum standard. He informed the participants that WPCs provides a technological solution to the menace of plastics and wood waste in our cities. He invited the private sector companies to seek Industrial partnership in the development of the material to a commercial product. However he stated that there will be the need for more funding for research into the product development, the optimum ratios and blending conditions that is types of coupling agents (readily available on the Ghanaian market) for material formulation.

**Interactive Discussions**

Participants deliberated on the economic viability of the technology used in this industry, with due regard to the cost involved in the research and production of wood dust and plastic composite. The chairman concluded that although the WPC technology was a good idea, more research needs to be done on available policy options, the coupling agent and the economic values of the WPC technology since those were some fundamentally important areas in the project.

Mr. Peter Derry stated that he perceives the project to be a one stop solution to waste management and natural resource depletion and therefore the government would also create an enabling environment (tax reduction) to boost the project and urged other partners to support the project. Participants welcomed this idea and encouraged stakeholders to get involved in enforcing this project to make it successful.

**3.2.2 Tilbury Environmental Group**

Captain E. Botchway who represented Tilbury Environmental Group (TEG) located in Tema, Ghana then gave an overview of the operations of the Company in oil waste collection and disposal systems. He said the main objective of the company is to eliminate pollution altogether or prevent pollution in the marine environment.

In order to arrive at this objective, TEG collects waste from ship dockings in Tema, treats the oil waste and disposes off ship garbage on shore. Captain Bochtway explained the sources of marine waste and

the segregation processes which his company carries out. After segregating oil from waste water, the waste oil is sold for road work (bitumen). He explained the procedures used in waste collection and recycling of oil waste at the company which includes Notification, Declaration and Collection. The Notification process involves ships informing TEG of the quantity generated, and then the ship completes a declaration form indicating the amount of garbage and oil waste. The waste is collected by trucks and sent to the landfill sites. He again added that due to the nature of their work staffs are exposed to hazardous material. Some of the challenges faced by the company are:

- Unsuitable landfill sites for hazardous waste;
- Lack of control;
- Workers do not have adequate protective equipment;
- False declaration of volume and weight of waste discharged from ship;
- No appropriate reception facility;
- No sufficient training for company staff; and
- Difficult for contractors to recognize certain waste.

He concluded that the global provision of adequate port waste reception facilities will contribute towards the elimination of intentional pollution of the marine environment from maritime activities.

**Interactive Discussions**

Dr. Donkor emphasized the importance of treating marine waste in an ecologically rationale manner and cited the Probo Koala tragedy which confronted the Ivorian capital of Abidjan in 2006. This is a case in point where waste was introduced into some water bodies which destroyed marine life and also poisoned many lives.

Other discussions centered on how participants could establish a network which will provide more experiments on the uses of waste oil.

Mr. Derry then mentioned that it will be a good idea for government to provide incentives to waste collectors because profit is normally generated through recycling. He further advocated for ships which do not segregate at source to be fined by the state. The informed participants that Ministers in

Ghanaian cabinet have been tasked to bring five different projects which would create jobs and alleviate poverty and waste collection recycling would be part of the projects identified. He said there could be a body of sorters who could be adequately trained for sorting waste and also given incentives to solve the problem.

Participants commended TEG on its oil waste segregation methods and its contributions to solving the waste problem. Questions asked by participants also focused on the future recycling plans of the company. Participants suggested a platform for recycling wastes can be created by setting up recycling units in some countries to address the transboundary problems on waste.

### 3.2.3 Zoomlion Waste Management Company

***Experiences in Waste Collection, Disposal And Recycling***

Zoomlion Waste Management Company Limited, one of the giant companies in the waste management, as well as environmental sanitation business in Ghana and Africa as a whole was represented by Mr. George Rockson, Head of Recycling and Decomposting. He shared the experiences of Zoomlion as a leading waste collection and disposal company in Ghana. He said that as Zoomlion was still learning from experiences of other countries, it thrives on partnerships and collaboration with universities- both foreign and local, so as to improve on their operations. He also outlined the different types of recycling systems which the company anticipates using in the foreseeable future.

He presented the company's plan of action for the near future as far as the issue of improving waste management technologies in Ghana are concerned. By February 2011, the sorting and composting facility, 300 MT /d of the company would be near completion. The compost produced from the facility enriched with minerals would be sold to farmers on credit. The facility he said will also serve as a regional centre for training. He emphasized that the success of this facility would however be based on the efficiency in the separation of waste at source.

He also discussed the approaches Zoomlion has adopted to educating the public on waste disposal. He stated that the company has established a Communications and Environmental Unit which handles public awareness, education and communications programmes of Zoomlion. Mr. Rockson said a major challenge faced by the company is how to collect fees for waste collection in the homes since such fees are charged and collected by the Metropolitan Assemblies. He stated that the re- zoning by the AMA has created a lot of problems for the waste collection companies. The company is however implementing a

GIS system to help map their clients for efficient collection of waste fees. Thus services will be provided to only clients who pay for the service.

Mr. Rockson suggested that the role of the network should include informing and contributing to national and local policies on the management of waste. The network should be a reliable source of general waste database that gives a clear picture of waste management (cost accounting) and supported by a decision supporting tool or platform. The platform (electronic print) he said could carry news letters on government position on key waste management factors, company news, and training programmes.

**Interactive Discussions**

Based on Mr. Rockson's presentation, the chairman urged participants to share their views on the Zoomlion experiences. Contributions were varied and participants suggested strategies which Zoomlion could adopt in increasing its revenue by using some laws or punitive measures to force waste generators who patronize their services to pay for such services. Discussions also centred on efficient waste collection methods which could increase the company's revenue. Mr. Chung, the Special Advisor of H.E. Ayittey on Waste Management, spoke about the waste management systems in Korea where segregation is done at source and offenders were prosecuted for littering the environment.

Mr. Yves Moe-Pouaty from Congo, advised that the waste management company as a corporate body must be considered as a legal entity, and therefore there is the need for a contract to be signed between the service provider and the user, so that when one party defaults the service provider can refuse to render services. The waste management companies must therefore depend on the judicial system to prosecute defaulters rather than relying on the municipal assemblies to deal with clients who default.

Mr. William Godwill Kuevidjeu, District Coordinator and Director, Finance and Administration, South Tongu District Assembly stated that there are byelaws (Liquid and Solid Bye law of the AMA) which make sure that the client pays for the service. The District Assemblies therefore has the responsibility to see to it that the defaulter pays. He advised the Company to compile the list of defaulters to assist the AMA to follow up. He also suggested that there should be a public (government) and private consultations on punitive actions for defaulters.

The chairman also recommended that Zoomlion should design and provide attractive bins to help educate and encourage waste segregation right from the home, communities and market places so that waste disposal can be become easier when it finally gets to the company's disposal sites. He added that more education on proper waste disposal will gradually bring about behavioural change among the populace.

**3.2.4 Zeal Environmental Technologies Limited**

The experiences of Zeal Environmental Technologies Limited were shared by Mr. Kwaku Ennin, Chief Executive Officer of the company. He briefed participants on the operations of the Company and stated that Zeal focuses a great deal on marine environmental management. He elaborated on the operations and best practices of the company.

He said that their current core operations are receiving ships generated oily waste water, general garbage from all vessels calling at the Takoradi Port and also managing waste generated by the Operators of the emerging Oil and Gas industry for safe disposal and in sound environmental manner at Environmental Protection Agency (E.P.A.) approved facilities.

He informed participants that the company has installed a modern Oily Waste Water Separating Plant manufactured by HYDROFLO, of St. Charles, ILL. Chicago, U.S.A. "Our newly acquired plant would also enable us to process gas condensate to be generated by West Africa Gas Pipeline. To meet our corporate vision, ZETL has acquired a 12.5 acre land of which 6.5 acre are being developed into a modern integrated waste management facility as a centre of excellence for the Sub-region".

He also spoke about the challenges facing the company in its work. The first of these obstacles were the lack of an incinerator which could not be purchased due to its high cost. Mr. Ennin added that accessing credit for such a facility was difficult due to high interest rates on bank loans. He called on the other waste companies present interested in profit making ventures to pull resources together to purchase incinerators which could benefit them all. He also called on governments to assist waste management companies in accessing credit for their operations.

Another problem faced by Zeal is the high cost of electricity in recycling waste material. In order to overcome such obstacles, he suggested that consultations amongst stakeholders in the private sector as well as a strong support from government could help improve the performance of companies in the waste management business.

**Interactive Discussions**

The discussions by participants centered on how stakeholders could come together to invest in one incinerator, so as to serve several companies in the waste management sector rather than wait on government to intervene.

In response to how landfill sites are selected Mr. William Kuevidjeu stated that feasibility studies are conducted and the EPA, Geographical Department, Chiefs and other stakeholders in the area are consulted before a land can be identified as a landfill site.

Dr. Donkor suggested to the industry players, to form a network which will create the platform through which such ideas and challenges could be discussed in-depth and addressed respectively. Hence one thrust of the Guinea Current Large Marine Ecosystem project is to facilitate this network which is being organized by UNIDO.

**3.2.5 Accra Plastic Waste Management Company**

In his presentation, Mr. David Agbenu said that in a bid to contribute to solving waste problem in Ghana, plastic producers and manufacturers came together to form a body whose mandate was to tackle waste problems in the cities. He explained that his company has been doing this by fixing attractive and colourful bins in town (one bin for plastic waste and the other for solid waste). For example, he stated that containers were placed at vantage points in Sogakope were possible due to collaboration between the Ministry of trade and Industry. One objective of the company was to encourage waste generators to segregate their waste when disposing waste materials into these bins. They also recruited plastic waste management guards to monitor activities of waste disposal within the cities and also provided dustbins for collection of plastic wastes and rubbish. Concerning the sustainability of the project, the stakeholders sponsored the bins by making advertisements on the bins and paying guards to watch over these bins. Some form of education was done on radio and television to create awareness. School children were also educated on how to manage plastic waste by forming clubs in schools.

Mr. Agbenu added that the aim of this initiative was to cultivate the habit of proper waste disposal and waste segregation by the public for easy collection and disposal for the company.

He informed the meeting that Ghanaian District Assemblies have also enacted by-laws to arrest littering offenders but the biggest challenge was waste disposal. On the other hand, Mr. Agbenu said that one of biggest challenge facing his company is the removal of the metal stands which holds the bins in place

being taken by local scrap dealers for other purposes. He stated that after collecting the waste Zoom lion and AMA supports the project in that aspect by disposing. He said this support was still not enough and therefore purchased cycles to dislodge the bins and sent them to the dump sites. In addition they pay the 70 guards and workers to police littering offenders. The project has had some groups from Liberia and Togo to study their activities. He said their expansion programme has been a challenge as some districts are reluctant to accept or understand the concept.

**Interactive Discussions**

Participants showed keen interest in Mr. Agbenu's presentation on waste segregation in homes and communities. Dr. Donkor suggested that an international agency like UNICEF could be granted membership on the network to assist in educating children in the communities.

**3.2.6 Cyclus Elmina Plastic Recycling**

Mr. Kenneth Agbeko began his presentation with a brief history of Cyclus Elimina Plastic Recycling Company in the Central Region of Ghana. He said that the company started as an initiative of the local assemblies which was a Dutch recycling facility in the Netherlands. The company specializes in plastic waste management and maintenance of public places for local government. With staff strength of about 170 permanent workers and 45 casual workers, the company recycles the following waste:

- Bottles; HDPE & PET
- Film; HDPE & LDPE (watersachets, packaging materials, and others) and
- Hard plastics; PP & HDPE.

Cyclus' approch to managing waste involves three processes; collection, processing and sales. This recycled waste plastic he said is sold to companies abroad for different kinds of production. He concluded on how Cyclus has positively impacted the local community in which they operate. He said the community had benefited by:

1. Care for a healthy environment and sustainable development;
2. Visible improvement of the environment;
3. Decrease of use of natural sources by encouraging reuse;

4. Job creation and poverty reduction; direct job creation for some 70 people (40% being women) and indirect job creation for some 50 agents and 500 collectors; and

5. Education on the importance of waste collection and recycling.

**Interactive Discussions**

In response to participant's inquiry on the waste collection methods of Cyclus Elmina Company, Mr. Agbeko stated that the company basically recruits local waste collectors and pre-finances their activities by buying waste from them. On the methods of cleaning and the agents for cleaning the plastics before being recycled, he said that ordinary detergents like Omo are used to wash the plastic waste before reprocessing the waste.

Participants also suggested to the company to use the Bona system in generating energy for production instead of generators which increases production cost.

**DAY 2, Wednesday 20th October 2010, Presentations (continued)**

Dr. Jacques Abe, the Environmental Officer of the Interim Guinea Current Commission (IGCC) chaired the second day of the round table discussion on waste management.

**3.2. 7. Emoc Engineering and Environmental Services Limited, Abuja, Nigeria**

Mr. Emmanuel Chukuwuocha briefed participants on the background of waste management in general in Nigeria. He then discussed the objectives and mission of the Nigerian waste management system, the waste and the environmental hazards which are associated with waste, the negative perception associated with waste management and those who work with waste. He further discussed the commercial benefit of waste management as well as the challenges faced by government and the private sector especially in harnessing the full potential within the waste management sector.

Some of the challenges include lack of a unified waste characterization procedures and strong support from government in the sector. He also said that contracts are given to some private companies which lack the appropriate and adequate capacity in terms of the equipments, technologies, and human resource capabilities. He cited some cases in Nigeria to back his point. He also added that some private

sector companies are interested in reaping their investments quickly when they invest in the waste management business.

Concerning the way forward, he said that in Nigeria, since everyone was a polluter, they all had to set up a system for managing waste. A waste management council has also been established and includes the informal sector in the main stream as well as women and children.

In Nigeria, he said that neighbourhood associations have been formed and empowered with legislature to arrest offenders. Mobile courts were also set up to persecute offenders and this even generated revenue. He emphasized that the private sector could be assist by being provided with funds for companies which work on the management of waste.

In proposing solutions to these challenges, he stated proposed the following: education, information, professionalism (by setting up a waste management society of Nigeria to ensure professionalism in this sector), the implementation of policies to monitor waste disposal in the countries, the provision of support from financial institutions, the adoption of a unified stand for waste collectors and the promotion of an approach where waste management issues would be resolved at lower levels within the community instead of vice versa. These, he opined, could help solve waste management problems.

**Interactive Discussions**

Participants discussed the important role which local communities play in ensuring proper waste disposal within the communities, as compared to what happens in the cities. Mr. Chukuwuocha concluded by explaining that local people hold their neighbours accountable for the waste generated in the environment and that is why the local communities are cleaner than the cities.

### 3.2.8. Sitrad-Congo, Congo Pointe Noire

Mr. Yves Moe-Pouaty begun his presentation indicating that SITRAD-Congo is a sanitation waste management company which recycles waste from both marine and land based waste. Situated at Point-Noire in the Republic of Congo, the company recycles and treats oil, solid and plastic waste which are collected mainly from households. He added that some of the recycled materials are used in producing pavement blocks.

With staff strength of over 100 people, Mr. Moe-Pouaty informed the meeting that SITRAD receives and processes over 30,000 tons of waste at its dump site. The company is currently collaborating with some

French agencies and environmental groups to provide finances to build an appropriate waste recylcing facility for SITRAD.

He informed participants about EKOPOL, the company's site for dumping waste collected and treatment facility. He said the treated waste is recycled into bricks which is used by the company but not sold to the general public because it does not have the license.

**Interactive Discussions**

In response to participants' interest in the activities of the company, he promised to send a comprehensive brief on the operations of SITRAD Company to the IGCC for circulation.

**3.2.9 Lassire Dechets Services**

The representative from Côte d'Ivoire, Mr. Joseph Brie N'gata of Lassire Dechets Services shared some experiences in the area of waste management in his country. He spoke about the pre-collection method of collecting waste by his company . He also discussed the ways in which waste is collected from homes and transported to the dumping sites by waste collectors. He said that in previous times when the trucks got to the dumping sites, the waste was weighed and the data about the quantities of waste was entered. A ticket was then given and the refuse was off-loaded at the landfill sites. The tickets were then sent to the authorities for payment. However, this resulted in some payment difficulties as it sometimes took about three months before payments were made by the authorities. He said that this nearly collapsed the company. Mr. N'gata indicated that with assistance from the World Bank though, a financial management system called MARCOM has been put in place to pay waste collectors within a month or less after submitting their bills.

**Interactive Discussions**

After his presentation, participants asked questions on waste collection and disposal legislation in Côte d'Ivoire and how effective these laws/policies were. Mr. N'gata confirmed that although there were problems in the enforcement of laws on waste during the era of the political instability, the recently peaceful atmosphere in the country has facilitated the implementation of these laws.

He provided positive responses to inquiries on the possibility of converting agricultural waste from cocoa pods into energy. Mr. N'gata informed the meeting that a great deal of research is currently being

done to find out ways to generate electricity from waste. He said that he would provide a comprehensive detail of such initiatives to the network in future.

### 3.2.10 Freetown Waste Management Company

The representative from Sierra Leone, Mr. Donald Tweede, shared some perspectives on the waste management system in Sierra Leone. He said that sound waste management was in its infant stages in his country. According to him, over the past few months, cubicles have been scattered in Freetown where waste is deposited for collection and disposal at dumping sites. He said that in the near future, his company plans to engage in house to house waste collection and the modalities for charging for waste collection will be incorporated into a proposed plan. His company would also consider educating women, children and students on sound environmental practices.

