

# Increasing Circularity in Africa's Plastics Sector

Detailed Research Report

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# I. INTRODUCTION

Global environmental degradation resulting from human activity is one of the most urgent issues facing this generation. The challenge of managing plastic waste puts the extent of this reality into sharp focus. Plastic is a highly versatile material with many applications: it is lightweight, water-resistance and makes transportation of goods easier while providing safe access to food produces. However, plastic production has increased 200 fold between 1950- 2015 from 2 million tons to 381 million tonnes, which translates to 2/3 of the mass of the world's population.<sup>1</sup> What's more is that the majority of the world's plastic waste, approximately 86%, ends up in landfills, is incinerated or is leaked into the environment.<sup>2</sup> Plastic leakage into the ocean every year measures up to approximately 8-12 million tonnes with significant threats to marine life and many questions about the broader effects of micro-plastics in natural water sources.<sup>3</sup>

To address the contemporary global concern about plastic pollution, we need to go far beyond finding technical solutions toward climate change to envisioning new operating systems that guide scalable transformation pathways to a new future. As such, addressing the plastics challenge, requires collaborative approaches, transformative and impactful change, constructive and timely action driven by a pluriverse of public and private sector stakeholders and leaders. It is also necessary to build inclusive business models that incorporate micro, small and medium scale businesses driven by youth and women entrepreneurs.

While developed countries are the largest per capita producers of plastic waste globally, three of the top 20 marine polluters of plastics are in Africa and include Egypt, Nigeria, and South Africa.<sup>4</sup> Africa, combined with Asia represent the greatest proportion of waste leakage or in other words, waste which does not enter recycling, landfills or other controlled reuse or end-of-use processes.<sup>5</sup> The urgency of addressing these challenges collaboratively is widely recognized. World Economic Forum (WEF) launched the Global Plastic Action Partnership in 2018 to mobilize multi-stakeholder support for countries to develop national action plans in the fight against plastic waste. The Ellen MacArthur Foundation and the UN Environmental Programme likewise established the Global Commitment for a Circular Economy on Plastic, which has 500 signatories representing the private and public sector as well as civil society organizations. Such global initiatives need to combine with regional and national multi-stakeholder frameworks to address plastic waste including the EU's Circular Plastics Alliance Global Alliance.

Circular Economy approaches are specifically seen as a promising way to address the global plastics challenge due to their emphasis on the entire value chain and positioning plastics as a material with recoverable value so that it is not disposed of after a short use. According to the Ellen MacArthur Foundation, a high-profile advocate of Circular Economy approaches, if plastics were adequately valued

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<sup>1</sup> Ritchie, Hannah, and Max Roser. "Plastic pollution." Our World in Data (2018).

<sup>2</sup> MacArthur, Dame Ellen, D. Waughray, and M. R. Stuchtey. "The new plastics economy, rethinking the future of plastics." World Economic Forum. 2016.

<sup>3</sup> Boucher, Julien, and Guillaume Billard. "The challenges of measuring plastic pollution." Field Actions Science Reports. The Journal of Field Actions Special Issue 19 (2019): 68-75.

<sup>4</sup> Babayemi, Joshua O., et al. "Ensuring sustainability in plastics use in Africa: consumption, waste generation, and projections." Environmental Sciences Europe 31.1 (2019): 60.

<sup>5</sup> Ritchie, Hannah, and Max Roser. "Plastic pollution." Our World in Data (2018).

for their secondary applications and externalities, we would avoid losing significant economic value, and instead create new jobs and business opportunities. For instance, it is estimated that 80-120 billion USD is lost annually by current plastic production and waste management methods.<sup>6</sup>

What are the most impactful ways to achieve a Circular Economy for plastics in Africa? How can waste management systems be developed in the face of infrastructure and resource challenges and are there business, administrative and design models that hold particular promise? What forms of investment have the most leverage to maximize outcomes at speed and scale? What types of policy incentive are needed to support a transition to circular plastics in Africa and which stakeholder groups must be represented to assure the most efficient and broad-based implementation of a CE agenda on plastics? The focus of this paper is on identifying the most effective pathways to facilitate a Circular Economy for plastics in Africa which will benefit consumers and support the economic development of African nations.

