VALUE CHAIN ANALYSIS REPORT AND INVESTMENT OPTIONS STUDY ON MUNICIPAL SOLID WASTE MANAGEMENT (MWSM) IN KAMPALA
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2018
FOREWORD

That Kampala and its environs face a waste crisis is beyond dispute. As this Synthesis Report makes clear, Kampala is growing, expanding and transforming into a modern African city. And, in parallel to its successful development, its citizens are consuming more and generating ever-increasing volumes of waste. Current systems, dependent as they are on ‘collect-and-dump’ approaches, simply cannot keep pace with Kampala’s transformation. It is therefore essential to take a fresh approach to waste management in the city, toward systems which both support and benefit from urban growth, deriving the greatest value possible and in so doing relieve the fiscal burden of ‘business as usual’ approaches.

Effectively transforming Kampala’s current waste management challenges lies beyond a single solution. At present the waste ‘system’ provides little or no incentives to support 3R or waste-to-resource (W2R) principles and practices from household to landfill. Any material recovery taking place is primarily the outcome of independent efforts, and limited private investment. This makes for a disconnected and inefficient system – of which the sum of efforts are yet to reap the benefits of waste valorization on the scale required. Solutions thus lie beyond a single actor, or even a set of actors. This Report highlights the new for a much stronger and clearer vision of national and local government in supporting a waste-to-resource approach, which would provide the institutional and physical infrastructure required to generate and sustain partnerships and guide the necessary investment that is needed.

As this Report demonstrates change is possible and is under way. The Government of Uganda has enacted a National Urban Solid Waste Management Policy which is to be implemented over a period of 15 years (2015-2030), providing the framework for actions to transform the waste sector. This Report demonstrates that there is value in waste. While each material lends itself to specific solutions, taken as a whole waste can – and should – have its value realized. To miss this opportunity is to undermine efforts to green Kampala and its surrounding region, but it is additionally a lost economic opportunity. And, not insignificantly, it is also a lost opportunity to provide employment and livelihoods. Taken together, these represent significant potential benefits.

This Synthesis Report has been completed by the Global Green Growth Institute in partnership with Ministry of Lands, Housing and Urban Development (MLHUD), Kampala Capital City Authority (KCCA), and National Environment Management Authority (NEMA). The Report’s findings have also benefited greatly from the valuable insights and perspectives, from staff at Kiteezi Landfill, various recycling companies, wastepicker cooperatives, business sector representatives (inclusive of the informal sector) and a number of national and international organizations and experts dedicated to transforming Kampala’s waste management. It is hoped that the findings and recommendations of this report provide the necessary guidance, and act as a catalyst for the change needed to support a greener, more inclusive and economically vibrant Kampala.

Okubal Peter James Ejokuo
Country Representative - Uganda
Kampala city had a population of approximately 1.35 million in 2017, with an estimated generation of solid waste of between 1,200-1,400 tons per day. It is the responsibility of Kampala Capital City Authority (KCCA) to manage this waste. To meet this responsibility KCCA has contracted private waste collection companies to upscale collection and transportation of solid waste from points of generation to disposal facilities, with current dependence on Kiteezi landfill site.

Despite engagement with the private sector, it is estimated that only half of the city’s waste is collected. In broad terms, private companies manage about 50% of the total waste collected, while the other 50% is collected by KCCA, mainly in informal and semi-formal areas. The waste not collected is disposed of in undesignated places, which has led to a proliferation of illegal dumpsites in many parts of the city. In 2015 Kampala had about 227 dumpsites, of which 83% were unofficial.

Apart from KCCA and private waste collectors, the other key actors in the solid waste management sub-sector are households, industry and enterprises that generate waste, and in some cases engage in waste capture, recycling and processing in paper, plastics, cardboards, metals and PET bottles. It is estimated that around 10% of waste is recycled. Overall waste management in Kampala can therefore be described as that which follows the traditional collect and dump approach and does not as yet take advantage of more sustainable waste-to-resource/energy systems. From a cost recovery point of view, Kampala City invests a great deal in waste management, with proportionately limited investment returns. The gap between costs and revenue is likely to increase if Kampala does not urgently shift its waste management practices.

A number of factors help explain why waste management remains locked into traditional and costly waste management practices. These include attitudes to waste which do not yet see resource potential; a lack of decentralized infrastructure to collect, process and store waste; poor financial returns for recyclables which are not separated at source; and a lack of a viable commercial model for organic waste. There are also a lack of initiatives which integrate informal sector actors into formal waste management services.

The Government of Uganda has enacted a National Urban Solid Waste Management Policy. The policy, which is to be implemented over a period of 15 years (2015-2030) provides a necessary shift towards the principles of waste to resource, 3R and sustainability, among others. This current synthesis report, which summarizes research undertaken on the current waste management systems in Kampala through 2017-2018, is firmly anchored on the principle of waste to resource. The primary aim is to identify models and business opportunities for transforming waste management which supports WTR/E, job creation (‘green jobs’) and investment opportunities.
Those identified are:

a) **Urgently address separation at source through household and community education and collection systems.** Waste mixed equals value lost. Mixed waste limits economic opportunities and undermines the value returns from investments made. Transforming the current waste generation, collection and transportation system so that waste is separated at source and through the system is essential. The Report demonstrates that in some cases, 90 per cent of the value of waste is lost through being mixed. Effective source separation requires a balance of incentives and penalties, which must be consistent across public and private waste systems.