Mr. Tweede added that one challenge facing the waste management industry in his country is the absence of laws which could govern the waste management sector as exists in other countries. However, he was quick to add that the workshop had provided many insights into the issue and assured participants that there was a wealth of knowledge which could be tapped by Sierra Leone from the views of participants.

**Interactive Discussions**

Based on various recommendations from the audience to on the need to promote research, Mr. Tweede stated that his company and the Government of Freetown as a whole would conduct extensive research into waste management practices so as to find strategic ways of involving all stakeholders in establishing waste management systems in Sierra Leone. These ways included developing legislation and enforcing regulations which would support and monitor waste collection, disposal and recycling in Sierra Leone.

### 3.2.11 Environmental Protection Agency (EPA) of Ghana

Mr. Lambert Faabeluon from the Environmental Protection Agency (EPA) in Tema stated that Ghana is taking a lot of measures to recycle its waste materials. Consequently, recycling companies have been established in various parts of the country to reprocess the different types of waste materials like plastic, metals, and paper into fine products for commercial purposes. The private sector, he said, is

also actively involved in recycling waste materials due to the crucial role being played by the private sector in waste management. Hence, EPA gives priority to the work of companies which are interested in treating waste within the country. This support comes in the form of facilitating the process for obtaining permits by these companies for operation. The EPA has also carried out an assessment of pollution equipment and other equipment like recycling plants of companies that operate in the country. He said that the EPA had identified 15 different types of waste which can be treated and recycled.

Mr. Faabeluon also said that his agency has guidelines as well as government legislation to monitor and regulate waste management companies and their operations in the country. He indicated that the EPA is working to stop the importation of used electronic equipments from other countries into Ghana because of the surge of the electronic waste being produced worldwide which ends up being dumped in developing countries. This negatively affects the environment.

He informed the meeting that the EPA is exploring the possibility of setting up a recycling plant to reprocess used electronic waste especially computers. This is because in countries like the United States, jewellery is made from computer waste. The EPA has also produced three guidelines for waste management in Ghana and is ready to provide training if the need arises. Mr. Faabeluon emphasized EPA's readiness to partner with international organizations, NGOs and other agencies so as to provide solutions to waste problems.

**Interactive Discussions**

The chairman briefly summarized EPA's presentation and welcomed discussions on Mr. Faabeluon's presentation. Participants' discussions on this presentation were varied as they had different opinions on diverse topics which the EPA representative had discussed.

### 3.2.12 South Tongu-Sogakope Municipal Assembly

On behalf of the Sogakope Municipal Assembly of South Tongu District, Mr. William Kuevidjeu gave a brief overview of the district and explained the power structure of the assembly. He spoke about the formation of the environmental and sanitation sub-committee in the assembly. According to Mr. Kuevidjeu, the main aim of this sub-committee was to manage waste. He added that the crucial challenge for the assembly was how to recycle waste, though various steps that had been taken to collect the waste. Organic waste which could be used as compost was sold to farmers and fishermen.

However, he informed other participants that assistance is still needed to expand work within this area. He explained that the current waste management project in place is funded by UNDP, DANIDA, the Government of Ghana and the District Assembly.

While discussing the action plan of the Assembly for waste collection, disposal and recycling, he said that the Assembly will be purchasing sanitary clothing for the staff who manage the waste and also acquire and manage three dumping sites. He called on waste management companies to visit the South Tongu area and assist by providing support to the District Assemblies in waste management.

**Interactive Discussions**

Waste management companies stressed the need to collaborate with South Tongu in the collection, recycling and disposal of waste, owing to the commitment of this district to promoting recycling. Participants agreed that through the proposed network of the current meeting, the costs of implementing such initiatives could be cut down and the success stories of this District Assembly shared with other Districts.

**DAY 3, THURSDAY 21ST OCTOBER, 2010**

**4. FIELD TRIP**

A field trip was organized for participants to Tema Steel Works and Tilbury Environmental Group in Tema, Ghana. The purpose of the trip was to give participants a practical experience of the theoretical issues which they had been discussing and sharing at the workshop on waste collection, disposal and recycling systems. The trip was also aimed at studying and observing the activities of these two waste management companies.

**4.1 Tour of Tema Steel Works Limited Company**

The Tema Steel Company recycles scrap metals into steel for selling on a commercial basis. Upon arrival, the participants were received by Mr. Johnston, Assistant Production Manager. Mr. Johnston briefed participants on the history and operations of the company as well as its achievements and challenges.

Participants asked questions about this company's alternative source of power when the main source of power is off as well as the quantity of steel produced per annum. Mr. Johnston responded that the high costs of electricity for recycling and the sometimes inadequate supply of electricity are major challenges which Tema Steel encounters in the business.

He stated that one of their biggest challenges has been the inadequate supply of raw materials to the company. The company sometimes competes with foreign companies which are always ready to buy scrap at a higher price than they can offer to scrap collectors. These foreign companies export the scrap for recycling abroad.

He mentioned that about 90% of the company's workforce is from Ghana and the remaining 10% comprises expatriates from India. The participants ultimately expressed an interest in the company's operations while focusing their questions on the company's methods of waste collection, recycling and production of steel, tax obligations, labour and energy consumption.

Participants were taken to the recycling site of the company to observe the various stages of steel production. Touring the scraps centre where metal scraps are kept after collection from dumpsters, participants had the privilege of witnessing the melting and moulding of steel being cast into billets. Participants also visited the foundry section where sand is used for moulding steel into desired shapes. Mr. Johnston added that the slug (waste) from the billet which is not harmful to the environment is used for filling roads because of its hard texture.

**4.2 Tour of Tilbury Environmental Group (TEG)**

At the Tilbury Environmental Group, participants were taken through a brief presentation on the operations of the company. They were then taken around to see the reception site of the company. The Plant Engineer and Technician at Tilbury Environmental Group took participants through the processes of waste oil collection, treatment, filtering and storage processes used by the company.

## 5. Reflections from Field Trip, Formation of Network on Waste Management, Review of Draft Plan of Action and the Way Forward

At the end of the workshop, participants agreed to form a network so as to facilitate their work on the collection, disposal and recycling of waste within the GCLME region. This network included all participants present at the workshop (the private sector companies, GCLME, UNIDO, Environmental Protection Agency and Sogakope District Assembly).

Together with participants, Dr. S.M. Donkor reviewed and made inputs to the Action Plan (Annex 2). Deliberations also centred on the modalities for functioning of the Network. Participants agreed and designated the GCLME as a temporary bureau to monitor and support activities and work of the network. On the modalities and the organogram for the network, Mr. Moe-Pouaty, Mr. George Rockson

and Mr. D. Agbenu were nominated as the focal persons for the network. Furthermore, Dr. Jacques Abe, the Environment Expert of the GCLME was nominated as the leader of the network to co-ordinate and monitor activities of the network. The members suggested that IGCC-UNIDO should also host the website of the network for a year.

Mr. Emmanuel Chukuwuocha made substantive contributions to outlining the guiding principles for the network. He also suggested ways in which members of the network could share and use data for their collective benefit within their individual organizations. These are reflected in the Action Plan which participants then adopted. In adopting the Plan, participants also worked out the modalities and principles for the operations of the network to promote waste management as an essential service within the GCLME region. (See Annex 2 of this Report, for full text of Action Plan).

**6. Closing Ceremony**

The UNIDO Round Table meeting for "The Private Sector: Waste Collection, Disposal and Recycling Systems" was closed by Dr. S.M. Donkor. In his closing remarks, Dr. Donkor reiterated the need for continued networking amongst participants and their individual companies. He said that the success story of the network will be replicated in other countries within the Guinea Current region. Miss Sylvia Nsenkyire, the Programme Assistant for Ghana was identified as the focal person between the Ministry of Environment, Science and Technology and the network.

Dr. Donkor urged participants to study Dr. Yvonne Idun's report on waste collection, disposal and recycling and provide direct feedback to her. He assured the francophone participants that Dr. Idun's report will be translated into French and sent to them at a later date.

He expressed his gratitude to all participants, UNIDO, the government of Ghana, the RCU staff and especially to Dr. Idun for her research and report.

Dr. Idun in her closing statement thanked the participants for their time and co-operation as well as the staff of GCLME/UNIDO for assisting to achieve the expected outputs of the meeting.

**ANNEX 1: RECOMMENDATIONS FROM PROCEEDINGS**

## Recommendations by the Network

*In their collaborative work on waste collection, disposal and recylcing, participants of the network need to promote the following*:

- Give consideration to the transboundary impact of the transfer of waste for recycling across countries.
- Examine the profitability and economic benefits of the WPC and the stage at which it is operating (research or product stage). Further undertake extensive work on available policy options and the economic valuation on the production of WPC. The private sector must support the WPC project.
- Put proper structures in place to help in the segregation of waste.
- Conduct research on the possibility of using waste oil from ships as a coupling agent for the WPC product.
- Use the integrated approach as a means of enabling countries to provide a platform for recycling waste by creating collection centres in all the GCLME countries.
- Explore the possibility of replicating the Korea or Japanese system of collection of waste.
- Provide bins at vantage points to segregate waste as a first step.
- Ensure that collection sites are kept cleaner and attractive, and that personnel handling waste are appropriately equipped so as to attract people to dump waste in the right place.
- Involve the public from the conceptual stage to the implementation stage of projects.
- Emphasise communication, education and hygiene. Effect behavioural change through campaigns.
- Invest jointly to establish incinerators.
- Put emphasis must on recycling to promote waste management.
- Consider inviting UNICEF to join the network as this agency deals with children in the aspect of education, hygiene, sanitation and these are relevant to waste management.

- Adopt a consolidated approach to gathering resources so as to educate the public.

- Establish Environmental Management Systems (EMS) using the ISO 14000 series in the waste management sector.

- Develop a practical hand book / manual on waste management for the GCLME.

- Involve financial institutions in funding by giving support to waste management projects/programmes so as to develop the waste management sector.
- Grant taxes to waste management operators (this should be done on the part of governments in particular).
- Enhance good networking among stakeholders to enhance technology and equipment transfer.
- Create Action Plans for Waste Management. Develop National / Regional Waste Management Master Plans.
- Facilitate the acquisition of land (sites) and the establishment of waste management industrial park(s) in the GCLME region.
- Review the existing waste management systems of the region to identify pitfalls while finding solutions for charting the way forward.

- Create public awareness.

- Ban the packaging of non bio-degradable materials for packaging.

- Promote a litter bill to prescribe standards for regulating littering in the environment and to provide enforcement in the provisions of the bill.

- Grant incentives for pollution control. In this regard, network should work with governments to consistently make the effort of granting incentives to the companies which assist in reducing pollution.

**ANNEX 2: ACTION PLAN FOR THE NETWORK**

**Preamble**

We, the Government of the Republic of Ghana, Ministry of Environment Science and Technology, Environmental Protection Agency of the Republic of Ghana, Council for Scientific and Industrial Research (CSIR), South Tongu District Assembly (Sogakope), UNIDO, Qualiplast Recycling Company, National Plastic Waste Programme, Blowplast Recycling Company, Cyclus Elimina Plastic Recycling Limited, Barry Callebaut Company, Tema Steel Company Limited, Zeal Environmental Technologies, Zoomlion Ghana Limited, Cocoa Processing Company, Gieffe Wood Company Limited, Modern Wood Company Limited, Ghana Agro Food Company and Tilbury Environmental Group,

Having met in Accra Ghana, from the 19th to the 21st of October 2010, on the occasion of the Guinea Current Commission / UNIDO Round Table for the "Private Sector: Waste Collection, Disposal and Recycling Systems",

Reaffirming our commitment to promoting economic activities, environmental protection and social upliftment, thereby attaining sustainable development goals for the benefit of the citizens of the Guinea Current Region and contributing to the realisation of MDG 7 on environmental sustainability in our countries,

In cognisance of the fact that an integrated waste management with recycling system could be a positive tool to the attainment of these goals,

Reaffirming our dedication to promoting ecosystem health, human rights to a decent environment, poverty alleviation, and other equitable principles,

Acknowledging the membership of our country to international conventions such as Abidjan Convention, The Basel Convention on the Transboundary Movement of Hazardous Waste and Their Disposal (1989), the Stockholm Convention on Persistent Organic Pollutants (2001) and the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (1998),

Further acknowledging the efforts of our country to promote the implementation of these treaties at national level,

Being dedicated to promoting activities which will compliment these workings,

Hereby enter into a partnership to promote the environmentally sustainable Collection, Disposal and Recycling various forms of waste including the following:

- Plastics
- Sawdust
- Marine Waste
- Waste Oil
- Municipal Waste
- Agricultural Waste
- Glass
- Electronic waste
- Food waste
- Ferrous and Non-ferrous metals
- Paper
- Stationary Waste
- Chemical Waste
- Non hazardous Medical Waste
- Industrial Waste Water

We further undertake to promote the following :

**Ecologically Rational Principles**

1. Prior Informed Consent (PIC):
    - Develop a data sheet for waste tracking.

Action to be undertaken by: –EMOC (Nigeria), TEG (Ghana), and SITRAD (Congo).

Time Frame: Congo will send a standard template by next week.

2. Sorting waste at source (preventive principle):
    - Provide specific coloured bins for segregation of two categories of waste initially then increased according to the conditions in the area: biodegradable and non-biodegradable

Action to be undertaken by: National Plastic Waste Management Programme (Ghana), Zoom Lion (Ghana) and Les Lassire Dechets Services (Côte d'Ivoire).

*Network must be specific in the thematic areas of the pilot project which all partners will implement in the above mentioned forms of waste which to be recycled with due regard to promoting these principles.*

Time Frame for implementing project: One year to enforce pilot project on a particular zone.

3. Precautionary Principle:
    - Environmental Impact Assessment should be conducted on every waste management project. In circumstances where there is uncertainty, a knowledgeable source and the appropriate agency should be consulted about the scientific composition of the waste.

Environmental Impact Assessment: EPA of Ghana

Action to be undertaken by: EPA.

Agencies for the Scientific Research: CSIR (Ghana), EMOC (Nigeria) and, Freetown Waste Management Company, Sierra Leone.

(SITRAD –Congo will send a copy of their EIA document, for reference purposes).

4. Embrace Sustainable Technologies to improve waste management.
    - The governments of Ghana, Congo DRC, the Republic of Congo, Sierra Leone and Côte d'Ivoire as well as the private sector will make a conscious effort to invest in waste recycling, collection and disposal and promote research in these areas. Research should also focus on meeting market requirements.

Action to be undertaken by: CSIR (Research Institute –Madina, Accra), Ghana Standards Board and Blowplast Recycling Company:

a. Waste Management companies must inform the research institutes on issues to research for consideration in their research planning.
b. Funding for the research: In terms of sponsorships (grants), companies can sponsor research institutes for conducting research.
c. UNIDO will be the avenue for linkage between the private sector and the research institutions.

5. Organize relevant training and awareness programmes for as many sectors of the populace as possible in line with the objectives of the network. Parties will advance these programmes with due regard to promoting the following:
    - Expand the market across the network areas: Categories of waste and the scale of each category;
    - National, sub-regional, regional and international training programmes to be abreast with global trends.

Timeline: One year.

6. Application of Geographical Information System (GIS):
    - To acquire reliable data on certain catchment area, contribute to planning and choose best options for integrated waste management;

- To geo-reference the location of the transfer stations and buy back centres so as to help in providing education and directing people to the nearest stations;
- To identify dumpsites, landfill sites and transfer sites;
- The map should indicate where companies can provides services.

Action to be undertaken by: Zoom Lion Ghana Limited and EMOC.

Timing: For the next 6 months.

7. Application of Life Cycle Assessment (LCA) and Material Flow Analysis (MFA) , ISO 14,000.

   Action By: Zoom Lion, EMOC.

   - To advise metropolitan assemblies and policy makers on best available technology to adopt;
   - To decide where to locate the facility.

8. Develop Standards through joint and multi-agency Research and Development (R&D)
   - Standards of products (compost, plastics) and what they are to be used for;
   - Influence the development of standards or set up standards for its members;
   - Through it members develop best practice guidelines.

Action to be undertaken by: Members of the network; National Plastic Waste Management Programme to spearhead the development of voluntary standards for the network in consultation with EPA.

Timeline: One year.

9. Communication:

- Publish newsletters on the achievement, activities and challenges of members of the network (for example, e-journal, reports) twice a year for public education.
- Advertise conferences and training programmes, improve waste management practices
- Dissemination of information through documentary of best practices.

- Advertise commercial products, tenders, and other business information.

Action to be undertaken by: National Plastic Waste Management Programme (publication of newsletters).

GCLME to provide the network with a web page for the newsletter.

Members of the network must pay for advertisements in the newsletter and be responsible for promoting sponsorships, adverts and subcriptions.

UNIDO to be the trustee of the fund for a year.

10. Youth and Gender:

- Involve women and men, children and faith groups as change mechanisms in the management of waste.

Action to be undertaken by: EMOC which should share information on using youth and gender to promote waste management. EPA to facilitate sensitization workshops or to be the avenue to contact these groups.

11. Provide advice on measures for lack of compliance:

Action to be undertaken by: EPA should inform the network on measures.

12. Influence government to introduce incentives to private sector companies:

Action to be undertaken by: EPA.