As a rapid-fire survey, this paper reviews the state of play across three Africa countries: Nigeria, Kenya and South Africa. These countries represent distinct regions, consumer patterns and policy environment but face a common challenge to rapidly developing infrastructure, raising public awareness and fast-tracking innovation that can be deployed to address the challenges of plastic waste and facilitate the transition to a Circular Economy.

As context setting, Sections 2 and 3 define the main components of Circular Economies and how this relates to plastic waste. Based upon this, Section 4 offers an individual assessment of the three countries examined in this study. Section 5 concludes with recommendations to accelerate the Circular Economy agenda for plastics in Africa.

## II. DEFINING CIRCULAR ECONOMY

The core definition of a Circular Economy is the transition towards "closed loop" economic activity, whereby waste is eliminated or diverted to other types of economic activity, which also serves to minimize pollution. A Circular Economy is distinct from dominant "linear" models of economic activity which are based upon "take-make-dispose" and are widely recognized as unsustainable.

In addition to being a sustainable alternative, it is argued that Circular Economies have the potential to add up to 4.5 trillion USD in benefits to the global economy over the next decade from savings due to resources efficiency gain, hence de-risking and, minimizing externalities.<sup>7</sup> It is estimated that 100 billion tons of virgin materials are extracted annually. As of now, only about 9%<sup>8</sup> of the economy is operating according to circular principles, which suggests significant value remains on the table as well as work to be done to facilitate the transition.

Broadly speaking, Circular Economy agendas are set from the top-down, with the European Union, especially Northern European countries and China driving policy and business action. Regardless, coordination between public and private sector has produced a convincing case that Circular Economy

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<sup>6</sup> MacArthur, Dame Ellen, D. Waughray, and M. R. Stuchtey. "The new plastics economy, rethinking the future of plastics." World Economic Forum. 2016.

<sup>7</sup> World Economic Forum. "Towards the circular economy." (2013).

<sup>8</sup> Ibid.

business models can be both commercially attractive and attainable. Some notable examples include Protix, a Dutch company which upcycles food waste into pet food, Circos a subscription model for baby clothing and Mr. Green Africa, a Kenya-based producer of recycling pellets.

There are four key components to a Circular Economy approach, which are inter-dependents. These are:

### **Design and Process Engineering**

Designing waste out of products and services. This can be a reduction or redesign of packaging with different materials so they can be more easily recycled, reused or decomposed, improvements in production processes so they eliminate waste, such as reshaping machine cutting and stronger integration of steps in the value chain or parallel industries to channel waste to value-adding activities. Existing examples of circular design include clothing produced from recycled fibres, furnishings produced from tetrapaks, water-less dyes for clothing and bio-degradable beer bottles.

### **Business Models**

Circular Economy Business models are commonly referred to in relation to the "ReSOLVE" Framework. The Framework refers to Regenerate, Share, Optimize, Loop, Virtualize, and Exchange.