b) **Converting local informal dumpsites into material collection centres with appropriate infrastructure investment** would provide desperately needed decentralized infrastructure to support a whole-of-city approach. At present only half of Kampala City’s waste is collected, which has led to a proliferation of unsafe informal dumpsites, comprised of mainly mixed waste. The establishment of material collection centers would support both safe disposal, effective processing and support green jobs through establishment of waste cooperatives supporting the informal/formal collection and processing nexus.

c) **Support existing and new economies around recycling and valorization of recyclables.** Currently a large number of informal and informal recycling businesses operate in the city, but they lack the scale (including access to raw materials) and investment necessary to become or stay commercially viable. Beyond infrastructure, a more supportive policy and business environment would provide an impetus for investment into recycling. Following China's 2018 ban on targeted waste imports, an environment now exists for stronger domestic industries to emerge. Policies may include those which determine that plastics manufactured locally will have a pre-determined recycled content or that companies dealing with imported packaged products will contribute to a green fund which supports local recycling/replacement efforts, among other waste to resource initiatives.

d) **Establish economic opportunities around organic waste.** An estimated 70% of Kampala’s waste is organic. Much more needs to be done to identify viable business models, at scale, to take organic waste out of landfills and open dumping sites, including through Waste-to-Energy (W2E). At present organic material has very little value in the waste system. Possible interventions may include investments into decentralized biogas; animal feed; composting or supporting organic briquette production to displace current dependence on low quality coal.

e) **Valorize the waste stream through an economic model which supports sustainable collection and tipping fees.** The garbage management fees charged at household level must reflect costs associated with value chain, in line with principle of producer responsibility. Apart from supporting the principle of a circular economy, this model can be achieved by making fee collection at the household level more efficient rather than by raising the current service charges. Likewise, revenue derived from Kiteezi landfill from tipping fees is an underutilized source of revenue to support current and future waste-to-resource initiatives.
f) Waste is big business in Kampala and provides a positive opportunity for employment. This report supports that currently, thousands of workers are engaged in hundreds of formal and informal waste businesses, ranging from local SMEs to globally-linked businesses. There are opportunities to build upon local entrepreneurship, in terms of training, infrastructure and broader recognition. The poor, and those who have developed business opportunities around waste, should be recognized and more effectively supported. Women are particularly represented in the waste sector. Supporting a local waste-to-resource strategy therefore provides a platform for gender inclusive outcomes.

g) Finally, the NUSWMP provides a clear opportunity for Uganda to transform the way it manages and utilizes waste. But more needs to be done to support the strengthening of institutional arrangements which support the implementation of the policy.
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1.1 Background

The Global Green Growth Institute (GGGI) is implementing a Waste-to-Resource (W2R) program in Uganda, as part of its efforts to help build economies that are more efficient and sustainable in the use of natural resources, less carbon intensive and more resilient to climate change. The program, which primary focuses on Kampala City, builds upon studies by NCE-GGGI-EPRC (2016) Achieving Uganda’s Development Ambition and the World Bank (2017), in which waste management was identified as a sector that required direct and sustained interventions to support sustainability. Addressing waste management also supports The Government of Uganda’s aspiration to develop to a modern and prosperous country by 2040, based on the principle of green growth.

GGGI has also committed to support Kampala’s vision of a more sustainable and financially sound solid waste management system, in line with the National Urban Solid Waste Management Policy (NUSWMP) and the Kampala Climate Change Action Strategy (2016). Both reports seek to better position the city to meet its environment, development and climate goals in the context of a population of 4.8 million by 2040, and a greater Kampala Metropolitan region of 15 million.

Future growth, coupled with changing consumption patterns, indicate that the current state of solid waste management is set to get more complex, and more expensive to manage. In 2017, KCCA spent 5.3Bn/= ($1.5mm) to collect 263k tons of waste or 55% of the total waste delivered to the landfill. If 100 per cent collection goals are met through the existing approach to waste, all positive gains will be undermined by a lack of adequate infrastructure and capacity. In addition, there will be substantial economic cost in terms of missed livelihood and business opportunities.

The specific objectives of this synthesis report are to:

a) Assess the current municipal solid waste chain in Kampala;

b) Identify possible interventions which support waste to resource initiatives and economies, including support for green jobs;

c) Demonstrate opportunities to valorize the waste stream, including through investment in infrastructure and services which support a sustainable model for current and future generations.

1.2 Solid Waste Management Policies: Legal & Regulatory Framework

The overarching guidelines for urban solid waste management are provided by the National Urban Solid Waste Management Policy (NUSWMP) of 2017. The policy, which encompasses municipal, commercial and industrial waste streams, addresses the 15-year period from 2015 to 2030. Specific aims of the policy are to:

• Provide a national framework for solid waste management, including waste diversion,
reduction, resource recovery, reuse and recycling;

- Establish national solid waste goals and objectives, including an overall waste reduction goal and a plan to monitor progress toward the goals;
- Facilitate revision of sub-plans by Local Governments;
- Facilitate structuring of appropriate urban solid waste management legislation;
- Provide national leadership on waste and resource recovery and;
- Facilitate collaboration with non-state actors on urban solid waste management issues.