13. Monitoring and Evaluation:

From the onset, our network activities as well as overall waste management sector in Ghana in close support of Government agencies (EPA and others) will be monitored through:

- Internal Monitoring ; and
- Sector Monitoring.

Action to be undertaken by: Blowplast Recycling Company.

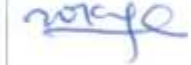
14. The group undertakes within the long-term, to establish a Waste Management Council as a professional body.

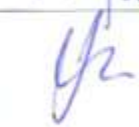
We also undertake to develop these principles into a well co-ordinated and funded action plan for our network and develop a self-sustaining means of financing our activities.

We further request the Guinea Current Commission to provide us with administrative and technical support for an initial one year from now, at which time we would have established ourselves in a well-coordinated manner.

**SIGNATURE PAGE**

| NO. | Name | Organisation | Signature |
|---|---|---|---|
| 1. | Dr. Stephen Maxwell Donkor | Guinea Current Commission |  |
| 2. | Mr. Emmanuel Chukwuocha | EMOC ENGINEERING & ENVIRONMENTAL SERVICES LTD ABUJA NIGERIA |  |
| 3. | Mr Moses C.K. Awude | South Tongu District Assembly, Environmental Health and Sanitation Unit, Sogakope. |  |
| 4. | William Godwill KUEVIAJEN | South Tongu Dist. Assembly – DCD FINANCE |  |
| 5. | George N K Rockson | Zoomlion GH Ltd. Head. Composting & Recycling Unit |  |
| 6. | Dr. William Owusu Ocloo | C.S.I.R – Institute of Industrial Research. |  |

| | NAME | ORGANISATION | SIGNATURE |
|---|---|---|---|
| | | | |
| 7. | MUTU MBOKO Justin | Centre de Contrôle et de Surveillance de la Pollution Marine (C.C.P.M.M) |  |
| 8. | Cindy Badoe | E.P.A (Ghana) | Badoe |
| 9. | DONALD TWEEDE | FREETOWN WASTE MANAGEMENT COMPANY SIERRA LEONE |  |
| 10. | NIGATA BRIE Joseph | E.I.D.A |  |
| 11. | GODFREY C. AMPOFO | BLOWPLAST |  |
| 12. | VIVIAN KWAKYE | COCOA PROCESSING CO. LT TEMA |  |

| | NAME | ORGANISATION | SIGNATURE |
|---|---|---|---|
| 13. | MOE-POUATY JULES EDMOND | SITRAD-CONGO |  |
| 14. | Prince Fimpong Tomop. | Jar Hua Chinese Company | Tomop. |
| 15. | FRANK CHINBUAH | NATIONAL PLASTIC WASTE MANAGEMENT PROGRAMME |  |
| 16. | DAVE AGBENU | ✓ |  |
| 17. | QUARANCHIE ADAMA-TETTEY | ✓ |  |
| 18. | FRED OHENE OMANE | QUALIPLAST |  |
| 19. | PATRICK TAWIAH ARMAH | — |  |

| | | | |
|---|---|---|---|
| 20. | Yaovi Nana Afua Idun | ICEGAD (International Centre for Environmental Science & Development) | |
| 21. | Jacques Abe | UNIDO-GCLME Project Accra, Ghana | |
| 22. | SYLVIA OBEI NSENKYIRE | UNIDO-GCLME NPA GHANA | |
| 23. | | | |
| 24. | | | |
| 25. | | | |
| 26. | | | |

**ANNEX 3: CONSULTANT REPORT ON THE COLLECTION, DISPOSAL AND RECYCLING SYSTEMS OF SELECTED PRIVATE SECTOR COMPANIES IN GHANA**

# REPORT ON "THE COLLECTION, DISPOSAL AND RECYCLING SYSTEMS OF SELECT PRIVATE SECTOR COMPANIES IN GHANA"

**UNIDO PROJECT ON "COMBATING LIVING RESOURCES DEPLETION AND COASTAL AREA DEGRADATION IN THE GUINEA CURRENT LARGE MARINE ECOSYSTEM THROUGH ECOSYSTEM-BASED REGIONAL ACTIONS"**

**SUBCONTRACT NO.**

**PREPARED BY :**

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## 1. GENERAL OVERVIEW

## 1.1 Introduction and Background

This report of the UNIDO Waste Stock Exchange Management System assesses the best practices and best available technologies which some companies in Ghana use in recycling the non-hazardous waste which they produce during their industrial activities.

Regarding its structure, the report is divided into two parts. The first portion consists of information from Ghana's Environmental Protection Agency and Ghana's Environmental and Health Unit of the Sogakofe District Assembly. These agencies were also interviewed so as to find out about the enabling environment and legal framework which govern the recycling of industrial waste in Ghana. After presenting this information, the experiences of the companies are then shared, to show how they operate within this legal framework, their best practices and challenges, best available technologies recommendations which can be made for charting the way forward they encounter, and how these can all fit into a proposed network of UNIDO on a Waste Stock Exchange in Africa.

The second component of the report then discusses the perspectives of the companies themselves. The various companies which were interviewed and successfully provided information are: Cyclus Recycling Company, Blowplast Recycling Company, Qualiplast Recycling Company, and The Accra Waste Management Association, Ghana Agro Food Company, Tema Steel, Tilbury Environmental Group, Jar Hua Company, Zoomlion, Cocoa Processing Company, Barry Callebaut Company, Gieffe Wood Company and Modern Wood Company.

In terms of the methodology used in compiling the information contained in this report, a structured questionnaire was provided to some companies as well as government agencies. The questionnaire was designed to find out the best practices which companies have to share in waste recycling and the best available technologies which they use in promoting recycling. In addition to the answers which these parties provided to the questionnaire, the author of the report also engaged in a series of interactive verbal discussions with the companies as well as the agencies. This provided some more insights into the practical nature of the issues which were being examined. Based on an analysis of the information collected, the author then prepared the current report.

In discussing companies' approach to recycling, this report categorises these companies into groups, on the basis of the various kinds of waste which they generate and recycle. These kinds of waste are: plastic waste, solid municipal and industrial waste, used oil, scrap metal, industrial food waste, cocoa shells and saw dust. These forms of waste are included in the 11 main forms of tradable non-hazardous industrial wastes which are produced in the coastal belt of Ghana, as identified by the First Progress Report of UNIDO on a "Waste Stock Management System in Ghana".[1]

[1] See UNIDO, "Waste Stock Exchange Management System in Ghana", First Progress Report (Revised). With the exception of the timber industry, the current report discusses wastes produced along Ghana's coastal belt.

In the present report, companies recycling waste oil are discussed in one chapter, those recycling plastic waste are discussed in another chapter and each of the remaining wastes are discussed in a separate chapter. In addition to the best practices and technologies which are discerned, an assessment is also made of the challenges which these companies encounter in their recycling activities. Based on these and suggestions put forward by the companies, the author makes a series of recommendations which could make recycling of non-hazardous waste more feasible and more lucrative in economic terms while being environmentally friendly as well.

## PART 1:ENABLING ENVIRONMENT AND LEGISLATIVE FRAMEWORK

### 2.1 Environmental Protection Agency Act (1994) (Act 490)

#### 2.1.1 Overview

In 1994, Ghana passed its Environmental Protection Agency Act (Act 490)[2] which established a body known as the Environmental Protection Agency[3] in that same year. According to Act 490, the functions of the EPA include granting environmental permits and pollution abatement notices for regulating the volumes, types, constituents and effects of waste discharges and emissions and of substances which are potentially hazardous to the environment.[4] The EPA also has amongst other functions, prescribing standards and guidelines on air, water, land and other kinds of environmental pollution including the discharge of waste and the control of toxic substances.[5]

In carrying out these functions, the Agency generally provides advice, direction and technical guidelines to assist Ghana's Metropolitan, Municipal and District Assemblies[6] within the ten different regions of Ghana, within the area of waste management.

The Agency grants Environmental Approval to waste management projects which are undertaken by private sector companies and other parties in the latter's promotion of waste recycling and other waste management initiatives.

Furthermore, the EPA also monitors activities of MMDAs to ensure that the work of the latter comply with EPA requirements on waste management. The EPA also oversees the extent to

[2] It is noteworthy that this Act is consolidated with the Pesticides Control and Management Act (1996). On 30th December, 1994, the former Act was assented to.
[3] Hereinafter, The Agency or EPA.

[4] Section 2(j).
[5] Section 2(h).
[6] Hereinafter, MMDAs.

which the MMDAs create awareness and educate the public on waste management issues such as refraining from littering waste. Though this is remarkable, the present report also recommends that to enhance the levels of compliance with EPA regulations, more waste disposal bins should be given to the MMDAs so that when distributed to the various communities, it becomes easy for these communities to abide by government regulations on waste management and recycling.

Over the years, the role of the District Assemblies in the management of waste generally and recycling specifically has been unsatisfactory. This is because these Assemblies have not been able to cope with the daily quantities of waste generated, which in turn owe to various technical, financial and logistical bottlenecks. It is therefore the expectation of the EPA that the District Assemblies should create the necessary legal and administrative environment for the private sector to operate in waste management.

### 2.1.2 Approach of EPA to Recycling

Many years before recycling waste became a way of life in Europe, it was being practised in Ghana. The main reason for practising recycling was economical as waste materials have been much cheaper than new or fresh raw materials.

In Ghana, scavengers and used materials merchants promote resource recovery from used waste material. They operate in many dumpsites around different parts of the country. These scavengers and used materials merchants are sometimes perceived to be a hindrance to municipal waste disposal operations since they tip and scatter wastes around storage containers. These perceptions notwithstanding, the EPA believes that Ghana should seriously consider ways of officially incorporating scavengers into municipal waste operations in this country. For example, scavengers can be designated as official used-materials merchants and given training and status upgrading by the government, country offices of international agencies, academic, Non-Governmental Organizations[7] as well as other agencies which work on waste management. For this to be possible, these proposals for regulatory reform could be incorporated as relevant amendments to Act 490.

[7] Hereinafter, NGOs.

Regarding recycling practices, the EPA further observes that an increasing amount of recovered materials is reprocessed by small producers outside the formal sector (for example, aluminum drowse, tyre rubber slippers, broken bottles for terrazzo and others). As much as 30-50% of Ghana's refuse may be reprocessed through these small industries. The rest is primarily organic and can be composted for sale as fertilizer in farming activities. Ways of strengthening and supporting these informal small-scale cottage-based waste recycling industries is a subject which is worthy of further research. This owes from the fact that as an Agency, the EPA has not undertaken any study in this area. There are certainly some best practices over the years such as the animal feed industries using offal from the Pioneer Cannery; waste yarns to pieces of fabric from Textile industries; re-use of plastics after regrinding and reprocessing; rubber for making doormats; and pieces of foam for pillows at Juapong.

These confirm that recycling is an interesting area which needs further research and documentation, as well as pragmatic recommendations on the applicability of such research to everyday experiences. This is because of the attendant benefits which go with it, namely, economic benefits from selling the compost, job creation from parties which recycle the refuse and environmental protection as these products when recycled are cleaned from the environment. These could help Ghana attain sustainable development goals including Millennium Development Goal 7, which exhorts countries to work on Environmental Sustainability.[8]

In view of these advantages which could be derived from recycling waste, recent developments confirm that over the decades, waste recycling is becoming more and attractive in Ghana. Consequently, several companies are gradually practising waste recycling especially in the urban areas. For example, at the Kumasi Brewery Limited and Guinness Ghana Limited (Kumasi) derive part of their revenue from the sale of dried yeast and used grain which is re-produced as animal feed for use in poultry and livestock farming. Other examples include the recovery of protein from abattoir wastes; recovery of: protein material from dairy wastes; silver from photographic waste; and smelting of scrap metal at Tema Steel Works.

The recycling method used in Ghana depends on the kind of waste material (for example, paper, textiles, plastic, metal, glass and electronics and others) to be recycled and the expected end-product. For example, some of these methods include pyrolysis. In the pyrolysis process, organic matter thermally decomposes in an environment that is devoid of any oxygen. Gasification is another method for recycling municipal waste, and it follows much the same process as pyrolysis, except that the environment where the decomposition takes place has a

[8] On Millennium Development Goal 7, see for example, http://www.undp.org/mdg/goal7.shtml.

small limited amount of oxygen, unlike pyrolysis where the environment has no oxygen. A heat source is required for the pyrolysis process, but no heat source is needed for gasification, because this process is self-sustaining thermally. When both pyrolysis and gasification processes occur at the same time, the gasification combustion reactions can provide the heat source needed for the pyrolysis process to perform the reactions. In this process, no heat source outside of the gasification process is needed for pyrolysis.

Within the area of solid municipal waste, the experience has been that though government has in certain instances provided subsidies where profit margins are less, these subsidies are woefully inadequate.

The EPA opines that the granting of incentives for attracting private sector investment in the re-use and recycling of waste is not its mandate, but should be handled by other Ministries including that of Finance and Economic Planning. Many companies in the private sector, as seen in Part II of this report, indicate that their main challenges lie in the fact that Ghana's government does not provide any incentives for recycling. The resultant scenario is that many companies in this country do otherwise and bury their waste as recycling is too expensive.

In view of this trend, one recommendation for improving the current situation is that the EPA should work in collaboration with the Ministries of Finance and Economic Planning, to discern the kinds of incentives which need to be granted to be granted to companies when they recycle different kinds of waste. This recommendation is being made because waste recycling is both an environmental and economic issues, and should therefore not be regulated by only one arm of government. The EPA could for instance, make it a requirement that the more a company recycles its waste in conformity with ecological principles, the more incentives this company could obtain. This could encourage companies to promote excellent practices in this vein.

Another policy proposal which this report puts forward for the EPA in recycling is that the EPA could further implement its contemplated vision of establishing a biogas plant in collaboration with companies, so that they collect wastes from individuals/agencies for recycling/conversion to energy. In addition to granting incentives to individuals/agencies to provide waste for such purposes, this could help resolve the sometimes acute energy crisis in Ghana. Ghana's District Assemblies believe that attempts are being made but should be improved in this vein.

Regarding the manner in which the companies report to the EPA on these systems, the EPA stated this is done by companies' submission of Annual Reports and Environmental Management Plans to the Agency.

### 2.1.3 Challenges Faced by EPA in its Work on Recycling

From the perspective of the EPA, the constraints which confront this Agency in its work on recycling are a lack of public awareness on benefits of recycling; lack of recycling facilities; lack of funds and appropriate technologies; lack of facilities for waste separation;[9] as well as the exorbitant cost of energy and water supply for reprocessing and treatment. In order to resolve these problems, this report suggests that the EPA strengthens its partnerships with international agencies, NGOs, various communities within the country, the private sector, academia and other affected parties. Such partnerships already exist but should be boosted to promote more training workshops on capacity building and public illumination, offering more fellowships, traineeships, and consultancies to compliment the workings of regular government staff in waste management and resolve other pressing needs. Collaboration with the Energy Commissions of regional and sub-regional mechanisms such as the Economic Community of West African States (ECOWAS), the African Union (AU) and the New Partnership for African Development (NEPAD) could also help resolve these problems.

The EPA has a particular problem of many companies using waste recycling technologies which are not well advanced in Ghana, in contrast to most developed countries. As a result, most companies practising recycling have been using very simple indigenous technologies. Resource recovery whereby useful waste substances are manually or mechanically collected, sorted and treated for other productive use. Sometimes, it involves treatment of the waste for re-introduction into the manufacturing system, or recycling of end-product waste such as paper, tires or glass material - where treated waste is used to produce a modified, lower quality final product. Through the abovementioned recommended partnerships in this Chapter, this obstacle could be gradually resolved.

Another challenge faced by the EPA in its work in this area is how to deal with fragmented pieces of legislation which regulate waste management and recycling. This is because at the moment, existing legal enforcement provisions on waste management are generally scattered in various ordinances and decrees. Some of the laws enacted include:

[9] See also, Paragraphs 1.2.5 to 1.2.8, pp 5-6, UNIDO GR/RAF/04/004, "Waste Stock Exchange Management System in Ghana", Third Progress Report (Revised), November 2009 where some of these problems are also discussed.

- The Constitution of Ghana (1992), that is Section 41(k).
- The Criminal Code, 1960 Act 29, that is, Sections 296 and 297.
- The Local Government Act, 1993 (Act 462).
- The Environmental Protection Agency Act, 1994 (Act 490).
- Water Resources Commission Act, 1996 (Act 522).
- The National Building Regulations 1996 (L.I 1630).
- The Environmental Impact Assessment Regulations 1999 (L.I 1652).
- Environmental Sanitation Policy (May 1999) and its Revised Version (May 2007).
- National Water Policy (June 2007).
- Legislative Instruments Establishing MMDAs.
- By-laws of MMDAs.

In addition to the above legislation, policies and regulations, guidelines have been developed for the management of various types of wastes. These documents include:

- Guidelines for the Management of Healthcare and Veterinary Wastes in Ghana (July, 2002).
- Manual for the Preparation of District Waste Management Plans in Ghana (July, 2002).
- Ghana Landfill Guidelines (July, 2002).
- National Environmental Quality Guidelines (1998).
- Handbook for the Preparation of District Environmental Sanitation Strategies and Action Plans (DESSAPs).
- Draft Guidelines for the Transport, Storage, Pre-treatment and Safe Disposal of Hazardous Waste and Obsolete Chemicals.