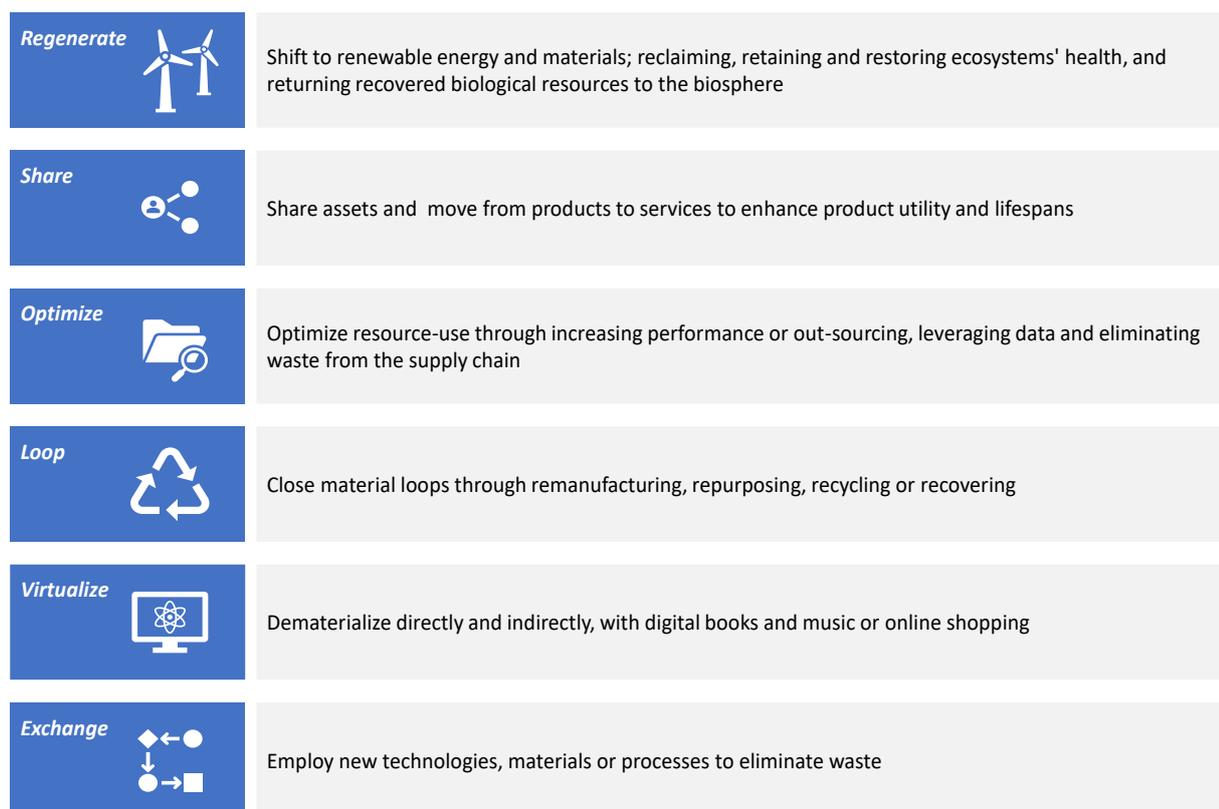
It is likely that for any single organization aiming to achieve fully circular operations they would need to implement more than one of the business models represented in the ReSOLVE Framework. A powerful example of a this is Schneider Electric, a multinational whose circular activities include energy management, industrial automation and renewable electricity and account for 12% of its revenues.<sup>9</sup>

The attractiveness of the ReSOLVE framework is that it captures business models which are grounded in commercial success stories and in common sense approaches to managing costs. However, some areas like recycling are riskier and require high capital investments, which underscores that there is no one-size-fits-all approach to meet the dual objectives of environmental stewardship and economic development.

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<sup>9</sup> World Economic Forum. These 11 companies are leading the way to a circular Economy. 2019