Prior to adoption of the NUSWMP, solid waste management was still being guided by a number of unconnected policies and legal instruments. For example, the responsibility of solid waste management lies with local governments as specified in the Local Government Act of 1997. Sections 38 and 40 of the Act provides the Local Government (Kampala City Council) (solid waste management) ordinance. The Ordinance places responsibility of collecting and disposing of solid wastes on Kampala City Council Authority (KCCA). The ordinance also requires KCCA to ensure there is separation of solid waste at the point of generation. The ordinance further indicates that it is an offence to remove, collect or disturb solid waste in containers, or to remove solid waste from a container. This effectively makes scavenging an illegal activity, though many people continue to engage in it.

Other prohibited activities include placement of waste on open public places such markets, streets, river banks, parks or any other place which makes such placement a public health nuisance. Clearly, the challenges associated with illegal dumping of waste arise from compliance and enforcement issues rather than lack of enabling policies and regulations. The Auditor General Report (2010) cited poor waste management as resulting from a lack of public awareness campaigns and inadequate funds for collection, transportation and disposal.

The other law that directly provides for the management of solid waste in Uganda is the National Environment Act of 1995. The Act established the National Environmental Management Authority as a semi-autonomous agency responsible for coordinating, monitoring, regulating and supervising environmental management in Uganda (NEMA, 2018). The authority, in consultation with lead agencies, is empowered to issue guidelines and prescribe measures and standards for the management and conservation of natural resources and the environment. For example, in 2015, NEMA, in partnership with KCCA, banned usage of polythene bags of less than 30 microns. However, following concerns by the manufacturers, the President issued a directive shelving enforcement of the ban for the period between 2016 and 2021. The Directive further required KCCA to enhance issuance of licenses to investors seeking to recycle waste, including polythene bags and other plastics.

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1.3 Waste Generation and Composition

The rate of solid waste generation in Kampala in 2015 was 3,206 tons per day and is expected to increase to 4,739 tons per day by 2030. Caution should be applied to such data however, as almost half of all waste is not collected and as such the composition is relatively known. Given that future urban growth of Uganda’s cities will be informal, meeting the waste collection needs of poorer settlements and households should be of greatest priority. Composition of waste received at Kiteezi offers some guide but would not account for high diversion rates for metals, or the likely high dumping rates for organic waste, for example.

The main waste components are organic matter, paper, polythene bags, cartons, metals and PET bottles. Approximately 70% of municipal solid waste is organic waste. This includes from households, restaurants, market waste and vegetable matter from yards.

However, recovery rates vary substantially – indicating market price and ease of collection/transport. The most highly valorized materials include metals (at a full recovery rate), with PET bottles, plastics and cardboard at around 40-70% of recovery, and soiled paper (8%) and organic waste (3%) being the least collected, and subsequently valorized.

1.4 Waste Management Paths

The waste generated in Kampala follows three main paths: namely

- Open dumping
- Recycling
- Landfilling.

Notably, most of waste in Kampala is disposed of at a large number of ‘unofficial dumpsites’. These should be an important focus of future waste management strategies. Often these sites emanate from temporary garbage collection points that lack frequent or efficient collection services. Kampala has
an estimated 227 temporary garbage storage points, of which 83% are illegal/unofficial while 17% are official. Open dumping of municipal solid waste is acknowledged as a threat to public health. Open dumping also contributes to pollution of air, soil and water resources. Though it is a ‘free’ strategy, attributed to avoiding the cost of collection or due to the lack of collection options, the financial cost being avoided today will have to be incurred in future, and the burdens associated with diseases and loss of environmental services (e.g. clean water) will last for generations.

Waste that is collected formally is taken to Kiteezi landfill. The landfill, in operation since 1996, is located 15 km from the city centre. Approximately 1,200-1,400 tons of waste are transported and landfilled at Kiteezi daily. The source of waste is spread across public and private operators. KCCA is responsible for transportation of waste from informal settlements, through the ‘self-loading program’. Low willingness-to-pay of poorer communities makes purely commercial operations less viable in such areas. In 2015, KCCA created licenses for three private contractors to collect from designated areas, for a 5-year period. Though performance has been variable, today three companies handle around 50% of the city’s waste, though ‘errant companies’ (individual collectors) also account for a sizeable proportion.

<table>
<thead>
<tr>
<th>Collection Company</th>
<th>No. trucks</th>
<th>No. workers</th>
<th>No. female workers</th>
<th>Quantities Recovered in 2017 (tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>KCCA</td>
<td>24</td>
<td>n.a</td>
<td>n.a</td>
<td>263,126</td>
</tr>
<tr>
<td>Nabugabo</td>
<td>26</td>
<td>360</td>
<td></td>
<td>65,846</td>
</tr>
<tr>
<td>Homeclean</td>
<td>40</td>
<td>400</td>
<td>200</td>
<td>58,691</td>
</tr>
<tr>
<td>Kasasiro</td>
<td>19</td>
<td>103</td>
<td>10</td>
<td>28,660</td>
</tr>
<tr>
<td>Errant companies</td>
<td>40</td>
<td>n.a</td>
<td>n.a</td>
<td>64,759</td>
</tr>
<tr>
<td>Total</td>
<td>149</td>
<td>n.a</td>
<td>n.a</td>
<td>481,082</td>
</tr>
</tbody>
</table>

(1) Reflects snapshot as of December 2017 (not full year)

Source: Company interviews and data provided by KCCA
The landfill operates a gate at which source and type of waste are broadly recorded, but there is no current capacity to weigh incoming waste, and no tipping fees are in place. Waste is spread, compacted with location decided daily. Kiteezi is operating beyond capacity and is unstable in several locations. The landfill has a base liner, which facilitates collection of leachates. This reduces contamination of ground water, though lining is not complete. Leachate collected in the past was treated in a wetland, after which it was released into a stream. However, owing to a landslide in recent years, and a lack of maintenance, neither the leachate ponds nor wetlands are functioning. Kiteezi may then be described as a semi-controlled landfill.