Faced with this multitude of laws, policies and guidelines, the administration of issues relating to waste recycling becomes rather difficult for the EPA. As a solution, this report recommends a more collaborative, co-operative and co-ordinated approach amongst various governmental agencies and ministries which comprise Ghana's Hazardous Chemicals Committee which was established by the EPA in 1994.[10] This Committee consists of the Ghana Standards Board, the Ghana Atomic Emery Agency, Ghana Cocoa Board, Crops Service Department of the FAO, Veterinary Services Department of the Ministry of FAO, three officers from the EPA and three other persons who should have special knowledge and experience in toxic chemical

[10] Section 10.

management.[11] Since recycling mainly lines with the EPA which also forms a part of this Committee, it seems reasonable that the EPA shares every pertinent detail about its work on recycling waste, with the Hazardous Committee, for recommendations, pragmatic solutions and other issues which could facilitate its work.

As far as recycling is particularly concerned, the EPA and this Committee, might also start anticipating the possibility of formulating a consolidated policy/law/set of regulations as part of Act 490, so as to facilitate the regulation of these recycling activities. Furthermore, such an approach helps to avoid overlap and duplication in the enforcement of these policies, while enabling companies, individuals and other parties to make easy reference and abide by ecologically rational principles when they are intent on reprocessing their waste.

Having discussed the EPA and its work on waste recycling, the examples of two of Ghana's District Assemblies, the Accra Municipal Assembly and the Sogakofe District Assembly are now discussed. The rationale for the choice of these two Assemblies is that from the author's research, these two Assemblies are amongst those in Ghana which are keen to promote recycling and are keen to forge networks with other agencies to reprocess their waste. The current situation is that waste management is such a pressing environmental problem within various neighbourhoods in Accra and Sogakofe, and there are not enough facilities to dispose not recycle waste.

## 2.3 Accra Municipal Assembly (AMA)

### 2.3.1 Overview

The AMA is created under Ghana's Local Government Act (1993) (Act 462) which empowers Ghana's District Assemblies to enact By-Laws. In 1995, the Accra Municipal Assembly, in conformity with the Agency's mandate of enforcing sound environmental principles in waste recycling and other aspects of waste management[12] passed the Liquid and Solid Waste Management By-Law and Regulations. These regulations deal with the management of solid and liquid waste in Accra.

[11] Ibid.
[12] See for example, Supra 4.

### 2.3.2 Approach of AMA to Recycling

The AMA, through its 1995 By-Law, requires that all residents in Accra should make available the solid and liquid waste which they generate available to AMA and its accredited agencies for collection and disposal. After collecting these wastes, AMA has the responsibility to place and dump the waste at its dump sites which are located throughout Accra. AMA charges residents a reasonable fee of this, and residents send their waste to a central containers and a collection point. This is cheaper than when waste is collected from the homes of individuals. In the case of the so-called third class residential areas such as Bubuashi and Nima, the residents dump their waste in communal containers at exceptionally low fees.

People from diverse parts of the communities, owing to lack of finances and jobs, collect money from residents who dump waste at the Central Collection sites in different parts of Accra-Nima, Kwabenya, Agbogbloshie and Kasoa. Some NGOs, opinion leaders and individuals also collect money from residents when they dump their waste and these individuals say that the money they collect is used to clean the environment.

The contractors collect this waste from the collection points and are paid by the AMA to do this. This was costly however for AMA. Hence, as from June 2010, the AMA established a new programme in place where for the purposes of waste collection, Accra has been zoned into nine lots and given to accredited contactors. Within this new set-up, the AMA does not pay the contractor any fee for collecting waste. The contactors place the communal containers at vantage points where attendants collect the waste from residents for disposal. Here, the waste is then lifted by the contractors and then finally dumped at the disposal sites in Accra's areas of Gono, Sarbah (near Kasoa in Accra, between Ghana's Greater Accra and Central Regions), Kwabenya and Nima in Accra. AMA charges the contractor a fee for landfill disposal and no recycling takes place at this point.

The AMA believes that there is the need for Ghana's government and international donors to assist in finalising formal arrangements which will segregate the garbage which is produced in Accra, according to their varying levels of toxicity. The less toxic forms of waste could be recycled; others could be treated in a proper engineered landfill, incinerated or disposed of by another means. There is the need for clearly stipulated guidelines for these activities to occur.

The AMA has for some years now, been concerned about the persistent littering of the environment by waste-particularly plastic waste, and its negative impacts which include causing environmental pollution, preventing the city and communities as well as beaches from being clean, and a loss of income to the tourist industry, as these trends prevent tourists from visiting a city which could otherwise be environmentally clean. Hence, in 2007, Honourable Agyir Blankson, then Head of the AMA, acting under the auspices of the AMA, threatened to ban the production and sale of sachet water, as the sachet, after it is emptied of its drinking water, is littered everywhere by the Ghanaian populace. When the plastics are littered in gutters and on the ground, this detracts from the philosophy of promoting clean environment which the AMA seeks to promote in its work. Such a practice, compounded with rains, worsens this problem of environmental protection. When the plastic sachets are also dumped into the sea, rivers and lakes as is often practised in Accra-around the areas of Teshie, Labadi, Korle-Gorno and other areas, this causes pollution and affects marine life by choking fishes, for instance.

Faced with these negative trends in waste and plastic management in particular, the AMA commends the establishment of private sector initiatives to deal with the problem by recycling plastic wastes and cleaning the environment so as to get rid of these unwanted products. These private sector initiatives, according to the AMA, include those of Zoomlion, a private company which collects municipal and industrial waste and organizes female sweepers from some communities to sweep the streets, segregate the waste and send it to collection points in various communities in Accra. These initiatives also include Blowplast and Cyclus Plastic Recycling Companies which collect plastic waste from Takoradi throughout various towns in the Central Region to Accra and Tema for recycling, and the Accra Plastic Waste Management Association which operates to clean the city and collect all plastics which are littered in various communities in Accra.

### 2.2.3 Challenges

The other forms of waste such as industrial waste, other forms of household waste and medical waste are also problematic areas which the AMA believes it still needs to tackle. One way of doing this could be by establishing adequate technological facilities for recycling waste,[13] forging more sustainable partnerships with international communities to effectively collect and recycle waste, so as to clean the environment, generate income and create jobs. This could

[13] AMA project on Korle Lagoon, see details and cite.

create more levels of sustainable development through waste recycling and the promotion of a waste stock exchange. At the moment, AMA does not promote recycling on a formalized basis, apart from having scavengers who promote recycling on an ad-hoc basis, without any training programmes and facilities such as gloves, booths, hats and goggles.

## 2.3 Sogakofe District Assembly, Environmental Health and Sanitation Unit

### 2.3.1 Overview

The Environmental Health and Sanitation Unit of the Sogakofe District Assembly has in their work, included waste management and recycling, in conformity with EPA rules and regulations.[14] Though there are a few success stories, many challenges still remain. This Agency has expressed a deep commitment to promoting recycling because waste is produced in such large quantities in many communities within this area, with inadequate recycling and disposal facilities. The Accra and Sogakofe District Assembly particularly expressed the need to create jobs, generate income and promote environmental protection through the enactment of appropriate by-laws and policies which will enable their workers and individual community members to collect and recycle waste. At the moment, individuals have embarked on recycling waste, albeit on an ad-hoc and informal basis. This Agency also needs some financial assistance, more facilities such as sufficient bins, as well as more incentives and other forms of help to effectively collaborate with communities so as to collect and recycle waste.

### 2.3.2 Approach of Assembly to Recycling

This Assembly monitors the work of Zoomlion while collaborating with this company to collect and dispose of waste. Recycling is still underway. The main rationale for adopting this approach is to ensure environmental protection, by ensuring that plastics are not littered in gutters, on the ground and everywhere. Hence, approximately 5% of the Assembly's common fund goes into the recycling of waste. The Assembly does not have any economic motives for recycling waste-that is, has not yet made plans about the kind of money which it could raise from recycling waste/empowering individuals to reprocess waste.

[14] See Supra 9.

Furthermore, the Sogakofe District Assembly is currently using landfills for collecting waste which is sometimes recycled by individuals from the communities. However, the Agency plans that in the foreseeable future, it will focus on composting-that is, producing fertilizer from organic waste, so that the manure is sold to farming communities. This all depends on where waste is sorted as there are relatively safer ways of managing waste. Incineration will be better if recycling fails, though it must be borne in mind that incineration could also be dangerous as burning of plastic could generate some dangerous gases.

As far as the Sogakofe District Assembly is concerned, sorting by individuals is the best method which is being used for recycling. These individuals come from the community as well as private NGOs which collaborate with the Assembly.

So far, individuals from the community have been collecting waste in exchange for payments. These individuals like to collect plastic waste in particular which they recycle and sell to small companies, though the Assembly is not sure which ones. Blowplast Recycling Company has been said by some individuals in Sogakofe to buy this waste though.

The District Assembly plans to enact some by-laws on waste management and recycling which are not yet gazetted. The Assembly has only one container for collecting plastic waste and this is not being used. Given the fact that drinking water is sold on a large scale by ten drinking water companies, plastic waste from the sachet plastic which stores the water is disposed of at large, after people drink the water. Though there are inadequate storage facilities, there is no need for a central container for collecting these plastics. What the Assembly believes that it needs are smaller containers placed at vantage points and on the spot payment for the people who bring it to main collection point. The Assembly would like to pilot the small container system at eight major points along the main road in Sogakofe where a great deal of plastic waste is generated.

For the very best practices to be obtained though, the Assembly would recommend that sophisticated equipment for recycling plastics and other forms of waste is provided to the Sogakofe district.

### 2.3.3 Challenges Faced by Sogakofe District Assembly, Environmental Health and Sanitation Unit

The Assembly faces challenges of shortage of staff and a lack of sufficient knowledge on the part of some of the staff. In order to rectify this shortcoming, there should be short training courses of one/two week(s) duration for staff.

The staff should also give more training to communities as the levels of enlightenment on the part of the community are woefully inadequate. Communities litter indiscriminately in all parts of the community, into the rivers and everywhere. This has caused grave problems of sanitation. Within this context, the staff needs more facilities such as tools, resources, education materials, incentives, vehicles such as motorcycles and trucks for collecting waste, boots, gloves and other environmentally-friendly equipment for officers who are engaged in collecting waste.

More landfill sites are also needed and must be found in order to handle waste.

The Assembly further needs to possibly enact by-laws which ensure that every household gets a standard container and latrine. Though agencies such as the Danish International Development Agency (DANIDA) have been attempting to help, more action needs to be taken in this area.

The Assembly also lacks sufficient resources. For instance, at the moment, there are only two containers for collecting waste in Sogakofe's Songhor community. Even these two containers are so high that many people do not gain access to it when they want to put their refuse in it. Most of the waste in this and other communities therefore end up being kept home and burned.

When it gets to recycling, sorting is also a problem.

From the perspective of the District Assembly, the most familiar law is Act 29 (1960) which deals with general nuisance involving pertinent issues such as waste management and abatement. The EPA has had a forum on training the Assembly on various aspects of this law.

More action needs to be taken by the government as far as the formulation and implementation of laws are concerned. In doing this, specific attention needs to be paid to including the culture of the people.

The Sogakofe District Assembly also recommends that the government of Ghana should grant more incentives to both private sector companies and the district assemblies in this country, so as to attract private sector investment in waste recycling.

## PART 11: PRIVATE SECTOR COMPANIES AND RECYCLING

### Overall Summary

Within different sectors, such as in plastics, waste oil, timber and solid municipal waste (such as food waste, plastics and used boxes), companies pay serious attention to the need to recycle the waste which they produce during their activities. These companies have indicated that reprocessing these forms of waste is preferable to dumping the waste in gutters, on the land, in the sea, lakes, rivers and in landfills. This is because the latter could cause the emissions of foul and noxious gases and odors, and some of these gases could adversely affect human health as well as marine and other aspects of ecological life. Hence, companies recycle with the fundamentally important objective of protecting the environment from these effects. Coupled with this objective, companies have also indicated that the rationale for their recycling also arises from their need to create jobs for workers who recycle the waste and also, raise income from selling the recycled products which would have been otherwise disposed of.

### 3. PLASTIC WASTE

### Overall Summary

Of all the non-hazardous wastes produced in Ghana's coastal belt, plastics have been said to be produced in massive quantities and littered the most- in gutters, along beaches and in other parts of the country. Plastics comprise the sachet water bags, carrier bags, plastic buckets, containers, [15] gallons and chairs.

### 3.1 Cyclus Plastics Company

#### 3.1.1 Profile

[15] See UNIDO Third Progress Report, Ibid, under 2.1, at p 7.

Owing to the lack of adequate facilities such as insufficient waste disposal bins and suitably trained personnel to treat to collect and recycle the increasing amounts of waste generated in Ghana, in 2006, The Netherlands-based Cyclus NV Plastics Recycling Company, established its sister-agency in Aburansa near Elmina in Ghana. The main thrust of activities of Cylcus Plastics in Aburansa is to collect and recycle used plastics (plastic bags, plastic bottles, sachet water bags, gallons and other forms of plastics) which have been dumped on the ground and along the beaches, from various towns and cities such as Takoradi in The Western Region, through others such as Cape Coast, Biriwa and Saltpond in the Central Region to Accra in the Greater Accra Region. The company also sells some of the collected wastes to giant plastic recycling companies such as the Tema-based Blowplast Recycling Company. Cyclus reprocesses the used plastics into seedling bags, waste disposal plastic bags and shopping bags for sale and use in Ghana. Through these recycling initiatives, Cyclus is therefore able to produce raw material for other sectors and create jobs for the local populace in Aburansa as well as help clean the environment of littered plastic waste.

### 3.1.2 Best Practices, Best Available Technologies and Challenges

Every week, Cyclus successfully uses three trucks to collect used plastics from the Western, Central and Greater Accra Regions-from Takoradi to Tema.

On a weekly basis, Cyclus collects approximately 20 tonnes of used plastic bottles. These belong to the Polyethylene Terephthalate and High Density Poly Ethylene plastic groups.

Cyclus hopes to expand the collection and recycling of these plastics to about 30 tonnes within the foreseeable future. Cyclus collects about 120 tonnes of hard plastic such as buckets and cups, making the Polypropylene plastic groups. Gallons being a part of the High Density Poly Ethlylene group, are also collected.

The company collects 500 tonnes of film plastics, comprising water sachets which are from the High Density Poly Ethylene group of plastics; shopping bags which are a part of the Low Density

Poly Ethylene plastic group; and seedling bags which belong to the Low Pressure Poly Ethylene group.

About 50 agents from all over the south coast collect these plastics for Cyclus to recycle. Through this activity, these agents derive some financial income and jobs from Cyclus, though this income may not be necessarily lucrative.[16]

After collecting these various forms of plastics and depositing them in Aburansa with the trucks, the staff of Cyclus, at the recycling plant then sort the plastics into the various categories of plastics listed in this chapter. The staff then separate the bottles, gallons and buckets into different colours, after which these items are washed thoroughly and dried. They then use pressers to compress all the plastics and remove the air from them, and extract Poly Vinyl Chloride (PVCs) from the plastics as these can cause emissions of hazardous gases to human health and the ecology, and destroy machinery. The staff then use crushers to crush these plastics into pellets. Some of the plastic pellets are then rolled into gallons and jerry cans, while the sachet water bags are fabricated into shopping bags and seedling bags. About 80 to 90 per cent of these recycled products are used extensively in the local industry in Ghana. This is desirable for many parties in Ghana, because importing these substances can be expensive. Some of the crushed plastic pellets are also exported into China and are used as fibre for producing jeans, tennis balls, sweaters, carpets and pillows.

According to Cyclus, sorting and recycling by manual means by staff are amongst its best practices as these give the staff a great deal of work to carry out, for which they are paid. On the other hand, the company anticipates importing more sophisticated equipment for crushing, pelletizing and moulding the plastics into the new substances such as gallons. This should be very soon.

However, the main challenge for Cyclus is the high import taxes which the Government of Ghana imposes on companies which import such machinery. Hence, Cyclus believes that tax

[16] See for instance, UNIDO Third Progress Report (2009), Supra 9, at under 2.3.1 at p7, where collectors of waste by recycling companies are generally said to be paid between 0.15 and 0.20 Ghana Cedis per kilogramme of plastic waste when they collect such waste. This amount is inadequate in Ghanaian terns. Hence, the report notes that it takes over 14 hours to earn sufficient money for survival.

exemption could help bring in the necessary machinery to Ghana and thereby expand its recycling activities.

## 3.2 Qualiplast

### 3.2.1 Profile

In 2002, Qualiplast was established in Accra as a plastic processing company which imports raw material from China, Thailand, Germany, the USA and other countries for recycling into solid plastics. These solid plastics include buckets, plastic crates for storing soft drinks and alcohol, funnels, jerry cans, food and drink flasks, plastic cups, plastic bottles and other plastic products. In addition to this process, Qualiplast also collects used plastic chairs, used buckets and used solid plastic products from individuals in whichever part of Ghana's community, pays the individuals for this and recycles these plastics into buckets, jerry cans and other solid plastic material which Qualiplast then sells to diverse parts of Ghana's populace.

### 3.2.2 Best Practices, Best Available Technologies and Challenges

While carrying out these activities, Qualiplast is committed to promoting sustainable development-it collects recyclable material including used plastics so as to prevent these plastics from littering the environment and also recycles them for sale and further use, thereby creating jobs for Qualiplast staff who recycle and income for the company and staff when they sell the re-manufactured plastics-buckets, plastic crates for storing food items such as fish, alcohol, soft drinks, tomatoes for sale and other products, as the case may be.