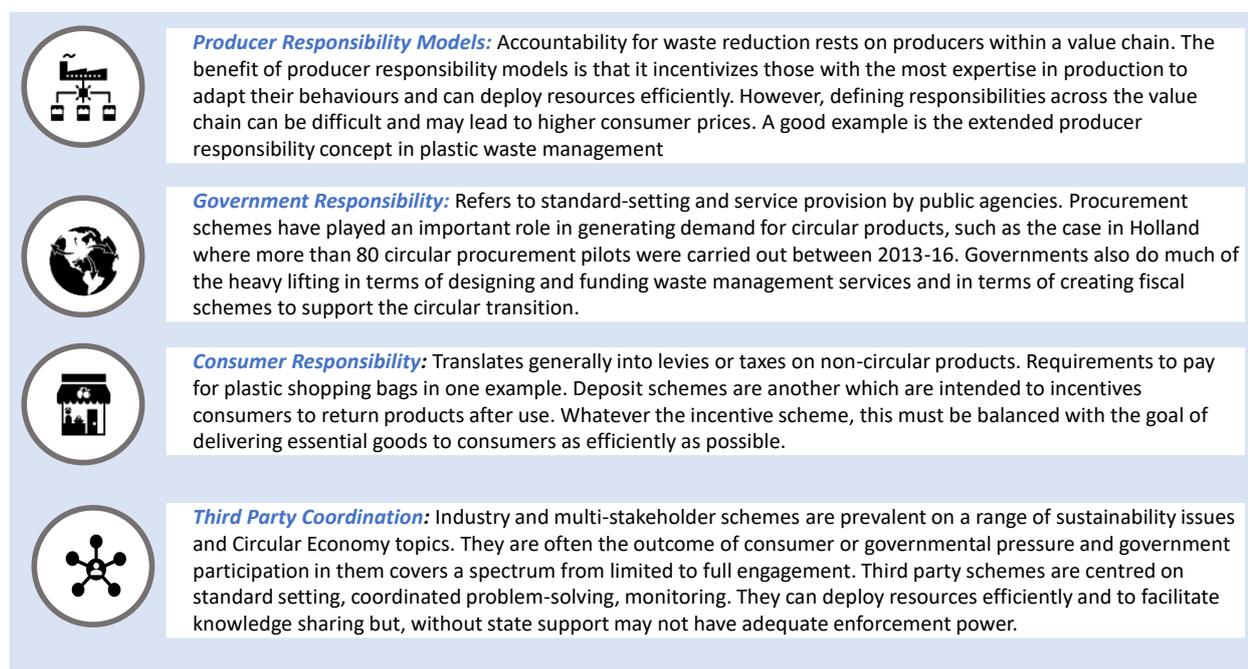
Figure 1: The ReSOLVE Framework



## Policy and Governance

Policy and governance are keys aspects of the Circular Economy agenda. At the national and multilateral levels, well-designed policies can create the right incentives for producers and consumers to limit waste generation and facilitate trade of recyclable and reusable materials. At both the multi-lateral and multi-stakeholder level, coordination furthermore improves standard setting, knowledge sharing and dissemination of best practices to accelerate the transition towards Circular Economies. From a resource and waste management point of view, there are four responsibility models in the policy toolkit.

Figure 2: Policy and Governance Toolkit



As with all other aspects of the Circular Economy, no single policy model can be expected to act as a silver bullet, and successful policy design is a matter of working across all domains.

## Financing the Circular Economy Transition

A global transition to a Circular Economy claims to offer significant long term economic benefits, which is why the Circular Economy proposition is so attractive. However, many Circular Economy models require drastic shifts in mainstream production and consumption model and depend upon capital intensive physical and digital infrastructure to function efficiently. Sharing platforms for example are most successful when supported by well-designed managed IT systems, with active participation from consumers and other organizations on the value chain.

Many technologies which underpin purist views of circularity are furthermore at early stages of development and are not ready to scale, particularly in price-sensitive consumer segments. In this respect, while there is a great deal of interest from institutional investors in circular solutions, the supply of investment opportunities that meet the size and risk profile of their mandates at this stage is relatively limited.

In short, there is, considerable investment required to accelerate the transition towards Circular Economy and a respective share of risks. Public funding, earmarked through taxes and levies, combined with public and private venture capital and credit arrangements are the most direct ways to fund Circular Economy business and policy initiatives. However, growing interest in blended finance gives access to a broader investor mix and enables flexibility in terms of scaling investment and distributing risk.