Apart from landfilling of the waste at Kiteezi and illegal dumping across the city, waste is recovered and sold as recyclables. The process involves picking of the recyclables from the local dumpsites, stockpiling and then transporting to the recycling facilities. Some dealers either collect directly from the dumpsites or have contracted waste pickers who collect and deliver recyclables for a fee. Recyclables are also picked from the streets and from the waste bins and bags before they are emptied into garbage trucks. Waste collectors also supplement income through selling off materials before reaching Kiteezi landfill site. The other recyclables are picked directly at Kiteezi landfill site, principally by members of a Cooperative.

**1.5 Employment & Livelihoods**

*There are more than 3,000 people involved in and employed in the informal sector which deals with solid waste.* This informal sector is mainly involved in the collection and sorting phases of the solid waste cycle including waste collection truck loaders and waste pickers at the landfill. Several waste brokers are also operating in the informal sector. Within the formal private sector there are 100+ companies registered as recycling companies in Uganda. It is estimated that up to 1,000 people
operate at Kiteezi landfill site\textsuperscript{6}. Though formed into a cooperative, their activities are not aligned with planning and general operations of KCCA.

GGGI's approach to green growth and valorizing waste streams is to help support and create 'green jobs', and support livelihoods of the poor and the development of SMEs. To this end, there are important opportunities from Kampala to capture and build upon in terms of investing in businesses across the waste cycle; separation, collection, processing and commercialization. The following table quantifies the various actors in the waste value chain of Kampala and a range of their estimated monthly income. Clearly, women are present across the waste sector. They are less present among metal foundry and waste collection loader jobs. Research undertaken in this report demonstrated the important role waste plays in livelihoods creation. Solutions to waste must then represent strategies which provide the opportunity to build upon this sector, in ways which do not stigmatize, displace or marginalize.

<table>
<thead>
<tr>
<th>Actor</th>
<th>Number of actors</th>
<th>Women (% of total)</th>
<th>Income per month (UGX)</th>
<th>Income per month (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Street waste pickers</td>
<td>1,000+</td>
<td>70%</td>
<td>Low: 100,000 High: 300,000</td>
<td>Low: $28 High: $83</td>
</tr>
<tr>
<td>Landfill waste pickers</td>
<td>1,000+</td>
<td>80%</td>
<td>Low: 168,000 High: 600,000</td>
<td>Low: $47 High: $167</td>
</tr>
<tr>
<td>Itinerant waste brokers</td>
<td>100-200</td>
<td>20%</td>
<td>n.a</td>
<td>n.a</td>
</tr>
<tr>
<td>Scrap dealers - organic waste</td>
<td>200 - 300</td>
<td>90%</td>
<td>Low: 1,000,000 High: 2,000,000</td>
<td>Low: $278 High: $556</td>
</tr>
<tr>
<td>Scrap dealers - plastic waste</td>
<td>200-250</td>
<td>75%</td>
<td>Low: 800,000 High: 1,300,000</td>
<td>Low: $222 High: $361</td>
</tr>
<tr>
<td>Scrap dealers - metal waste</td>
<td>300-500</td>
<td>10%</td>
<td>n.a</td>
<td>n.a</td>
</tr>
<tr>
<td>Shoemakers - rubber waste</td>
<td>200-300</td>
<td>15%</td>
<td>500,000 High: 900,000</td>
<td>Low: $139 High: $250</td>
</tr>
<tr>
<td>Recyclers - plastic waste</td>
<td>30-40 \textsuperscript{1}</td>
<td>80%</td>
<td>250,000 High: 372,000</td>
<td>Low: $69 High: $103</td>
</tr>
<tr>
<td>Recyclers - metallic waste</td>
<td>25-40 \textsuperscript{1}</td>
<td>5%</td>
<td>250,000 High: 700,000</td>
<td>Low: $69 High: $194</td>
</tr>
<tr>
<td>Metal foundry workers</td>
<td>5,000+</td>
<td>2%</td>
<td>400,000 High: 1,000,000</td>
<td>Low: $111 High: $278</td>
</tr>
<tr>
<td>Waste collection loaders</td>
<td>500-700</td>
<td>2%</td>
<td>150,000 High: 200,000</td>
<td>Low: $42 High: $56</td>
</tr>
</tbody>
</table>

\textsuperscript{1} Number of firms

Source: Stakeholder interviews

2.1 Materials Recovery & Value Chain Analysis

It is estimated that only 10% of the total waste generated in Kampala is recycled. Typical of many informal systems, materials recovery is highly uneven, opportunistic and determined by potential value derived. The most common recyclables are the ferrous and non-ferrous metals such as aluminum, copper and brass, cardboards, office paper, high density and low-density plastics and PET bottles while only a fraction of organic waste is utilized (typically as animal feed).