The company prefers to use plastics for fabricating these crates rather than using timber because the latter suggests felling more trees for wooden crates and this could cause deforestation on the already depleting forests in Ghana. Furthermore, when wooden crates are used to store fish for instance, the corners of the wood could rot and poison the fish. Qualiplast therefore suggests that UNIDO and other international agencies such as the Danish International Development Agency (DANIDA) and other international agencies train fishermen and farmers in Ghana, so as to enlighten them on the potential hazards which could arise from using wooden crates for storage. This could help them understand the need to use plastic

crates more frequently, while departing from the use of wooden crates to store their food items.

Qualiplast collects a total of about 200 tonnes of plastics every week-both raw material and used plastics, for recycling. The company anticipates expanding its activities and could collect more tonnes of raw materials in the future for recycling. In the case of used plastics, the company promotes the buy-back principle by paying individuals from various sectors of Ghana's populace for collecting the used plastics which they do not need any longer and would otherwise dispose of. Qualiplast adopts this approach so as to encourage individuals not to litter their used plastics in various parts of the country while this enables this company to also derive adequate material for recycling.

After collecting the plastics, Qualiplast staff wash, clean and distill the plastics with water. The plastics are then separated into different colours, put in granulators and crushed by these granulators. The waste is then put into extruders and pelletizers where it is melted, then rolled into jerry cans, plastic crates, buckets and other plastic material. In the experience of Qualiplast, the granulators have served as excellent equipment for use in recycling plastics.

Similar to many other companies such as Tema Steel Limited (discussed in Chapter 5.1), the frequent power and electricity cuts in Ghana negatively affect Qualiplast in its recycling activities, as this prevents this company from being able to manufacture as much re-used plastics as it normally would produce for sale. The frequent power cuts also make it expensive to recycle plastics in Ghana. The company hopes that this problem will be resolved, as electricity is fundamental to the progress of any given company's activities.

Qualiplast has also expressed concern about the lack of available data which exists on the quantities of plastic waste which are being imported into Ghana. The company believes that the proposed network between UNIDO on the one hand and some waste management companies on the other (for promoting a Waste Stock Exchange which would promote the recycling of wastes) should pay particular attention to conducting a study on these issues-that is, the amount of flexible and rigid plastics coming in.

In order to make good use of reprocessed plastics, Qualiplast suggests that the UN should also educate more people and promote awareness campaigns on separating different kinds of waste-for instance, when plastic waste is disposed of in separate containers than other forms of waste, this facilitates the collection of plastics for recycling by Qualiplast and other plastic recycling companies.

Zoomlion should also be able not only to collect waste, but recycle it as well, Qualiplast further proposes. Alternatively, Qualiplast suggests that Zoomlion could sub-contract to other companies to recycle, because waste disposal is a big problem in Ghana-not only in the area of plastics waste, but even with glass, metal and other forms of waste. When used/broken glass for instance is shipped into Asia, this could be recycled into new jars, bottles and glassphalt. Glassphalt is used in laying roads. These initiatives could therefore be explored in Ghana.

## 3.3 Blowplast Recycling Company

### 3.3.1 Profile

In 1993, Blowplast was set up to recycle plastics and has since then, been the largest Polyethylene Packaging Industry in West Africa, with over 500 workers. Of the 40,000 metric tonnes of sachet plastics which are produced daily by individuals from various sectors in Ghana, Blowplast recycles about 20,000 metric tonnes on a daily basis at its recycling plant in Tema, to produce black plastic shopping bags and black plastic disposal bags.

Blowplast is committed to keeping the environment clean and aims at reducing the costs of cleaning the environment when it has been littered with plastic waste. For Blowplast, the idea to recycle used plastics in Ghana was because of the need to reduce over littering of plastic waste in Ghana and to provide plastic bags and containers (from recycling used plastics) so as to promote compact packaging of food and other materials. Above all, Blowplast aimed at reducing its costs in purchasing raw material for use as plastics products. This is because in Ghana, recycling plastics is cheaper for Blowplast as well as local companies which buy the reprocessed plastic products for selling.

### 3.3.2 Best Practices, Best Available Technologies and Challenges

Staff at Blowplast use the recycling methods of washing, drying, crushing, extrusion and pelletizing plastics. After collecting and weighing the plastics at the Blowplast dumping site, staff then segregate the waste manually into plastic sachet materials which Blowplast needs for recycling and other waste which the company does not need. Thereafter, the staff washes the waste twice so as to remove sand and other debris from it. The next stage is to granulate the waste with a Granulator. The waste is then put in a Centrifuge Drying Machine in order to remove all the water from it. Blowplast indicated that this machine and the Granulator are its best technologies so far in recycling. The waste is then put in a heater to make it dry. After this, it is put in an Extruder and Pelletizer. At this stage, every 25 kilogrammes of the waste is mixed with 1 kilogramme of a chemical called Master Bag which makes the plastic black.

In carrying out these processes, the best practices of Blowplast are mainly the production of dust bin and production of carrier bags.

In carrying out its recycling activities, Blowplast faces the challenges of manual segregation and how to install lots of sophisticated technology which is more expensive. In the face of this, Blowplast has ordered a more sophisticated recycling equipment of more than $ 2 million (USD) from Italy and Austria so as to expedite the company's amount of plastics which it recycles. The company anticipates recycling and installing this equipment by February 2011. In order to overcome this obstacle to the fullest extent, Blowplast believes that it needs to forge well-organized partnerships with many other recycling companies in developed countries, so as to facilitate the importation of more equipment.

In its recycling activities, Blowplast provides transportation for its staff who collect plastics from communities to its collection plant. This has motivated the staff and served as a good mechanism and business model. In order to motivate its staff to a greater degree, Blowplast believes that there should be an increase in premium payments and provision of even more vehicular assistance to its staff who collect wastes. Physical sorting and segregation of waste are practised by staff at Blowplast. Since waste collection is not such a profitable venture, Blowplast could also grant other benefits (in-kind) to its waste collectors so as to motivate them to collect more plastic waste for recycling.

Furthermore, Blowplast suggests that the government of Ghana should grant it (that is, this company) more power rebate utilities as incentives to increase recycling of plastics.

## 3.4 Accra Plastic Waste Management Association

### 3.4.1 Profile

This Association, based in North-Kaneshie, started in 2007 to resolve the persistent littering of used plastic sachets in Accra. The Founding Directors of this Association further collaborated with Ghana's Ministry of Trade on the possibility of establishing an initiative which could give some value to the plastic waste generated in this country by collecting and recycling this waste for sale. Though this Association does not promote recycling as such, it acts as an important agent in promoting public awareness on recycling and providing bins which could collect plastic sachets for sale as raw material to other recycling companies.

### 3.3.2 Best Practices, Best Available Technologies and Challenges

In the first few months of its operation, this Association placed six 20 footer containers in different parts of Accra and set up a task force to collect these waste every day, using these containers to collect the waste. To date, the company has further distributed almost 3,500 bins to various communities in Accra alone. The Association initially sold the collected plastic waste to Blowplast Recycling Company, for recycling by the latter company.

However, the Association now focuses mainly on enlightening the public about how to manage wastes in an environmentally friendly manner, refraining from littering and also, the potential hazards associated with dumping waste in the environment. The Association plans to collaborate with Zoomlion and the International NGO, namely, CHF International, to promote such programmes and especially, teach the public how to also produce compost from organic waste.

In terms of best available technologies, the Association has used motorized tricycles in collecting plastic waste from various communities in Accra such as Ablekuma, Mamprobi,

Kaneshie, Odokor and Nsawam Road. The Association hopes to use more of such equipment with time.

In its work, the best available technologies of the Association are also its use of newspapers and the radio to educate the public on ways of promoting recycling as well as other environmentally sound practices in waste management. For instance, every Monday at 11:00 hours (GMT), some members of this Association educate the public on reasons why it should not to litter the wastes which they produce. This is done through the Ogbonu, FM and Ghana Broadcasting Corporation's Radio Ga Station in Tema (a radio station which discusses various issues in Ga, one of Ghana's local languages).

The Association also contemplates using Giant Billboards to carry such messages across.

Compounded with these, the Association hopes to distribute more litter bins and place them at vantage points, while separating the bins into different colours-green and yellow for example, and then use each different coloured bin to collect a different category of waste.

By the end of the year, the Association hopes to have distributed 6,000 more bins to various communities throughout Accra such as Adenta and Madina. In order to prevent littering, the Association has distributed such bins within areas such as Nojokuku in Accra and Ashiaman near Tema.

**Table 3.1 : Plastic Recycling in Some Ghanaian Companies**

| **Name of Company** | **Degree of Recycling** | **Type of Waste Recycled** | **Volume of Waste Recycled** | **% of Waste Recovered from Recycling** | **% of Recycled Waste Sold for Profit** |
|---|---|---|---|---|---|
| **1. Cyclus** | Complete | Used | 540 MT | 100% | 100% |

| | | | | | |
|---|---|---|---|---|---|
| | Recycling (waste to shopping bags, seedling bags, gallons) | Sachet Plastic Bags, Gallons, Bottles, and Other Plastics | every week | | |
| **2. Qualiplast** | Complete Recycling | Same as that of Cyclus | 200 MT every week | 100% | 100% |
| **3. Blowplast** | Complete Recyclcing | Sachet Plastics | 20,000 MT every week | 100% | 100% |
| **4. Accra Plastic Waste Management Association** | Incomplete recyclcing (collection of waste; education programmes on recycling) | All Forms of Plastics (of interest) | None | 0% | 0% |

## 4. USED SCRAP METAL

### 4.1 Tema Steel Company

#### 4.1.1 Profile

This company was set up in the 1960s under Ghana's then President, His Excellency Dr. Kwame Nkrumah, to recycle used steel into steel bars for utilization in the building industry. This company was also set up with the aim of creating jobs. The company further has as its objectives, the need to protect the environment from being contaminated with used steel and metals which contain harmful elements such as zinc and copper, as these could pollute human and ecological health. Hence, Tema Steel Company devotes itself to promoting sustainable development through its reprocessing of used steel.

4.1.2 Best Practices, Best Available Technologies and Challenges

This company uses many trucks to collect about 180 to 200 tonnes of used steel and scrap metal each week from Agbogbloshie in Accra, where there are stockpiles of these substances. Such metal is derived from used machinery at home and in industries, decommissioned shops, old ships, as well as old and broken down ships. Many individuals from a number of communities also collect the scrap steel and metal and act as agents who have depots for collecting such used steel and scrap. These individuals/agents hire trucks and bring the metal to Tema Steel Company where they are paid by Tema Steel for the used metal which they give to the latter for further processing and sale. Tema Steel does not collect other substances such as used batteries but only collects substances which contain steel. Hence, if a substance contains some other metals, the refinery process, as described in this chapter, separates the steel from the other substance, refines the steel and sends the other substance to the Tema Dump Site for final disposal.

The steel is then melted in a Melting Furnace after which it is refined in the Refining Furnace so as to remove the impurities. When in the Melting Furnace, substances such as silicone, manganese, ferro-silicon and ferro manganese are added to the steel, so as to improve its quality. In this sense, “fresh steel” is then derived. It is then put into an electronic Arc Furnace which is used to melt this scrap to steel pellets. The company’s workers then put these pellets into a Concust where the pellets are then rolled into steel bars. The steel bars are then sold by Tema Steel Company for the construction of buildings. Since its inception, the Melting and Refining Furnaces as well as the Electronic Arc Furnace are the best available technologies which this company has used in recycling.

The by-products of this refining process are undesirable impurities/unwanted slag. This slay is separated and mixed with lime during the melting. The lime reacts with the sludge to produce a slag which is then sent for disposal by the Tema Metropolitan Assembly. As in the case of other countries, in the near future, Tema Steel could however arrange with other companies to collect and crush the slag with a crusher. This produces magnetic separators to separate the iron and gold contest. When either of these substances is mixed with bitumen, they can produce coal tar for the construction of roads and the filling of potholes. They can also be used to manufacture cement for constructing buildings. The dust which emanates from the process can be used for making blocks. Zinc can also be extracted from the dust for a series of purposes, such as zinc coating.

Though this is a relatively easy process, the company staff ensures that they wear protective clothing and refine to such an extent that they do not use steel which is mixed with other substances. This approach helps in the success of this company's recycling operations.

The main challenges which this company faces in these recycling activities are the energy shortages which affect the process of melting and rolling the steel as the procedure requires energy.

Furthermore, the taxes which the government of the Republic of Ghana imposes on the company, according to Tema Steel, are rather high. Hence, Tema Steel believes that the government of Ghana and other agencies could grant more incentives to promote its business.

The company also faces a constraint of fierce competition, as other companies and individuals have started exporting used scrap metal to other countries, and this means that Tema Steel would not find enough available scrap metal. The implication of this is that it may get to a time when this company will have to start importing used steel as raw material for its recycling business.

**Table 4: Recycling Scrap Metal**

| **Name of Company** | **Degree of Recycling** | **Type of Waste Recycled** | **Volume of Waste Recycled** | **% of Waste Recovered from Recycling** | **% of Recycled Waste Sold for Profit** |
|---|---|---|---|---|---|
| Tema Steel Company | Complete Recycling (Waste to End Products) | Used Steel and Scrap Metal (to produce steel bars) | 180-200 tonnes every week | 80% (Steel Bars); 20% unwanted slag dumped in dumpsites | 100% |

## 5. USED OILS

### 5.1 Tilbury Environmental Group

#### 5.1.1 Profile

In its desire to fulfill the obligations required by the MARPOL 73/78 Convention of the International Maritime Organization,[17] in 2001, the Government of Ghana approached the IMO for technical assistance for a feasibility study to be conducted. Following the recommendations of the feasibility study, the Ghana Ports and Harbours Authority through international competitive bidding awarded a contract to Tilbury Environment Group (TEG) of UK to establish and operate the port waste reception facility in the Port of Tema.

The Tilbury Environment Group (TEG) runs a purpose designed flexible port reception facility with a portable sludge treatment system dedicated for Annexes I and V[18] of MARPOL 73/78 for Port of Tema, Ghana. The facility is the first of its kind in the sub-region and possibly Africa. TEG has a commitment to ensuring customer satisfaction by promoting the ideals of MARPOL as its business philosophy. It receives technical support from Solids Control Services (SCS), accredited and certified to ISO thus making it pursue safety, quality and environmentally sound practices with a commitment to continuous improvement and innovation. It offers a 24 hour and 365 day responsive service. In conjunction with the Ghana Ports and Harbours Authority, Tilbury ensures that the facility is available to vessels calling the port without causing them undue delay in compliance with MARPOL.

The rationale for the involvement of Tilbury Environmental Group in recycling non-hazardous waste is to promote the goal of MARPOL 73/78 which seeks to prevent marine pollution by ships. Tilbury seeks to provide adequate reception facilities in ports to receive ships wastes generated onboard during their journeys.

#### 5.1.2 Best Practices, Best Available Technologies and Challenges

In its work, Tilbury has a number of best practices to share.

[17] Hereinafter, IMO. For further details on the Convention, see International Convention for the Prevention of Pollution from Ships (1973), as modified by the Protocol of 1978 relating thereto (MARPOL).

[18] Annex I seeks to prevent marine pollution by oil and prescribes the conditions under which tankers may discharge oil into the sea. Annex V prevents pollution by garbage from ships. This Annex deals with the different types of garbage and specifies the distances from land and the manner in which they may be disposed of.

TEG's flexible system enables it to provide convenient, fast and efficient collection services with minimum or no disruption to port activity. Its 24 hour service is provided through the following methods:

- The Quayside tanker collection of used lubricating oil/fuel residues, sludge, oily tank washings and oily bilge water from vessels at berth.
- The Quayside truck collection of garbage from vessels at berth.

In carrying out its work, TEG ensure that it has adequate storage facilities at its treatment site in the Port of Tema, capable of holding all volumes of oily waste/ sludge received. Depending on demand, appropriate and suitable receptacles are provided. These are made to complement emptying schedules with a view to promoting health and safety concerns.

To ensure compliance with standards, an on-site laboratory is available to carry out a sample analysis before and after treatment. Results are regularly assessed by the Environmental Protection Agency.

TEG also treats and disposes of used oil. While giving due regard to the variable composition ratio of oil (water and solids), TEG with its technical services providers, SCS, has a treatment system. This system is flexible enough to cope with fluctuations in feed stock. This system is based on the "BATNEEC" (Best Environmental Technique Not Entailing Excessive Cost) approach.

With a well-proven technology and service experience, treatment is facilitated by the use of decanters and centrifuge. It is done in customised separation solutions to afford oil recovery and re-use with minimum environmental impact. Recovered oil is re-used by small medium local industries to power their equipment.

TEG participates in ecologically rational programmes such as the oil spill emergency response in the Port of Tema under the direction of the Ghana Ports and Harbours Authority.

Tilbury has a concession with Ghana Ports and Harbours Authority to collect ship wastes for recycling and re-use. Tilbury's operations produces non-hazardous waste water from its separation procedures. This is treated tested to be sure it conforms to the EPA required standard of 15ppm before discharge through (check)

Tilbury uses a decanter and centrifuge in separating oil, water and sludge from ship waste collected and this is not just best practice but BATNEC under given circumstances

The technology used by Tilbury has less challenges except for complying with routine and planned maintenance.