### III. MAIN COMPONENTS OF A CIRCULAR ECONOMY FOR PLASTICS

#### Design and Process Engineering

Currently, much of the innovation around waste reduction and recovery of plastics is centered on downstream aspects of collection and recycling. Product codes embedded into packaging for example increase the efficacy of sorting and recycling.

With the advent of a new Circular Economy Action Plan published by the European Union earlier this year, there is increasing emphasis to shift the attention towards material design so that plastic products can be reused, regenerated or more easily recycled.

For the consumption sector, particularly food packaging, which accounts for most plastic waste produced<sup>10</sup>, developing both upstream and downstream solutions can be challenging. Currently, recycled PET is the only plastic material which has a recognized standard for food grade recycling, although substantial efforts are being made to recycle the components of flexible plastics into food grade products. In collaboration with the industry-based Sustainable Packaging Coalition, DOW chemicals for example has created recyclable flexible barrier pouches and packaging for products like granola and nuts.<sup>11</sup> However, legislative frameworks for food grade recycled products are quite stringent and significant research is required to assure that recycled packaging is safe to consumers.

To accelerate the diffusion of recycled packaging standards, organizations such as the Global Alliance to End Plastic Waste and the OECD environmental and policy committees advocate for harmonized standards, which would lower costs for regulatory approvals, improve consistency of product design and thus lead to improved recycling rates globally.<sup>12</sup>

Another emerging area of development is in the realm of biomaterials. Here, a range of exciting new types of packaging and building materials are being developed to use organic and highly de-compostable materials that can be linked to composting services. Biopak, which operates across 2000 postcodes in Australia and New Zealand is one example of this. Coca-Cola offers another example with its PlantBottle, which is a composite of sugarcane, other plant-based material and PET. The technology has been made freely available to competitors to improve joint coordination on reducing CO2 emissions from materials production. Another recent breakthrough is the paper bottle, developed by Paper Bottle Company (Paboco), which has been embraced by leading beverage companies.

#### Business Models

The four business models which are most relevant to the plastics sector are: 1) Regenerate, which is based on the development of biodegradable alternatives to plastics; 2) Optimize or reduce the number

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<sup>10</sup> Plastics Europe. Plastics- the Facts 2018. An Analysis of European plastic production, demand and waste data. 2018.

<sup>11</sup> Recycling Today. Dow introduces recyclable flexible plastic packaging. 2016.

<sup>12</sup> European Commission. Leading the way to a global circular economy: state of play and outlook. 2020

of fossil-based materials used in plastic production 3) Loop, where recycling dominates and 4) Exchange, which is predominantly focused on reuse models for plastic-based products.

Some bio-based alternatives to plastics are well developed, such as bio-degradable packaging for shopping bags (brown paper bags) and non-food packaging. While market penetration of these alternatives is increasing, their share of the global market is relatively small as those types of substitutes are more costly and must also be integrated into well-coordinated collection systems.<sup>13</sup>

Other types of bio-alternatives are also being developed which can deteriorate after use. Organic films which cover fruits and vegetables are one example, however the costs of these materials remain too high to deploy at large scales.

Optimizing relates to efforts at reducing the weight of plastic packaging. Most major FMCG companies have invested in reducing the weight of their packaged products as this helps to reduce the carbon footprint associated with production and transportation. However, this can lead to a reduction in the quality hence value of materials collected for recycling, which can be problematic for privately organized collection schemes.

The most "circular" types of recycling involved are those which keep plastic products within the same value chain. In the FMCG sector, the concept of bottle-to-bottle recycling is well established, with countries such as Norway achieving 97% recycling rates with the support of accessible deposit-return schemes.<sup>14</sup> Package-to-package recycling is less feasible for other types of plastic materials, where the composites are more complex and standards for food safety have not yet been regulated. Furthermore, the quality and value of plastic polymers reduces the more plastic is recycled. Under these circumstances collected materials may be converted into other types of materials such as fibres for furnishings or into fuel. These types of solutions are considered less "circular" because recycled products enter new supply chains which break chains of oversight and accountability and often result to lower economic value

Exchange models also exist for plastic products and subscription services for ice cream, as well as other home products, have been successfully trialled by Loop, a circular economy shopping platform established by TerraCycle, a US-based recycling business.<sup>15</sup>

## Policy and Governance

Plastics' policy landscape is very active, with governments, businesses, and civil society organizations mobilizing at every level.