2.2 Approaches for Transforming Management of Solid wastes

To initiate change it is important to understand current drivers of the waste management system. It has rarely been possible for countries at ‘traditional’ approach to waste to immediately transform to low-waste economies. The key components of a cleaner system, such as limited consumption (bans on plastics etc), separation at source, effective and affordable collection systems, recycling and waste

\textsuperscript{6} Personal Communication with the Landfill Manager, 2017
to energy with limited landfill etc rely on a combination of technical, financial, governance, socio-economic resources and behavioral factors. As Uganda aspires to improve waste management, it should seek a path that reflects local conditions and opportunities.

The Government of Uganda has developed the National Urban Solid Waste Management Policy (NUSWMP) to guide management of municipal, commercial and industrial waste in the country. It offers key principles and targets which provide a platform for change, over the next 15 years. Specifically:

a) Waste Hierarchy: prevention, 4R (Reduce, Reuse, Recycle, and Recover) and safe disposal shall be emphasized;
b) Polluter pays: polluters and generators of waste should pay the cost for cleaning or managing the waste;
c) Precautionary approach: Precaution shall be applied where there are threats of serious or irreversible damage to human health and the environment;
d) Inclusiveness: All key stakeholders are to be engaged while developing and implementing solid waste management strategies and action plans;
e) Life Cycle: The environmental impacts of a product during its entire life cycle should be considered, (e.g. raw materials extraction, production, use and end-of-life product);
f) Proximity: Waste shall be dealt with close to the source of generation in order to reduce transportation costs and contamination of the environment.
g) Accountability: Fairness, transparency, accountability and evidence-based management shall be emphasized in all stages of waste management.

The main objectives of the policy are to:

a) strengthen the legal and institutional framework for effective urban solid waste management;
b) develop and implement appropriate and effective interventions for urban solid waste management;
c) develop and implement an integrated solid waste management system based on the Solid waste management hierarchy;
d) establish and operationalize appropriate financing mechanisms to support solid waste management and;
e) increase public education and awareness on solid waste management.

In order to strengthen legal and institutional frameworks for effective solid waste management, NUSWMP envisages the need to harmonize the existing policies and legal provisions. For example, Uganda has also adopted Waste-to-Resource Policy to guide departure from the current ‘collect and dump system’ to a more sustainable waste (resource) management system. Based on this approach, turning waste into a resource is an essential part of increasing resource efficiency and ‘closing the loop’ in support of a circular economy. Specific interventions include promoting waste sorting at the source and reduce activities associated with landfilling of solid wastes. These interventions
are consistent with strategies set under NUSWMP; they encourage practices that promote social-economic transformations and environmental sustainability.

### 2.3 An Example Of Decentralized Materials Recovery

An important recent example in approaching plastic waste engaging all stakeholders, which is commercially viable, has been introduced by Plastic Recycling Industries (PRI), the largest plastics recycling company in Uganda. This was structured as a partnership between PRI, KCCA and members of civil society, organized as a CBO. The goal of the partnership is to establish 10 plastic waste collection centers in different zones of the city by the end of 2018.

KCCA provides the land on which the centers are constructed. PRI has committed 175 million/= ($49,000) in total construction costs for all ten centers. PRI also serves as a reliable market for all collected plastics and has pledged to buy materials at market prices. The CBO is made up of community members, mostly women and youth, and it is responsible for operating the collection centers i.e. collecting, cleaning and packing plastics and finally selling them to PRI.

These centers are aimed at increasing collection and recycling of plastics at a local, decentralized level, and is already showing positive results in the two centres in operation. Rubaga, which has been in operation for only 6 months now supplies PRI with 10 tons of plastics per month, and Makindye, which has only been in operation for 4 months is currently supplying 3 tons of plastics per month. The Rubaga CBO, at its current capacity (which is expected to improve), is on track to make 60 million/= ($17,000) in 12-month revenue.

As the CBOs improve their capacity and efficiency, their revenue is expected to increase significantly. Rubaga is eventually expected to supply 4-6 tons of plastic per week, which translates to 120 million/=.
($33,000) in annual revenue. The positive performance of these collection centers is highly encouraging given that currently, PRI’s largest suppliers deliver no more than 8 tons of plastic per month. This success, though too early to gauge full results, serves as an example to demonstrate the possibilities that lie in working with large corporates to create value through corporate social responsibility (CSR) projects that benefit both the corporation and all stakeholders in the waste system.

### 3.1 Barriers

Shifting from the current system to a waste-to-resource approach must overcome key barriers. Through the reports undertaken by GGGI the following factors were identified:

**Socio-economic conditions & realities**: The per capita income of Kampala is less than 1,000 USD\(^7\). This implies that disposable income is relatively low. Spending that falls outside of basic needs (i.e. food, security, clothing and shelter) becomes difficult to justify or sustain. It would be difficult to turn around the SWM system on the current cost structure, without increasing collection fees which is related to income growth, willingness to pay and a very narrow affordability band.

**The institutional focus on solid waste management remains largely traditional and requires a significant shift in approach**: solid waste is seen as a nuisance to be collected and disposed of. The dominant path for solid waste remains landfilling, with the main activities being collection, transportation and disposal. Further, there is very little investment in education, value addition (e.g. separation at source) and waste minimization programs to support and sustain behavioral change over the time needed.