The non-hazardous waste water is ran through an oil remover weir packed with an oil absorbent material before it is discharged. Tilbury's business model is to recover cost in meeting its business needs to keep it efficient in service delivery

The provision of Port Reception Facilities are regulated from IMO's International Convention for the Prevention of Marine Pollution from Ships and its related Protocol (MARPOL 73/78). TEG's operations is therefore guided by and subjected to this international regulation. It is also regulated by GPHA's Environmental Policy which seeks to make it's ports environmentally sustainable. Ghana has not yet domesticated MARPOL 73/78 and therefore there is no national legislation to that effect.

As indicated earlier the Scope of services provided by the facility operators covers wastes specified in Annex I and V of the MARPOL Convention. These wastes specifically include the collection of waste oil, oily waste and residues, garbage.

At both ports, Ghana Ports and Harbours Authority owns Cesspit Emptier to receive Annex IV[19] waste upon request from the ships. This Annex IV is not within the scope of services provided by the reception facility operators.

The procedure for the discharge of ship-generated wastes by TEG in Ghana Ports is entails the following: When a ship calls at the Port the berthing crews of the operator together with a representative of Ghana Maritime Authority go on board the vessel and enquire from the Officer-in-charge (either the Captain or Chief Engineer) whether they have waste for disposal and the quantities of waste on board.

When the quantities are obtained and duly recorded the operator provides a tipper truck to receive all the garbage on board. This garbage is then sent to the approved disposal site within the metropolis. If there is oily waste to be discharge a road tanker is positioned at the side of the vessel and with the use of pressure hoes the oil is pumped from the tank of the vessel to the mobile tanker positioned on the quay. This operation is done in collaboration with the Fire and Safety Department of Ghana Ports and Harbours Authority (GPHA) who provide a fire tender on standby before the discharge begins. Discharge could also be carried out at the buys with the use of barge.

Upon receipt of the waste on the vessel, the Officer-In-Charge or its agent is issued with a Waste Receipt Certificate from the Operator, indicating details like type of waste discharged, volume discharged, the date and other relevant details worth-noting.

[19] This Annex prevents pollution by sewage from ships.

The collected wastes are then sent to the processing plant or the dumping site depending on the type of waste.

At the plant the oily waste is subjected to a series of treatment methods depending on the nature of the feed stock. This treatment could include a combination of gravity separation and physical filtration involving centrifuging and the use of a disc-stack separator.

Occasionally, coagulants and precipitants are used to enhance the separation proven.

The purpose of the treatment is to separate oil, oil residues and water from each other to the level that is physically and chemically possible. The separated water is subjected to another oil removing process by passing it through an oil removal weir packed with an oil absorbent material.

The end products of the treatment process are dewatered oil; and water.

The dewatered oil is sold to accredited buyers. There is a ready market for this oil which is used as wood preservative. It is also used as burning fuel for industrial machines like steam boilers. The buyers of this oil are accredited by Ghana Ports and Harbours Authority and Environmental Protection Agency. This is to ensure that the oil is managed and handled properly downstream.

The resultant water from the treatment process is pumped to the sea through a porous filter sock. However prior to the discharge, samples of the water is taken and tested to meet Environmental Protection Agency standards before it is pumped into the sea.

Coupled with the abovementioned, the concession agreement seems to adopt the definition of garbage as specified in the convention. It means 'all kinds of victual, domestic and operational waste excluding fresh fish and parts thereof, generated during the normal operations of the ship, as more particularly defined in Annex V of MARPOL 73/78.' The garbage received from the vessel is sent to approved disposal sites. It is the local government Authority which approves and designates the dumping site. TEG is planning to install an incinerator to incinerate garbage collected from ships in due course.

### 5.1.3 Challenges Faced by Tilbury

Tilbury currently occupies inadequate space to expand the facility in the port of Tema so as to meet the ship waste being received from ships. TEG is therefore considering acquiring additional space outside the port to facilitate this expansion

Furthermore, some Captains of vessels are reluctant to dispose of waste in the port as they claim it is sold in some ports to collectors. However, there is no international legislation to make such transactions legally permissible. Once a vessel does not have a Certificate of Waste Discharge from either of Ghana's ports or an IMO recognized Port Reception Facility from the last port of call, the vessel is compelled to discharge the waste.

Tilbury has not been granted any incentives as yet from government or other agencies. Through stakeholder engagement, some ideas could be fashioned out to create attractive incentives for the private sector as a whole and improve the recycling of used oils.

## 5.2 Jar Hua Company

### 5.2.1 Profile

Jar Hua Company, based in Amassamang in Accra, recycles used engine oil which it collects from Total Petroleum Ghana once every six to twelve months. This used engine oil is from cars, trucks and other vehicles. Jar Hua reprocesses this waste oil for further use in furnaces and bakeries, and for the manufacture of coal tar. For Total, the main reason for giving this waste to Jar Hua lies in the desire to enhance environmental protection because dumping used oil in the sea, rivers, gutters and on land, could produce toxic gases (such as hydrocarbons) which damage the ecology and human health. Hence, Total seeks to recycle waste purely because of environmental objectives and not for profits or economic motives while Jar Hua recycles because of economic and environmental motives.

### 5.2.2 Best Practices, Best Available Technology and Challenges

Jar Hua collects the waste oil from Total once in every six months, but not on a very regular basis. The waste oil is then put in machines to convert it to waste and extract other hydrocarbons from the grease. The waste oil is then reprocessed into coal tar and sold to companies which need this material in the construction of roads.

In the experience of this company, the best practices and best available technologies lie in converting the waste out into grease and extracting other hydrocarbons from the grease.

For this company, challenges include how to gain more advanced technology to use in its recycling processes.

**Table 5(a). Waste Types, Collection, Treatment and Disposal by Tilbury**

| Type of Waste From Ships | MARPOL Classification | Quantity | Treatment | Disposal |
|---|---|---|---|---|
| Sludge, oily water, oil bilge water | Annex I | 275 m3 per month | Filtration to separate solid matter and centrifugation to separate hydrocarbons from water | Purified water: Discharged to the sea and recollected oil, recycled for industrial use |
| Noxious Liquid substances | Annex II | Lack of Treatment Facility | N/A | N/A |
| Harmful substances in packaged form or from freight containers | Annex III | N/A | N/A | N/A |
| Sewage | Annex IV | Currently not accepted | N/A | N/A |
| Municipal waste/garbage | Annex V | 100 m3 per month | Selection of plastics, cans for recycling and burning | Kpone landfill site |

**Table 5(b). Recycling Waste Oil by Jar Hua Company**

| Name of Company | Degree of Recycling | Type of Waste Recycled | Volume of Waste Recycled | % of Waste Recovered from | % of Recycled Waste Sold |
|---|---|---|---|---|---|

| | | | | Recycling | for Profit |
|---|---|---|---|---|---|
| Jar Hua Company | Complete | Waste Oil | N/A | N/A | 100% |

## 6. SOLID WASTE (MUNICIPAL AND INDUSTRIAL) FROM GHANAIAN COMMUNITIES

### 6.1 Zoomlion

#### 6.1.1 Profile

In 2006, Zoomlion started its waste collection services in Ghana as a result of the ever increasing amounts of generated household and industrial waste from diverse sectors of the populace. In the face of waste management and recycling problems in other African countries, Zoomlion is gradually extending its activities to Angola, Guinea, Nigeria, Sierra Leone and other countries of the African region. Furthermore, Ghana's waste collection landfills and dumpsites are depleting fast and it is difficult to manage them. Zoomlion also had the aim of helping tackle the insufficient means of collecting and disposing of the waste. In the near future, Zoomlion also hopes to recycle its waste so as to help Ghana reduce the amount of waste which needs to be disposed of.

In view of these trends, Zoomlion has since its inception, had the primary aim of improving environmental welfare and sanitation in Ghana. Furthermore, with a view to creating employment and generating income from waste while recycling waste, Zoomlion has conducted feasibility studies on how to pay for compost, how to pay scavengers for their work in collecting a sorting waste and how to organise the payments of waste purchasers who might wish to recycle waste. In collaboration with donors and other stakeholders, some staff of Zoomlion therefore travelled extensively to Asia and Europe to find which lessons could be borrowed and bent to suit the Ghanaian situation as well as the requisite facilities which could be set up, to collect, recycle and dispose of waste. Out of this study tour, the Founding Directors of Zoomlion came to a conclusion that a waste collection system in Ghana would be a profitable venture in economic and environmental terms. With this came the establishment of Zoomlion.

While carrying out its waste management activities, Zoomlion Ghana also commendably supports the activities of agencies such as Hospitals and Psychiatric Homes, Ministries, Religious Groups, Orphanages and Other vulnerable groups. This is by collecting the waste generated by these agencies and granting some financial support to promote some of the activities of these agencies.

### 6.1.2 Best Practices, Best Available Technologies and Challenges

Zoomlion uses different methods for collecting waste with different equipment and has not yet started recycling its waste. However, since waste collection and management are being successfully carried out by this company, Zoomlion is now implementing plans to start recycling waste within the foreseeable future, as indicated in Chapter 6.1.1 of this report.

With the use of equipment such as skip trucks, road sweepers, manual tricycles, bulldozers, manual trucks, refuse containers and motorized tricycles, staff of Zoomlion collect waste from diverse communities in all the ten regions of Ghana. Zoomlion has also distributed thousands of containers to households and agencies for collecting waste instead of littering such waste. The waste which this company collects from refuse containers with its trucks, manual tricycles and manual trucks is transported to its properly engineered landfill sites where experienced personnel treat the waste with chemicals and finally dispose of the waste. These technologies are properly-maintained and have facilitated Zoomlion's best practices in collecting waste.

Amongst Zoomlion's best practices are its waste collection process, its sweeping of streets and pavements, as well as its use of motorized tricycles for collecting waste. These tricycles are suitable for collecting waste in high density communities.

Furthermore, Zoomlion has been able to implement a project on involving women in operating its tricycles, so as to involve more personnel from each of Ghana's ten regions in collecting waste.

This company has also involved youth in its waste collection activities. For example, through its EcoBrigade programme, Zoomlion has recruited about 10,000 young people in Ghana who are cleaning many of Ghana's beaches-from Aflao in the Volta Region to Half Assini in the Central Region. This programme is being enforced with a view to restoring Ghana;s vegetative cover.

Regarding best available technologies, Zoomlion contemplates using the Windrow Composting Systems which is of high quality. It is a whole in-housed facility/machine which is able to sort and separate waste. It offers a more sustainable way of recovering recyclable material for further use. Windrow is specifically designed to decompose large amounts of waste. Within this

system, material which is being recycled into compost is normally placed in a pile with a width of about 5 feet, with mechanical aeration and water added to expedite the process of decomposing the waste. Once this facility is installed and operational, Zoomlion hopes to sell the compost which it obtains to public, farmers, estate developers, landfill sites and green projects in communities.

Some of the business models and mechanisms which have ensured success by this company lie in the networks which the company has forged with business clients in the past. The young staff of the company are sometimes given the opportunity to explore further possibilities as far as promoting networks are concerned.

Zoomlion faces some challenges in its operations. There is the issue of finding sufficient tracts of land to recycle and dispose of waste, especially, with the expansion of Accra and a resultant increase in population which means rises in waste generation. Even where there is the availability of land, obtaining the requisite permit is a lengthy and bureaucratic procedure.

Regarding recommendations for improving the situation of collecting waste, the company suggests the need for greater numbers of young staff who will be given additional technical training by the company. Research Institutes must also help the company out especially in terms of technology transfer.

The company further believes that it could forge more research networks with partners from all over the world who collect, treat and recycle waste.

**Table 6: Recycling Solid Municipal and Some Industrial Waste**

| Name of Company | Degree of Recycling | Type of Waste Recycled | Volume of Waste Recycled | % of Waste Recovered from Recycling | % of Recycled Waste Sold for Profit |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| 1. Zoomlion | Incomplete | None | None | None | None |

## 7. INDUSTRIAL FISH WASTE

### 7.1 Ghana Food Company (GAFCO)

#### 7.1.1 Profile

This company, located in Tema, Ghana, is a major company in canning tuna, milling wheat and milling fish feed/fishmeal for use in feeding fishes. In the fishing industry which is its main focus, GAFCO indicated that massive amounts of fish waste had in the past been produced and dumped in the sea. Here, this waste could biodegrade, cause the emissions of harmful gases and pollute marine life, while causing foul odours. GAFCO therefore felt a need to change this pattern. The solution was for this company to recycle the fish waste which it produces from processing and canning fish, into fish meal which would be used to feed the fish before the processing of fish is carried out. Hence, for GAFCO, the main objective for recycling fish waste was to promote environmental protection.

Furthermore, recycling fish waste is a profit-oriented venture as it is more cost-effective than having to buy fish feed. The waste here becomes raw materials for other operatives within the facility for feeding the fish. Fish meal normally costs about 620 USD for 1 ton and if it can be obtained by recycling, then this would suggest a better approach than dumping fish waste at sea where it pollutes the sea and other forms of marine life.

#### 7.1.2 Best Practices, Best Available Technologies and Challenges

GAFCO is able to recycle about 35% of the fish waste which it produces every day (for the fish meal needed to feed other fishes which this company would produce in the future). In the absence of such reprocessing, the fish waste could accumulate and eventually turn into maggots. The capacity of the Fish Meal Plant is about 35 MT of Fish Waste, with a daily

production of fish being about 50 MT yield and about 17.5 of it being recovered every day from recycling. GAFCO believes that the Fish Meal Plant has sufficient capacity and is successful in processing the fish waste into fish feed. When recycled, the final product, fish meal, with 60% protein sells at about 53 Ghana Cedis per ton. GAFCO sells about 30% of the feed to fishing agents, giving GAFCO a profit of about 26%, in addition to saving on the costs of fish feed which GAFCO uses for feeding its fishes.

GAFCO's best practices in recycling fish waste include sterilizing, pressing, drying and milling, which all take place-one after the other in the recycling process. During the sterilizing process, the fish waste from the fish cannery which is stored in the hash cold room is retrieved first and foremost. The waste is then sent through the conveyor and hopper where the fish particles fall to the floor. The waste is then sent to the sterilization unit where it is sterilized with steam to condensate, after which it is sent to the presser. Here, it is pressed to eliminate over 50% of the water in the waste in order to ease the subsequent drying process and thereby, save energy. The next stage is the drying operation which uses heat from steam to dry the sterilized material. There is then the milling operation which ensures that the waste is ground to the right particle sizes as required by quality assurance specifications. After the dried material has been milled to the required particle sizes, it is weighed and bagged to be delivered to the stores and directly to the Feed Mill Plant.

Milling is one of the methods of recycling fish waste which has proved to be most successful in terms of providing ecological sanitation as well as financial remuneration. Milling provides best products for the feed production which has added value and can also compete internationally to give enough profit margins.

GAFCO believes that in terms of best available technologies, milling is the best way of recycling waste, as it converts the whatever waste into powdery form and then powdery products are obtained to further produce items which one desires.

Some of the challenges being faced by GAFCO in these operations are a lack of a sufficiently cold room for preserving fish waste. Waste originating from fish canneries comes in moist form. If exposed, these develop maggots, owing to high protein content. Hence, the need for a very cold room which could be used as a relevant storage facility. It is also important to use

sophisticated technology and effective machinery for excellent yields. Fish waste also needs to be kept out of the reach of birds, houseflies and poultry as they could drop their waste on these. In this regard, GAFCO has a chilled room but also needs a proper system for keeping the fish waste before it is milled.

Furthermore, GAFCO recommends including the need for more effective and efficient conveyers to convey waste from the source at which it is generated to the recycling plant.

**Table 7: Recycling Industrial Fish waste**

| **Name of Company** | **Degree of Recycling** | **Type of Waste Recycled** | **Volume of Waste Recycled** | **% of Waste Recovered from Recycling** | **% of Recycled Waste Sold for Profit** |
|---|---|---|---|---|---|
| Ghana Agro Food Company | Complete (waste to fish feed) | Fish Waste | 17.5 MT per day | 35% | 30% (70% used for feeding fish in GAFCO) |

## 8. COCOA SHELLS

### 8.1 Cocoa Processing Board

#### 8.1.1 Profile

This company produces cocoa products such as Ghana's Golden Tree chocolate, chocolate powder and chocolate butter from cocoa beans which are grown in Ghana. During this activity, the wastes produced are cocoa shells from the raw cocoa which is processed into these items,

as well as waste water which is generated during this process. Whereas the cocoa shells are not recycled *per se* but sold to farmers, the waste water is recycled by the Cocoa Processing Board.

The Cocoa Processing Board has many objectives in recycling namely: reducing financial expenditure in the company, reducing energy usage, using less power consumption in recycling, reducing air and water pollution, preserving natural resources, reducing pollution caused by waste, preserving natural resources, reducing pollution caused by waste, preserving natural resources for future generations, contributing to the reduction of the release of harmful chemicals and green house gases from rubbish and saving space required at waste disposal and landfill sites.