From an industry responsibility perspective, Extended Producer Responsibility programmes, having existed since the 1970s, are on the uptick and there are about 400 EPR systems in operation globally.<sup>16</sup> The intent of an EPR programme is for producers to take responsibility for collecting end-of-life products

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<sup>13</sup> van Crevel, Rubie. Bio-based food packaging in Sustainable Development. Food and Agricultural Organization of the United Nations. 2016.

<sup>14</sup> Tiseo, Ian. PET plastic bottle recycling rates in select countries 2018. Statista. 2020

<sup>15</sup> Ellen MacArthur Foundation. Reuse: Rethinking Packaging. 2019.

<sup>16</sup> Barkley, Peter. Extended Producer Responsibility: Guidance for efficient Waste Management. Organization of Economic Cooperation and Development. 2016.

and for sorting them before their final treatment, which is ideally recycling. There are multiple ways of implementing EPR programmes and the programmes themselves may be statutory or voluntary. A common approach to implementing an EPR programme is through the creation of Producer Responsibility Organizations (PROs), which producers fund to operate collection and recycling schemes.

The European Union has been most active in setting a regulatory framework for plastics. In 2018, the Commission adopted the European Strategy for Plastics in a Circular Economy, which outlined the need for improvements in design standards, related to packaging colours and composites to improve the efficiency of plastic recycling. The Commission has also targeted single-use plastics in a bid to eliminate marine litter.<sup>17</sup>

Bans on single-use plastics, such as straws and shopping bags are more widespread. In March 2019, 170 countries pledged to "significantly reduce" the use of plastics by 2030 at the UN Environment Assembly in Nairobi.<sup>18</sup> In addition to the European Union, Canada, Kenya, Zimbabwe, the United Kingdom, China, India, New York and California have all introduced bans or stricter controls on food packaging, setting the expectation that single-use plastics will be phased-out more globally.

Case examples of governments' procurement schemes focused on plastic reduction are harder to find, however they can be as simple as adding conditions to use only reusable or bio-degradable products in catering contracts. Plastic import bans are more controversial. After serving as the collector for half of the world's recyclable waste for a quarter of a century, China banned imported waste materials in 2018, leaving many countries with large waste surpluses.<sup>19</sup> Because most waste reaching China's shores was likely to be landfilled or incinerated, the consequences of this move are seen as positive by environmentalists forcing waste producing countries to improve domestic recycling schemes. In a pure Circular Economy, there would be no need to import or export waste as all products would remain in a localized value chain. Most countries are nevertheless a long way from that vision and smaller countries in particular may not have enough volumes to warrant investment in domestic recycling facilities, making them dependent on cross-border trade.

From a consumer responsibility standpoint, the use of deposit schemes is less prevalent for plastics than it is for glass, but it can be quite successful when coupled with accessible ways to return materials, as it is the case in Norway. In most OECD countries, waste separation processes are also regulated and in countries like Germany and Japan, well- indicated and serviced waste separation points combined with high rates of civilian obedience enable high rates of compliance to these regimes.<sup>20</sup>

Several multi-stakeholder programmes are governing plastic production and consumption. Key among these is the Global Plastic Action Partnership established in 2018 and driven by the World Economic Forum, the Global Commitment for a Circular Economy on Plastic, championed by the Ellen MacArthur Foundation and the United Nations Environmental Programme, the Plastics 2030 Voluntary

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<sup>17</sup> European Commission. EU Strategy for Plastics in the Circular Economy. 2016.