**Financial Returns**: Solid waste management provides commercial returns, but these are largely concentrated among private waste collectors and larger companies engaged in recycling. At the lower levels of the value chain, the recycling sector is largely dominated by informal sector operators where efforts and investments are scattered. There is a total absence of financial incentives for households to change behaviors.

**Markets for Recyclables**: Commercial opportunities have tended towards export to China (in the case of plastic), or Kenya for cardboard. As a result, there has been limited connectivity across domestic value chains. This indicates some lost opportunities for job creation, business development and and wealth creation for Uganda.

**Existing policy fragmentation**: Solid waste management, as a sector, is influenced by the prevailing political environment and legal issues. Though the NUSWMP offers a more holistic and comprehensive approach to waste management, existing policies and regulations work against coordination and waste-to-resource approaches.

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\(^7\) Accessed from https://tradingeconimic.com
Annex A: Materials Recovery: Value Chain Analysis for Kampala

A1 Functional Components

Figure 1.1 shows a schematic presentation of the existing solid waste management system in Kampala. As shown, only about 10% is diverted from controlled and uncontrolled disposal. The materials mainly recycled are ferrous and non-ferrous metals, cardboards, paper, polythene bags, plastics and PET bottles.

Figure 1.1: Schematic presentation of the existing solid waste management system

A1.1 Ferrous and non-ferrous metals

Metal is the most valorized material in the waste stream. High demand for scrap metals is consistent with the growth of global scrap metal recycling. As a result, prices are attractive for various actors, including waste pickers at the street or landfill. The three most recycled materials in Uganda are steel, aluminum and copper, with steel the most established. Metals and non-metals such as copper, brass and aluminum do not accumulate at disposal sites, often collected by neighborhood scrap dealers, and therefore do not present a disposal challenge. Indeed, the rapid growth of the construction industry has increased demand for steel which has resulted in fierce competition for scrap metal and price has increased by 78% from 510,000/= ($142) per ton in 2010 to 907,000/= ($252) in 2017.

There are over 2,000 workers (also known as “Jua Kali”) in the informal foundry markets. These Jua Kali buy raw materials from local scrap dealers and fabricate a

8 Personal communication with Waste Pickers at Kiteezi landfill site, Dec 2017.
wide range of metallic goods ranging from saucepans, weighing scales, machinery, to motor spare parts. They work in large semi-permanent hubs across the city in suburbs such as Katwe, Kalerwe, Ndeeba, Nakulabye, Kivulu, Kagugube, Katanga and Mengo. Kisenyi alone has over 500 artisans working in highly unsafe conditions. With no protective gear, injuries are common during the metal smelting process. Smelting is conducted under very unhealthy conditions. This is especially the case with air pollution arising from kilns. As most work is manual, recycling areas are also noisy. There is need to improve on this aspect by training foundry workers on occupational health and safety.

Aluminum is second to steel in amount of recycling in the market. Its segregation and recycling are identical to that of steel described above, with the same dealers and process. Recycling is done by both formal and informal sectors to make new products. There are about 20-30 aluminum metal recyclers in the formal sector of Uganda and over 2,000 foundry workers making goods out of Aluminum. The most common goods made of recycled aluminum are saucepans, weighing scales, doors and windows and aluminum roofing sheets.

The by-product of manufacturing (both formal and informal) such as stampings, turnings, and clippings, is called prompt scrap, and it accounts for almost half of all ferrous scrap supply, smelted to make new metal.

<table>
<thead>
<tr>
<th>Actor</th>
<th>Steel</th>
<th>Aluminum</th>
<th>Copper</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Buying Price/ kg</td>
<td>Selling Price/ kg</td>
<td>Margin</td>
</tr>
<tr>
<td>Street and landfill waste pickers</td>
<td>500</td>
<td>700</td>
<td>40%</td>
</tr>
<tr>
<td>neighborhood scrap dealers</td>
<td>700</td>
<td>1,000</td>
<td>43%</td>
</tr>
<tr>
<td>Large scrap dealers</td>
<td>1,000</td>
<td>1,000</td>
<td>0%</td>
</tr>
<tr>
<td>Exporters (1)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recyclers (2)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes
(1) Only copper is exported to Kenya
(2) Recyclers of steel (both informal and formal) sell their prompt scrap e.g. clippings

**A1.2 Paper & Cardboard**

The demand for waste office paper is high, as there is a ready market for recycled products. At present, the main recycling company for waste paper is Global Paper Products, based in Mukono, about 7kms from Kampala. At Kiteezi landfill, about 17 tons of waste paper are collected per month\(^1\), constituting around 5% of landfill waste.

Landfill waste pickers salvage any usable waste and sell it to brokers located near the landfill. Some of the landfill brokers employ waste pickers and pay them a daily wage of 7,000/= ($1.90) to collect as much paper and cardboard from the landfill as possible. The brokers sort, package, transport and sell the waste to recyclers in Kampala or export it to recyclers in Kenya.

In 2017, Kenya banned the use of plastic packaging material and this dramatically increased the demand for recycled cardboard in Kenya, which is used to make paper shopping bags that replaced plastic. As a result, brokers in Uganda are exporting cardboard to Kenya and at prices 27% higher
(FOB) than the local market.