### 8.1.2 Best Practices, Best Available Technologies and Challenges

As far as solid waste separation is concerned, cocoa shells, the main solid waste from the factory is collected separately. It is not mixed with other waste from the factory premise but sold out to agricultural entities which mulch and compost. These are used in farms and gardens. Mulching involves placing the waste over the soil to offer protection and retain moisture as well as the germination of seeds. Composting produces fertilizer which is added to the soil to improve its quality, thereby enhancing the growth of plants. These initiatives have resulted from the sale and export of the cocoa shells for use as mulching material for farms and gardens. The company also sponsored a research project by the University of Ghana to come out with the various uses that the cocoa shells can be put to. Amongst the research findings were that mulching was an environmentally friendly way of nurturing farms and gardens. Furthermore, cocoa shells were a good source of mulching and could be sold for this purpose. Thus, mulching and composting are amongst the company's best practices. Not much economic profit is being derived from these practices, apart from the environmental protection which these offer.

In addition to this, Cocoa Processing also has a private waste management contractor who collects the cocoa shells separately and carts them away in trucks to a landfill for final treatment and disposal. The rest of the solid waste such as used paper is incinerated in this agency's incinerator.

The company's next project will be to use the cocoa shells in heating the company's boilers, as is practised by Barry Callebaut.

In addition to producing these forms of solid waste, the company also produces waste water its industrial activities. The waste water is produced as a result of the construction of an effluent treatment plant for treating the cocoa and is the main waste produced by the plant. This is where spilled butter from the cocoa is collected and sold to local soap makers/manufacturers. Spilled diesel from the operations of the plant is also collected and sold to individuals for secondary use.

The waste water is used for the watering of lawns during the dry season.

This waste water will in future be used for flushing the water closet of Cocoa Processing Industry.

As far as best practices are concerned, the company practises preventive maintenance according to the operations manual provided by the manufacturer of the effluent treatment plant.

Furthermore, on a daily basis, there is the removal of every floating debris or scum from the surface of the effluent at the sump and collection tank as well as a collection of oil from the sump. There is a collection of accumulated scum, from the surface of the waste water.

On a bi-monthly basis, there is a sampling of waste water from all sectors, while the tank which stores the water is drained and cleaned thoroughly.

The company has also planned and designed spill prevention and control management facilities at all designated washing wares to prevent any spills.

In terms of profit oriented ventures, the company has successfully purchased pumps and irrigation pipes. The company has also acquired drums for the collection of spilled butter, diesel and other similar by-products of its processing activities.

In terms of challenges, the Cocoa Processing Company faces financial constraints of how to construct the effluent treatment plant.

The Company is also confronted with frequent power cuts, and this affects the aerators which have to be restarted again.

Furthermore, water enters the motors of the aerators since it is submerged. Another challenge for the Company is how to meet the EPA guidelines for the treated water for some parameters.

There is also the dilemma of how to use the waste water-whether to flush it in the water closet (WC) which makes it difficult because of the financial implications of funding such a capital intensive project.

Compounded with these, there is a foul stench which emanates from using the treated water to water/irrigate the lawns.

## 8.2 Barry Callebaut

### 8.2.1 Profile

Barry Callebut has factories in many countries including Ghana Cameroon and Brazil where it processes cocoa beans into liquor, chocolates and sweets, for sale in these countries and exports to other countries. In Ghana, Barry Callebaut has been operating since 1994 in Tema. Amongst the priorities of this company are the need to promote environmental protection through conserving resources, minimizing adverse impacts of industrial activities, and promoting waste recovery as well as recycling. After processing cocoa into these products

therefore, Barry Callebaut recycles the residual cocoa shells by burning them in a shell boiler and also, composting these shells for use as manure on farms. In carrying out these activities, this company recycles these with the aim of saving energy and attaining environmental sustainability, rather than dumping the waste anywhere.

### 8.2.2 Best Practices, Best Available Technologies and Challenges

Recycling by Barry Callebaut does not aim at deriving any profit from cocoa-related wastes.

Amongst the company's best recycling practices is its burning of cocoa shells for fueling boilers which the company uses in processing its cocoa. This has reduced its consumption of gas/fuels for use in boilers, and the company is then able to save about 50%-80% on the costs of fuels which it would have otherwise purchased to use in the boilers.

In burning the cocoa shells, Barry Callebaut's best available technologies which it uses are the cocoa shell combustion system. This enables the company to generate high efficiency steam from the process of burning the shells.

The company burns about 8,000 metric tonnes of cocoa shell waste every year, fulfilling 100% of its factory steam requirements from cocoa shell burning.

Barry Callebaut's best practices also include its respect for the legal and regulatory requirement of the Ghana's Environmental Protection Agency as well as those of international conventions such as the Basel Convention on the Control and Transboundary Movement of Hazardous Waste (1989).[20] These laws require that waste generation needs to be minimized in industrial and other activities, and waste should not be littered anywhere, but disposed of, in an Environmentally Sound Manner. By burning cocoa shells through combustion and regularly monitoring the emissions of gas from these boilers, Barry Callebaut adheres to the required principles of national and international legislation.

[20] See for instance, http://www.basel.int.

This company has even gone as far as launching its Global Environmental Policy (in 2008) for all of its factories, so as to focus on improving specific areas which could potentially affect the environment. These areas are: emissions, water consumption, energy consumption, waste and transport.

In its work on recycling, the company faces the challenge of not getting enough incentives from the government.

## 9. SAW DUST

### Overall Summary

Some timber companies generate saw-dust as a by-product of their timber processing activities and recycle the sawdust by burning it in the companies' boilers, using a system of combustion. Through this combustion process, power is used for fueling the companies' kilns which are used in processing timber for the company. This combustion process is therefore cost-effective as it saves the company additional costs of paying for power to be used by the kilns when processing the timber.

However, it is noteworthy that the large majority of companies working in this sector generally indicate that they do not recycle the sawdust which they produce, and that they do not practise any form of recycling, minimisation and disposal methods. For some of the companies in this sector, international partners have in the past initiated projects which deal with recycling of waste and have approached these timber companies. However, these exercises did not produce any results, so apparently, apathy and fatigue have set in.

### 9.1 Gieffe Wood Technology Limited

#### 9.1.1 Profile

Gieffe Wood Company was established in 2005 in Kumasi, to process different kinds of wood into coffins which are sold locally. Owing to the many quantities of wood which it processes, the company produces excessively large quantities of sawdust.

#### 9.1.2 Best Practices, Best Available Technologies and Challenges

With a view to saving costs and promote ecological health, Gieffe recycles the saw dust which is produced as a by-product of its activities. Hence, as a result of avoiding having to purchase wood fuel for processing wood into coffin, the generation of power from this exercise becomes a more cost-effective way of producing fuel.

The use of boiler/kiln dry equipment is the main method which is used for recycling. The saw dust is first of all collected and put into conveyer pipes are connected directly to the boilers/kiln dry machine. When the saw dust is transported to the boilers/kiln, it is dried and generates power. The conveyor pipes are constantly connected to the boilers, so as to ensure that power is constantly generated from recycling the sawdust.

Constraints faced by this company include the accidental fires which sometimes occur when reprocessing the sawdust. These fires arise from machine faults. In order to overcome these challenges, Giffe educates its officers and provides more fire extinguishers in case of emergency.

Waste processing companies are given seven years tax holiday exemptions by the government of Ghana. Though Giffe opines that this is useful, this company recommends that the government should increase the tax holiday period further and provide other similar incentives to motivate this company as well as other timber companies.

## 9.2 Modern Wood Technology

### 9.2.1 Profile

In 2000, Modern Wood Technology was set up in Kumasi to produce quality wood products for exports and to support the local furniture industries of Ghana. In carrying out this objective, this company produces household and office furniture. While mainly exporting furniture to Italy and other countries of the European Union, Modern Wood Technology has a monthly average product capacity of fifteen containers.

Owing to the vast quantities of sawdust which this company produced from its timber processing activities, Modern Wood Technology has for some years now, started a system of

recycling the sawdust, so as to obtain some profits. This was preferable to being faced with the continued trend of how to dispose of this waste. Hence, similar to Gieffe Wood Technology Limited, Modern Wood has for some years recycled its saw dust so as to generate power for the kiln dry machine which the Company uses to process wood.

9.2.2 Best Practices, Best Available Technologies and Challenges

Similar to Gieffe Company, Modern Wood is also able to save on the costs of fuel, through the recycling of sawdust.

Modern Wood Technology has built conveyors to convey the sawdust to the boiler /kiln dry machine. After collecting the sawdust in the conveying pipes which are directly connected to the boilers/kiln dry machine, the saw dust then dries up in the latter machine. It then generates energy which can be used by the company for its industrial activities rather than having to pay for further use of energy from other sources.

The main challenge which this company faces is how to treat the large amounts of sawdust which it produces. Modern Technology recommends forging partnerships with stakeholders so as to distribute the sawdust to them and the latter use this for recycling and sale.

**Table 9: Recycling of Sawdust**

| **Name of Company** | **Dumping in the Open** | **Energy Generation (Boilers)** |
|---|---|---|
| 1. Gieffe Wood Technology Limited | 0% | 95% |
| 2. Modern Wood Technology | 0% | 80% |
| | | |

## 10. RECOMMENDATIONS FOR THE WAY FORWARD

In addition to the recommendations which are made in the previous chapters of this report, the following suggestions are also put forward:

As a matter of urgency, establish a partnership amongst UNIDO, the private sector and the EPA, on a Waste Stock Exchange, to promote the recycling of waste.

The government, in collaboration with NGOs and other stakeholders need to collaboratively promote the following:

Create public awareness on the economic benefits of recycling and re-use. Also sensitize general public in the advantages of waste sorting or separation.

Government subsidies for the cost of energy and water supply for reprocessing and treatment of waste.

There is the need to set up waste exchange programmes between producers. This will bring significant gains in cash savings in raw materials and energy costs.

Promote research by the Council for Scientific and Industrial Research, relevant institutions (for example, Institute of Industrial Research) into recycling such as metal recycling, saw dust and wood waste, textile by-products, agricultural waste re-use etc. Need to establish an information Bureau for the collection and dissemination of such research results.

Effective communication and information exchange is an asset in any human endeavour especially in the handling of wastes that could endanger the environment. Waste management and recycling should be the concern of all in the society and it is prudent to expect industry to

recognise its role in informing the public and monitoring institutions about the state of handling of waste disposal and the possible effects on the environment.

Appropriate guidelines ought to come from regulating agencies setting out the limits of effluent disposal. Society then becomes the watchdog of compliance with these limits. With a review of limits set for effluents, producers will be urged to rehabilitate obsolete and inefficient recovery units. This will stimulate new technology development for efficient processes and low-waste operations.

The equipment to recycle waste must be placed as close as possible to the waste which needs to be recycled, rather than being transported from one end to the other in order to be recycled.

Sensitization, capacity building and legal review processes need to be promoted by the EPA for the benefit of communities, NGOs and other sectors of Ghana's populace, so as to improve the efficacy of Ghana's various laws.

Since the recycling of waste is an environmental issue and some of these issues become cross-cutting (within this context, trade and environment), Ghana's EPA needs to collaborate with the Ministries of Finance and Economic Planning, to grant incentives to companies for recycling waste, rather than leave this matter to the latter or other Ministries as the case may be. If for instance, incentives are granted to companies, they recycle their waste and this contaminates the environment, this inevitably falls to the EPA to deal with. Hence, the need to be involved at an early stage of the incentive-granting process.

## Appendix 1: Questionnaire for Private Sector Companies

1. What is the rationale for the involvement of your project in recycling non-hazardous waste?

2. How did your project become involved in profit oriented recycling and the re-use of non hazardous waste?

3. What kind of recycling methods do you use for recycling the non-hazardous waste which you produce during your industrial activities?

4. What are the best practices involved and profit-oriented ventures which you use in these recycling practices?

5.What are some of the challenges faced in these recycling practices?

6. How could these challenges be overcome?

7. What are the best available technologies which you use in recycling the non- hazardous waste which you produce?

8. (a) What are the various mechanisms and business models which have facilitated your recycling of non-hazardous waste?

(b) How can these be improved upon?

(c) How do you tackle waste separation if applicable?

9. (a) What are the various laws, by-laws and policies which regulate your recycling of non-hazardous waste laws?

(b) How can these be improved upon?

10. (a) What are the incentives which the government gives to companies to attract private sector investment in waste recycling and re-use?

(b) How can these be improved upon?

## Appendix 2: Photos of Waste Recycling Activities

Figure 1: Recycling Plastic Waste, Qualiplast Recycling Plant

Figure 2: Recycling Plastic Waste, Qualiplast Recycling Plant

Figure 3: Recycling Plastic Waste, Qualiplast Recycling Plant

Figure 4: Recycling Plastic Waste, Qualiplast Recycling Plant


Figure 5: Side View of Tema Port

Figure 6: Recycling Plastic Wastes,

Figure 7: Cyclus Recycling Plant, Aburansa, Elmina

Figure 8: Recycling Scrap Metal, Recycling Plant, Tema Steel Company Limited.

Figure 9: Recycling Scrap Metal, Recycling Plant, Tema Steel Company Limited.

Figure 10: Recycling Scrap Metal, Recycling Plant, Tema Steel Company Limited.

Figure 11: Recycling Scrap Metal, Recycling Plant, Tema Steel Company Limited.

Figure 12: Recycling Scrap Metal, Recycling Plant, Tema Steel Company Limited.

Figure 13: Recycling Scrap Metal, Recycling Plant, Tema Steel Company Limited.

Figure 14: Recycling Scrap Metal, Recycling Plant, Tema Steel Company Limited.

Figure 15: Recycling Scrap Metal, Recycling Plant, Tema Steel Company Limited.

Figure 16: Zoomlion Activities

Figure 17: Zoomlion Activities

Figure 18: Zoomlion Activities

Figure 19: Zoomlion Activities

Figure 20: Zoomlion Activities

Figure 21: Zoomlion Activities

Figure 22: Zoomlion Activities

Figure 23: Zoomlion Activities


Figure 24: Zoomlion Activities

Figure 25: Zoomlion Activities

Figure 26: Zoomlion Activities

Figure 27: Zoomlion Activities

Figure 28: Zoomlion Activities

Figure 29: Zoomlion Activities

Figure 30: Zoomlion Activities


Figure 31: Zoomlion Activities

Figure 32: Zoomlion Activities

Figure 33: Zoomlion Activities

Figure 34: Zoomlion Activities

Figure 35: Zoomlion Activities

Figure 36: Zoomlion Activities

Figure 37: Zoomlion Activities

**ANNEX 4 : LIST OF PARTICIPANTS**

**ROUND TABLE FOR PRIVATE SECT0R**

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**ANNEX 5: WORKING PROGRAMME ROUND TABLE FOR PRIVATE SECTOR: WASTE COLLECTION, DISPOSAL AND RECYCLING SYSTEMS**

| Days | Tuesday, 19th | Wednesday, 20th | Thursday, 21st |
|---|---|---|---|
| **8:30 - 9:30 am** | Arrival of Participants<br><br>Registration of Participants | Chairperson: Dr. Jacques Abe | Chairperson: Mr. Napoleon Gbolonyo |
| **9:30 -10:00 am** | Opening Ceremony | Modalities for Functioning of African Network | Field Trip to Tema Steel Works and Tilbury Environmental Group, Tema |
| **10:00 – 10:15am** | **Coffee Break** | **Coffee Break** | **Coffee Break** |
| **10:15 -10:30 am** | Chairperson: Dr. Stephen Maxwell Donkor<br>-Introduction of Participants<br>-Overview of Project and Thematic Focus of Workshop, Dr. S.M. Donkor and Dr. Yvonne Idun | Modalities for Functioning of African Network (Continued) | Field Trip to Tema Steel Works and Tilbury Environmental Group, Tema |
| **10:30-12:30 pm** | Waste Collection, Disposal and Recycling Systems in Africa: Perspectives from Participants (15 minutes each; 6 presentations). | Review of Draft Plan of Action for Network | |
| **12:30 – 1:00pm** | **Lunch** | **Lunch** | **Lunch** |
| **1:00 -3:00pm** | Perspectives from Participants (Continued. 15 minutes each; 8 presentations) | Review of Draft Plan of Action for Network (continued) | Reflections from Field Trip<br><br>The Way Forward<br><br>Closing Ceremony |
| **3:00-3:15pm** | **Coffee Break** | **Coffee Break** | **Coffee Break** |
| **3:15-5:00 pm** | Perspectives from Participants (Continued. 15 minutes each; 7 presentations) | Finalising and Adopting Plan of Action for Network | |
| **5:00-5:30pm** | Questions, Answers and Lessons for Establishing an African Network on Waste Collection, Disposal and Recycling Systems | | |

**ANNEX 6: SPEECHES**

**STATEMENT BY THE DR. YVONNE IDUN, CONSULTANT FOR GCLME PROJECT AT THE UNIDO ROUNDTABLE MEETING**

**19TH OCTOBER, 2010**

Mr. Chairman,

Honourable Minister of Environment, Science and Technology Madam Sherry Ayittey,

His Excellency, the Resident Representative of UNDO for Ghana and Togo, Dr. Bartels,

Executive Secretary of the Guinea Current Commission, Dr. Stephen Maxwell Donkor,

Distinguished Workshop Participants,

Distinguished Ladies and Gentlemen.

I have the honour and the pleasure to welcome each and every one of you to this roundtable. First and foremost, we would like to express our heartfelt thanks to you all for kindly collaborating with us in our endeavour to promote the collection, disposal and recycling of waste.