<sup>18</sup> UN resolution pledges to plastic reduction by 2030. BBC News. 15 Mar 2019.

<sup>19</sup> Katz, Cheryl. Piling Up: How China's Ban on Importing Waste Has Stalled Global Recycling. Yale Environment 360. March 7, 2019.

<sup>20</sup> Premakumara, D. G. J., Miwa Abe, and Toshizo Maeda. "Reducing municipal waste through promoting integrated sustainable waste management (ISWM) practices in Surabaya city, Indonesia." WIT Transactions on Ecology and the Environment 144 (2011): 457-468.

Commitment, driven by the European Commission, industry-based initiatives, Alliance to End Plastic Waste and Sustainable Packaging Coalition. While state and non-state organizations play prominent roles in each programme (standard-setting, monitoring, and programmatic behaviour change), all multi-stakeholder initiatives carry the transnational organizations' hallmarks for global problem solving and increasing coordination across different organizations in the value chain and diverse stakeholder groups.

Another form of coordination is through the development of Eco-Industrial Parks and urban development initiatives, which can facilitate new product development and resource sharing across symbiotic industries. Eco-Industrial Park frameworks are designed around the principle of improving resource efficiency and reducing emissions, reduction but the same principles could be applied to areas such as integrated urban development<sup>21</sup>, where recycled plastic materials serve as building materials.<sup>22</sup>

## Financing

The main sources of financing to support the plastics sector towards a circular transition stem from Extended Producer Responsibility programmes, which are often the catalyst for investment in Producer Responsibility Organizations to undertake collection and recycling activities. At the European level, the same principles are being evaluated to stimulate financing for innovation in new material technologies.<sup>23</sup> Taxation and public procurement regimes also play a role in financing with regard to influencing market behaviour and channeling funds towards circular products and processes. Public funding bodies are also playing an essential role in providing capital for infrastructure and development. The European Union recently set up the Circular Economy Finance Support Platform to facilitate access to finance on circular economy projects; and multilateral fiancé institutions such as the IFC have supported larger scale projects such as USD 39 million financing to Engee for the development of a PET resin plant in Nigeria.<sup>24</sup>

Outside of the realm of regulated or public facilities, private financing for Circular Economy is still fairly limited. There are no specific funds focused on plastics specifically, but rather a handful of thematic funds for the Circular Economy. These include venture capital, private equity and debt financing, with the main financing instruments originating from green finance, such as green bonds.<sup>25,26</sup>

Given the scale of the necessary transition, the appropriate mix of public incentives and investments to stimulate institutional demand is necessary to deploy greater investment opportunities. Institutional demand for all types of sustainable products is at a record-high, and organizations such as the Blended Finance Taskforce may play a facilitative role in setting up larger financing mechanisms when scalable solutions have been identified.

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<sup>21</sup> Hong, Hongru and Gasparatos, Alexandros. Eco-Industrial Parks in China: Key institutional aspects, sustainability impacts and implementation challenges. *Journal of Cleaner Production*. 2020.

<sup>22</sup> Allam, Zaira and Jones David. Towards a Circular Economy: A Case Study of Waste Conversion into Housing Units in Cotonou, Benin". *Urban Science*. 2018

<sup>23</sup> European Commission. A European Strategy for Plastics in a Circular Economy. 2018.

<sup>24</sup> NS Packaging. IFC approves \$39m financing for Engee's PET resin plant in Nigeria. September 2, 2020.

<sup>25</sup> United Nations Environmental Programme. Financing Circularity: Demystifying Finance for Circular Economies 2020.

<sup>26</sup> Ellen MacArthur Foundation. "Financing the Circular Economy: Capturing the Opportunity". 2020.