The main weakness associated with paper recycling arises from the fact that waste is not sorted at source, resulting in contamination and lessening options for recycling. As a result, local demand is higher than existing supply for waste paper.

Opportunities associated with recycling for waste paper include setting up of decentralized waste collection centers, near to paper-intensive businesses. This could improve recovery of clean waste paper. This will also improve revenue for waste pickers with the street price for clean waste UShs 1000/ kg compared with UShs 600/ kg for dirty paper.

The main strength with cardboards is their high demand, which is associated with ban of using plastic bags in Kenya. At the moment, 15-20% of recycled cardboard is sourced from Kampala by Kenya’s waste paper recycling company, Kamongo Waste Paper Ltd. Most of the cardboard is collected at Kiteezi landfill site, from where it transported to Mukono for further baling in transit to Kenya.

The main weakness with cardboards lies with the fact that most recycling facilities are based in Nairobi. Despite the high transportation costs, the Kenyan market offers better prices compared with the Ugandan market. The other factor undermining value derived is contamination with water and food. This makes recycling difficult. The price difference with clean material is significant.

The establishment of cardboard collection centres and baling units would significantly help reduce collection, revenue and transport challenges.

<table>
<thead>
<tr>
<th></th>
<th>Buying Price / kg (UGX)</th>
<th>Selling Price / kg (UGX)</th>
<th>Gross Profit %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardboard - exports to Kenya*</td>
<td>100</td>
<td>331</td>
<td>231%</td>
</tr>
<tr>
<td>Cardboard - local market**</td>
<td>100</td>
<td>260</td>
<td>160%</td>
</tr>
<tr>
<td>Paper</td>
<td>600</td>
<td>800</td>
<td>33%</td>
</tr>
</tbody>
</table>

* On average ~4% of supply does not pass the quality control done by Kenyan buyers
** On average ~25% of supply does not pass the quality control done by local recyclers

A1.3 Plastics

There are over 30 companies registered as plastic recycling companies in Uganda. Most of these are engaged in recycling of PET, Polyethylene (both HDPE and LDPE) and Polypropylene (PP). PET is the most recycled plastic in Uganda. At present, there are several major recycling companies in Kampala: PRI, Standard Plastics, Aquilla and a Chinese recycling company, but a number of other operators. Altogether, these recyclers have been exporting a total of about 582 Metric Tons of recycled PET flake to China. At a price of $430 per metric ton, the total annual revenue of the industry is $250,000. The largest recycler of PET is PRI, an offshoot of Coca-Cola with 45% market share of PET exports operating though at only 50% capacity due to a lack of raw materials.
The main strength with PET bottles is that they are a popular choice for packaging soft drinks, juices and water. They are also used to store liquids such as motor oil, cooking oil, milk and ink. They are also cheap compared with glass.

The main weakness for PET bottles lies with the fact that it is expensive to install recycling facilities. This may explain why recovered waste PET bottles are exported to China for recycling. However, China has put an embargo on importing plastics for recycling. Reduced demand implies low prices for recovered PET waste. This may encourage stockpiling and more dumping of waste bottles. Already, some companies in Kampala which are affected by this embargo, have started looking for alternative markets in India, Pakistan and South Africa\(^9\). However, the new markets are still unstable compared with Chinese market prior to the current embargo.

There is a clear opportunity for Uganda to develop local capacities for recycling PET bottles. Some of the products that can be made include polyester fiber, which can be used for making filling material for cushions, pillows or converted to fabrics for clothing. PET recycling may also involve making of straps that may be used for parking and baling various products. Already a Kampala based company (Aquila Recycling) is focusing on this opportunity, although no facilities have yet been installed\(^6\).

The greatest threat associated with PET bottles is the fact that the more it remains a major littering material, the more it faces a ban, just like polythene bags. In Kenya for example, NEMA has threatened to ban production, sale and use of plastic bottles if manufacturers fail to install collection points by mid-2018. This presents an opportunity for installation of PET recycling facilities, not only in Kenya but also in Uganda, if such collection centers can be set up and become operational.

‘Hard plastics’ (HDPE) attract good prices once recovered from the waste stream. This may explain why hard plastics are less common in open areas and at dumpsites. Its scarcity is reflected in its price of 850/= to 1,050/= ($0.24 - $0.29) per kg Most plastic recyclers also recycle used jerrycans, plastic plates etc. used in making new products. Twenty-two per cent (22%) of PRI’s recycling material is HDPE (its second largest product). The recycled resin is sold locally to manufacturers such as Victoria Nile (for Jerrycans), Mukwano (for bottle caps), and even local plastic floor tile manufacturers.

**A1.4 Polythene Bags (Kavera)**

Kavera is the most commonly used plastic shopping bag in Uganda but in 2009, the government of Uganda, through NEMA, banned the importation, manufacture and use of polythene bag of gauge 30 microns and below, popularly known as “kavera”. The issues cited as reasons for the ban included clogging of water channels and impeding smooth water filtration and percolation into the

\(^9\) Personal communication with a recycling company CEO, Dec 2017
soil. However, NEMA has since failed to enforce the ban due to a strong lobbying from recyclers and manufacturers of Kavera.

There are currently 30+ kavera recycling plants in Uganda that have invested over $45mm in machinery and provide direct employment to 3,000 people and indirectly to 10,000+ others. The machinery used to make kavera is not fungible and therefore these plants cannot easily switch from manufacturing kavera to manufacturing other products. The recyclers buy the raw material from street pickers and landfill waste brokers and produce a total of 2,500+ tons of recycled material per year.