Given the increasing amounts of waste which are generated in Ghana, the adverse effects of such waste on the health of human beings as well as their environment, UNIDO and the government of Ghana deem it prudent to focus on this area in their work. It is encouraging to note that nowadays, the private sector has also been a proactive actor in this initiative. Put together, all of these agencies are now promoting the recycling of waste, so as to add value to waste which becomes more valuable when reprocessed and could serve as raw material. More importantly, such an approach also helps Ghana to clean its environment and also, protect its citizens as well as its ecology from the harmful effects which wastes could have on them.

These workings are important because as far as waste collection, disposal and recycling are concerned, problems exist. These include a lack of sufficient co-ordination amongst some of the agencies which work on waste issues as well as insufficient public enlightenment on the inherent toxicological and ecotoxicological characteristics of waste. With a view to rectifying these problems so that waste management has a positive effect on the lives of Africans, this workshop has as one of its fundamentally important targets, the establishment of a formal network an initiative of which all of your agencies will have membership.

UNIDO believes that with this network, we could have a more co-ordinated approach to recycling the various forms of waste which are generated from diverse sectors-including the industrial, agricultural, medical and household sectors. Coupled with previously successful projects which UNIDO has implemented, the present meeting and proposed network are some of the outcomes of the UNIDO project on the on "Combating Living Resources Depletion and Coastal Area Degradation in the Guinea Large Marine Ecosystem Through Ecosystem-Based Regional Actions". This project has dealt with issues including those on the management, collection and disposal of waste, with an analysis conducted of information collected and used in preparing the report which have been distributed to you.

Based on empirical research which has been conducted on these issues, waste recycling is evidently being practised by the private sector and could be supported to a greater extent, by the government, international agencies and other interested parties. The private sector also believes that coupled with the desire for the promotion of economic activity, recycling should have as one important objective, the creation of jobs for impoverished communities as well as the protection of the environment from littering, as this could in turn negatively affect other sectors such as tourism.

In addition to success stories and challenges, the private sector has given sufficient information on the equipment which it uses in recycling waste, with photographs shown, the even more sophisticated equipment which it hopes to use in the future, the profit-oriented ventures which it uses in recycling its waste and other pertinent information. While putting this information in the current report, we will greatly appreciate any further input/comments which you may have.

We will also take a field trip to Tema Steel Company and Tilbury Environmental Group, to have an idea about how some of our companies engage in these recycling practices, what lessons can be learned from them and what equipment they use in reality.

In order to chart the way forward, we would like to kindly suggest that you make your views known on your experiences and the functioning of this anticipated network, so that we can gain maximum benefits from recycling our different forms of waste.

We wish you a fruitful mission and hope that we will attain successful outcomes from this meeting.

Many thanks.

**STATEMENT BY THE UNIDO EXECUTIVE SECRETARY FOR GCLME PROJECT AT THE UNIDO ROUNDTABLE MEETING**

**19TH OCTOBER, 2010**

Mr. Chairman,

Honourable Minister of Environment, Science and Technology Madam Sherry Ayittey,

His Excellency, the Resident Representative of UNDO for Ghana and Togo, Dr. Bartels,

Distinguished Workshop Participants,

Distinguished Ladies and Gentlemen.

I am pleased to welcome all of you to this roundtable. On this important occasion, UNIDO, the Government of the Republic of Ghana, private sector companies in Ghana, Côte d'Ivoire, Sierra Leone, Nigeria, the Republic of Congo and the Democratic Republic of Congo have come together to deliberate on strengthening the role of the private sector in the collection, disposal and recycling of wastes. These discussions are being held with a view to establishing a partnership amongst these parties so that more work is carried out to promote the recycling of different forms of waste, an activity which could result in the derivation of income, creation of more jobs and sufficient levels of environmental protection. Hence, through this initiative, UNIDO aims at working with the private sector and the Government of Ghana to enable Ghana and some other African countries to fulfill inter-alia, certain international obligations such as MDG 7 on environmental sustainability.

Various forms of waste are being increasingly generated in Ghana (waste oil, cocoa shells, plastics, food waste, household and other forms of waste). Compounded with this and a lack of sufficient waste disposal facilities, Ghana's government and the private sector are promoting the collection and management of such waste in as many communities as possible. UNIDO is also working on improving ways in which waste is handled after it is generated.

In doing this, UNIDO not only pays particular attention to the ways in which waste is collected and disposed of, but is also focusing in-depth on the ways in which waste is being recycled, so as to derive some value from these substances. In this regard, UNIDO has conducted a research study on "The Collection, Disposal and Recycling Systems of Select Private Sector Companies in Ghana" as part of its project on "Combating Living Resources Depletion and Coastal Area Degradation in the Guinea Large Marine Ecosystem Through Ecosystem-Based Regional Actions". The main aim of this study has been to explore the various methods which private companies use in recycling the waste which they generate as by-products of their industrial activities, the approach which these companies adopt, the best practices involved, the best available technologies which they use and the legislative framework within which the private sector companies operate. UNIDO has also worked on the challenges faced by the private sector in these activities. With the information gathered in this report which has been distributed to all of you, we hope to elaborate further on these issues, as a basis for establishing a platform upon which the proposed network will operate.

On this occasion, we welcome ideas from all of you about your experiences in recycling, the legislative framework within which you operate, your best practices and challenges, how you have overcome these challenges/believe we could collaborate to overcome these obstacles, how you envisage the proposed network to function, how to ensure that this network is sustained and accomplishes expected outputs as well as how to chart the way forward.

We believe that we can collaboratively enhance waste recycling in Ghana and the rest of Africa through our combined efforts in recycling, for the benefit of our various communities where issues such as waste collection, management and recycling need to be promoted in even greater depth, so as to derive more income, create jobs and ensure a clean environment, for the benefit of all.

Thank you a great deal.

**STATEMENT BY THE UNIDO REPRESENTATIVE FOR GHANA AND TOGO AT THE UNIDO ROUNDTABLE MEETING**

**19TH OCTOBER, 2010**

Mr. Chairman,

Honourable Minister of Environment, Science and Technology Madam Sherry Ayittey,

Executive Secretary of the Guinea Current Commission,

Distinguished Workshop Participants,

Distinguished Ladies and Gentlemen.

I am delighted to be with you this morning to share a few thoughts on the role of UNIDO in the development of the private sector as an engine of growth and the interest of UNIDO in the recycling of waste.

Private sector is the driving force of industrial development in virtually all countries. Broad agreement exists on their crucial role in economic and industrial development and in particular in achieving the Millennium Development Goals. In this context, a critically important role is played by micro, small and medium enterprises, which, on average, make up over 90% of enterprises in the world and account for 50-60% of employment in particular in developing countries, whose major challenge is to combine the SMEs' employment potential with increasing productivity. This means shifting from low-value, price-driven to higher-value, knowledge-based performance. In order to prosper, private sector needs an environment that facilitates growth, including easy access to business related information, technical support services, funding and national and international markets.

UNIDO's specific focus in the field of poverty reduction through enhancing the development contribution of the private sector consists of supporting the formulation of industrial policies that improve the general business environment for private sector development, as well as in building up local productive capacities in a private sector-led process. In particular, the activities of the Private Sector Development Branch aim at promoting industrial enterprises that drive the economic growth process and foster entrepreneurship, technological dynamism and associated productivity growth. These, in turn, create skilled jobs, contribute to the achieving gender equality and women empowerment, and support integration into national and global value chains. Private Sector Development also acts as the focal point within UNIDO for the Donor Committee on Small Enterprise Development and the UN Global Compact. Technically, these services are provided through activities within the following thematic areas of: Business Environment and Policy Support (BEP), Clusters and Business Linkages (CBL), and Rural and Women Entrepreneurship and Human Security (RWE).

Mr. Chairman, Hon. Minister, Distinguished ladies and Gentlemen,

*In the course of the past few years, there have been increasing incidents of waste generation in Ghana and other African countries, within many sectors, as a matter of rises in population. Wastes could be hazardous or non-hazardous. Ghana's waste originates from activities including agricultural, industrial, medical, household and other activities. These forms of waste specifically include waste oils, used fluorescent tubes, solid waste such as plastics, used paper, used cocoa shells, fish waste and broken glass. Some of these substances may be hazardous in themselves because of their inherently toxic qualities and need to be disposed of. These include used fluorescent tubes which contain mercury. The more harmful wastes which are destined for disposal, could altogether, inflict rather harmful effects on human health and the environment. This is because these wastes contain harmful substances such as mercury, cadmium, lead, asbestos, acidic wastes, plutonium and Poly Chlorinated Biphenyls which upon being inhaled, cause cancer, physical paralysis, chemical burns and other sickness in human beings, as well as affect soil fertility. When they come into contact with the sea, rivers and lakes, these wastes also kill fishes and other forms of marine life, while polluting these waters, which are more often than not, a source of drinking water for diverse sectors of Ghana's populace.*

*For the forms of waste which are destined for final disposal, the government of Ghana collects and disposes of this waste in dump sites and incinerators. Private sector agencies such as Zoomlion, Cyclus, Blowplast, Tilbury, Zeal and the Accra Plastics Waste Management Association have also become involved in collecting wastes from household and industrial sectors with the use of trucks, motorised tricycles and the use of other equipment. Plans by Ghana's government to establish properly engineered landfills to be constructed in Kwabenya and other parts of the country are in progress and are yet to be implemented. This would require a great deal of foreign investment, but is a realistic ambition which we can attain, with much dedication and commitment. In implementing these plans, UNIDO hopes to work with the government of Ghana which is dedicated to promoting environmental goals and meeting certain international obligations such as MDG 7 on environmental sustainability.*

*Other forms of waste may be less toxic or non-toxic at all. These could be put to further use after recycling them, while using environmentally sustainable steps, thereby creating jobs for the poor, generating income for them and promoting environmental protection. Altogether, these recycling activities then result in sustainable development. This is because recycling items such as used plastics and waste oils could produce plastic bags, kerosene and other useful products for sale by parties which recycle them.*

*In the light of these positive benefits which waste could yield for Ghanaians on the one hand but the detriments which it could have on human and ecological health on the other, UNIDO in its pursuit of sustainable development and poverty reduction goals contemplates establishing a network with the government of Ghana and other private sector companies in Africa to promote the recycling of waste to a greater extent in Ghana and a few GCLME countries.*

The idea of recycling of non-hazardous waste is a very laudable one then. Recycling has been used in different parts of the world as a means to better manage resources and reduce costs and the impact of waste materials on the environment. The recycling of plastics has been chosen by UNIDO as an appropriate way to:

- Demonstrate the potential for lessening the impact of plastics on the environment
- Reduce operational and production costs for the plastics industries
- Create income generation and employment opportunities within the labour urban recycling sector through economic linkages with processing facilities.

Specifically, UNIDO has established a recycling processing Centre Project in Dar-es-Salaam in Tanzania in collaboration with the Ministry of Industries, Trade and marketing, TIRDO and other stakeholders. UNIDO will not hesitate to collaborate with any organisation in Ghana in this direction under the auspices of the Ministry of Trade and Industries and the Association of Ghana Industries.

On 23rd November this year, UNIDO in collaboration with other agencies will celebrate World Industrialisation Day under the theme: "Competitive Industries for the Development of Africa".

This theme is very relevant to this roundtable as competition gives birth to innovative ideas which promote development and the modern industry must consider as a matter of importance, recycling of industrial waste.

Distinguished ladies and gentlemen, the rationale behind this roundtable and the outputs which this event will yield are very timely. UNIDO will therefore encourage the institutionalisation of a formal network of private industries involved in the recycling of non-hazardous waste.

I wish you success in this endeavour of yours.

Thank you.

**STATEMENT BY THE HONOURABLE MINISTER OF ENVIRONMENT, SCIENCE AND TECHNOLOGY AT THE UNIDO, ROUNDTABLE MEETING**

**19TH OCTOBER, 2010**

Mr. Chairman,

His Excellency, the Resident Representative of UNDO for Ghana and Togo, Dr. Bartels,

Executive Secretary of the Guinea Current Commission,

Distinguished Workshop Participants,

Distinguished Ladies and Gentlemen.

It is with great pleasure that I welcome all of you to this important roundtable which brings together the Government of the Republic of Ghana, the UNIDO country office in Ghana which covers Togo as well, and private sector companies in Ghana, Côte d'Ivoire, Sierra Leone, Nigeria, the Republic of Congo and the Democratic Republic of Congo.

Within the recent past, globalization has been on the increase, inevitably resulting in a rise in business as well as other activities in Ghana, as well as the rest of Africa and the world. This has meant significant rises in waste generation for these countries. As far as Ghana is particularly concerned, many tonnes of solid waste are produced daily. Ghana's Ministry of Environment, Science and Technology as well as its Environmental Protection Agency are therefore working on waste management, collection, disposal and recycling. These agencies have also included these issues in their national programmes and are encouraging their regional offices and municipal assemblies in all ten of Ghana's regions to promote environmentally sound management of waste-from the moment the waste is generated and collected till the moment it is disposed of, thereby seeking to adopt a cradle to grave approach.

These agencies have trucks which collect waste from households and other sectors, then dump them in waste dump sites. They are also planning to set up properly engineered landfills in some areas all throughout the country, so as to facilitate the final treatment of waste.

Basically, categories of waste which are generated in Ghana include medical, agricultural, industrial and household waste.

- Medical waste: As medicine continues to be improved and developed in Ghana, more hospitals are created and produce wastes from this sector. Such waste is generally hazardous.
- Industrial waste: With rises in business activities in commodities such as computers, electricals, mobile phones and other products, greater numbers of factories and shops have been set up in Ghana with greater levels of foreign investment in Ghana. As a consequence of these processes, more forms of waste are generated on a daily basis.
- Agricultural Waste: Within farming, poultry and other activities, useful produce are yielded-for instance, waste from livestock and poultry which can be composted for use as fertilizer for growing plants. In growing plants, chemicals are sometimes used and need to be regulated as some of them could be obsolete and hazardous to human health and the environment.
- Household Waste: These wastes originate from household activities and are normally food/kitchen waste which can also be disposed of, or recycled as manure for further use on farms.

Despite the deep commitment of Ghana's government to treating and managing waste, this is not sufficient to solve the problem of waste increases in Ghana. Hence, the ardent work of the private sector to help collect, dispose of and recycle waste cannot go unnoticed. Such workings should be encouraged and more partnerships formed amongst the private sector, government, UNIDO and other interested parties, as anticipated by this roundtable.

To make waste management more effective in Ghana, this proposed partnership should also target waste recycling in particular. While scavengers currently derive meagre amounts of money from helping in collecting, reprocessing and selling waste (on a low-scale level), this partnership could target the promotion of recycling at higher levels, and provide sophisticated equipment as well as incentives to these scavengers. Given the high poverty levels and pressing needs of environmental protection, training these people could help raise income, create jobs and create environmental protection.

While treating more harmful wastes in dump sites and with incinerators, recycling the less harmful waste more frequently could therefore be another important solution to treating waste. In addition to establishing recycling centres, the planned partnership amongst agencies should also aim at training Africa's citizens on how to operate and manage other entities such as the Bio-Gas System. This system involves extracting gases from waste and treating waste to produce bio-gas which is in turn used in many civil and industrial utilities. Given the energy shortages which Ghana sometimes faces in both rural and urban areas, this network can also establish facilities for people who can also be trained to treat waste to produce electricity, as is currently practised in some parts of India, Brazil and Tanzania. This mechanism yields a dual effect, namely, decreasing the amount of hazardous gases resulting from disposing certain forms of waste, providing electricity to the population and also, promoting industrial, educational and other activities where energy is needed.

The application of the above methods alone to managing waste will not suffice in solving the waste problem in its entirety. However, when people enforce the right environmental laws and policies alongside being trained on education and awareness campaigns, this could enhance greater levels of environmental protection.

It is with due consideration to such factors that Ghana has gained membership to relevant international environmental treaties such as the Basel Convention on the Transboundary Movement of Hazardous Waste (1989) to which it acceded in 2003. In that same year, Ghana ratified the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals in International Trade (1998). In 2003, this country also ratified the Stockholm Convention on Persistent Organic Pollutants (2001). These wastes and chemicals seek to regulate global trade in wastes and chemicals. At the national level, Ghana's laws and policies such as the Pesticides Control and Management Act (1996) and The Mercury Law (1989) regulate the trading of substances such as pesticides and mercury.

In this country's deep commitment to promoting environmental sustainability, the Ministry welcomes the needed initiative of a network with UNIDO and the private sector, to promote recycling in conformity with the environmentally sustainable principles of these laws and policies. The government of Ghana therefore confirms its availability to collaborate in enforcing recycling initiatives.

Many thanks.

**ANNEX 7: PICTURES FROM WORKSHOP AND FIELD TRIP**

***The Executive Secretary, Dr. Stephen Maxwell Donkor, reviewing the Action Plan together with participants***

***Mr. Yves  Edmond Moe Pouaty, from Congo presenting a profile of CITRAD -CONGO***

***Participants in a discussion***

***Field Trip, Participants at the Tema Steel Company Limited***

***Field Trip, Participants at the Tilbury Environmental Group, Tema***

***Participants finalising the Plan of Action***

***IGCC consultant on Waste Management, Dr. Yvonne Idun and Dr. Jacques Abe, Environment Expert, IGCC***

***Tema Steel Company***

***Tema Steel Company***

***Participants at Tema Steel Company***

***Participants at Tema Steel Company***

***Participants at Tema Steel Company***

***Participants at Tilbury Environmental Group***


***Participants at Tilbury Environmental Group***