It is important to note that a kavera ban has been successful in neighboring countries namely Kenya and Rwanda. While it took Kenya three attempts over ten years, it finally passed a ban in 2017. In Rwanda, plastic bags have been banned since 2008. In Uganda, the manufacture of kavera is still ongoing despite the ban, albeit with much uncertainty.

The threats associated with the polythene bags sub-sector arises from the current trend of banning usage of polythene bags in the region. In case of Uganda, the NEMA ban is suspended for the period between 2016 and 2021. As pointed above, there is need for the plastic manufacturing companies in Kampala to demonstrate that environmental pollution can be controlled by diverting polythene bags from the waste stream and by making recycling more effective. Further, most of the polythene bags being sold in Kenya originate from Uganda. This implies that if Kenya tightens its ban on polythene bags, then some market (for Uganda produced polythene bags) may be lost. There is also promotion of woven materials and paper bags as preferred shopping and packaging materials. This may further shrink the market for polythene bags. The solution to these threats lies in expanding and making recycling of polythene bags more effective. The immediate intervention lies in installing more recycling facilities. Associated with this is the need for reducing recycling costs by ensuring collected polythene bags are relatively clean. This makes a further case for establishment of waste collection centers where polythene bags and other dry wastes may be sorted out and transported separately.

All prices in UGX

<table>
<thead>
<tr>
<th>Actor</th>
<th>PET (Buy)</th>
<th>PET (Sell)</th>
<th>HDPE (blow) (Buy)</th>
<th>HDPE (blow) (Sell)</th>
<th>HDPE (injection) (Buy)</th>
<th>HDPE (injection) (Sell)</th>
<th>LDPE (Buy)</th>
<th>LDPE (Sell)</th>
<th>PP (Buy)</th>
<th>PP (Sell)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Street waste pickers</td>
<td>0</td>
<td>400</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>800</td>
</tr>
<tr>
<td>Collection truck loaders</td>
<td>0</td>
<td>200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>200</td>
</tr>
<tr>
<td>Landfill waste pickers</td>
<td>0</td>
<td>300 (2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>200</td>
</tr>
<tr>
<td>Scrap dealers</td>
<td>200 (1)</td>
<td>400</td>
<td>800</td>
<td>1,050</td>
<td>800</td>
<td>850</td>
<td>500</td>
<td>500</td>
<td>300</td>
<td>800</td>
</tr>
<tr>
<td>Recycling plants (3)</td>
<td>400</td>
<td>1,548</td>
<td>1,050</td>
<td>1,800</td>
<td>850</td>
<td>1,600</td>
<td>500</td>
<td>1,200</td>
<td>800</td>
<td>n.a.</td>
</tr>
</tbody>
</table>

(1) Price of a kg of unsorted waste
(2) Average (400/= for clean bottles and 200/= for dirty bottles)
(3) Recycling plants sell resin

Given than prices are derived from byproducts of petroleum, the final price of recyclable plastic is positively correlated with the price of oil; prices today are 75% lower than they were during the oil price peak in 2011
**A1.5 Organic Waste**

Organic waste constitutes around 70% of municipal solid waste but is the least valorized. Urgent attention is required to support more effective collection, processing and value addition to organic waste.

The main weakness associated with organic wastes lies with income potential compared to the costs involved in collection, transportation and processing. This is especially the case when organic wastes are mixed with other wastes such as glass, plastics, and medical waste. In Uganda, compost and organic fertilizer prices remain low with little support, compared with the marketing of synthetic fertilizers. Due to competition from artificial fertilizers, a policy that requires blending of composts and artificial fertilizers may be required. If separation at source is made efficient, there is greater potential in animal feeds, and other uses.

At present the most valorized organic waste is “Bikuuta” (green banana/matooke peels). Small restaurants and hotels are major generators of matooke peels, especially in high population neighborhoods e.g. markets and slums. Itinerant brokers buy the waste from small restaurants and sell it to organized groups of roadside brokers. These groups sell their inventory to farmers to use as animal feed or convert it into compost or mulch to improve the quality of soil. Most of the roadside brokers do not have permanent locations and are sometimes evicted from the premises by KCCA. Other challenges include lack of storage, high costs of transportation, and lack of technology and know-how to add value to the waste.

Organic waste to energy potential requires further analysis and investments to support a more sustainable and profitable use of organic waste in Kampala, and in other cities. There are companies willing to invest waste to energy plants such as pyrolysis\(^\text{10}\). In addition, several businesses have attempted to develop competitive businesses from organic briquettes, and in so doing have utilized local organic waste. But, most businesses are localized and lack capital – though they do provide the potential to use uncollected organic waste, as well as displace coal. Incineration would unlikely be feasible option due to high moisture content of municipal solid waste generated in Kampala. The moisture content is estimated at about 70%\(^\text{11}\) and there is a low calorific value of organic waste generated in the city. A key finding of this report, is that organic waste provides important opportunities as a resource (including energy), and must be part of any comprehensive waste management approach.

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\(^\text{10}\) Personal communication with CEO at Aquila Recycling Ltd

\(^\text{11}\) Komakech et al (2017). Characterization of municipal waste in Kampala, Uganda