## IV. TOWARDS A CIRCULAR ECONOMY FOR PLASTICS IN AFRICA

The Circular Economy Agenda for Plastics is rapidly becoming salient across several African markets. Several governments, including those of Nigeria and Ghana, have developed national programmes on plastic waste management. Multinational companies operating in Nigeria are also under pressure due to their global and regulatory commitments to eliminate plastic waste in all of their markets. While the plastics problem is an existential one across Africa as with the rest of the world, the institutional and market contexts differ considerably from Europe, China and Canada, where the majority of Circular Economy-oriented policies have been formulated and implemented. What particularly stands out, is the critical role of the informal sector in waste collection and recycling activities, the prevalence of plastic packaging in providing essential goods, high price sensitivity to alternative packaging materials, and low rates of national waste collection. With this in mind, what are the most impactful ways to achieve a Circular Economy for plastics in Africa?

We have undertaken a rapid-fire assessment of three key African markets: Nigeria, Kenya and South Africa; interviewing policy experts, industry bodies, corporations and eco-entrepreneurs to identify the highest impact activities that also serve the priorities of African governments to deliver economic development and improve consumers access to essential goods. We use this section to describe the state-of-play across the three countries and assess the potential for circular opportunities in our study.

### Nigeria

#### Production and Consumption of Plastic

Nigeria is often referred to as the powerhouse of Africa. With a current population estimated at around 200 million and growing, the country is expected to become among one of the top five most populous countries in the world by 2100<sup>27</sup>. Its young population and abundant natural resources has earned Nigeria a position in the "MINT" acronym coined by Goldman Sachs economist Jim O'Neill, which refers to emerging economies that have the potential to drive international growth.<sup>28</sup>

#### Challenges of Managing Plastic Waste in Nigeria

The challenges of harnessing growth opportunities in Nigeria are well documented. In the realm of plastic production and consumption, the market in Nigeria faces some obstacles that exist across multiple sectors: there is a heavy reliance on imported plastic materials and goods, which destabilizes consumer prices, coupled with and poor energy and transport infrastructure which increase production and logistics costs. To some extent, weak infrastructure also increases Nigeria's dependence upon plastics,

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<sup>27</sup> Ghosh, Imam, "The most populous Countries in 2100". Visual Capitalist. Published by World Economic Forum September 8 2020.

<sup>28</sup> Durotoye, Adeolu. "The MINT countries as emerging economic power bloc: Prospects and challenges." *Developing Country Studies* 4.5 (2014): 1-9.

the lack of a nationwide sanitation and drinking water system, makes water sachets the primary source of clean water.<sup>29</sup>

Efforts to manage plastic waste more specifically face obstacles from initial product disposal. Nigeria produces an estimated 2.5 million tons of plastic waste per year.<sup>30</sup> Facilities to manage waste separation at the source are not widely available at the household level, although by some estimates, the greatest proportion of plastic waste is generated from household consumption in the form of water sachets, food packaging and other types of consumable products.<sup>31</sup>

A limited volume of waste is disposed of through institutional channels. The figures for Lagos State are estimated at 54% collection rate, which is hampered by issues such as traffic congestion.<sup>32</sup> Unregulated disposal has led to an estimated leakage of two hundred thousand metric tons of plastic from Nigeria to the Atlantic Ocean every year.<sup>33</sup> Open burning of plastic has furthermore raised concerns about air quality and health, although formal estimates of the volumes incinerated are unavailable.<sup>34</sup>

On January 27, 2021, WEF announced that Nigeria had joined the Global Plastic Action Partnership, underlining the level of commitment in bringing together leading policy-makers, business leaders and civil society organizations to prevent further plastic pollution, create jobs and increase business opportunities.<sup>35</sup> Figure three below summarises the plastic cycle in Nigeria.

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<sup>29</sup> Interviews with industry association representatives, October 2020.

<sup>30</sup> Babayemi, Joshua O., et al. "Initial inventory of plastics imports in Nigeria as a basis for more sustainable management policies." *Journal of Health and Pollution* 8.18 (2018): 180601.

<sup>31</sup> National Waste Policy on Plastic Management, Federal Ministry of Environment, Jan. 2020

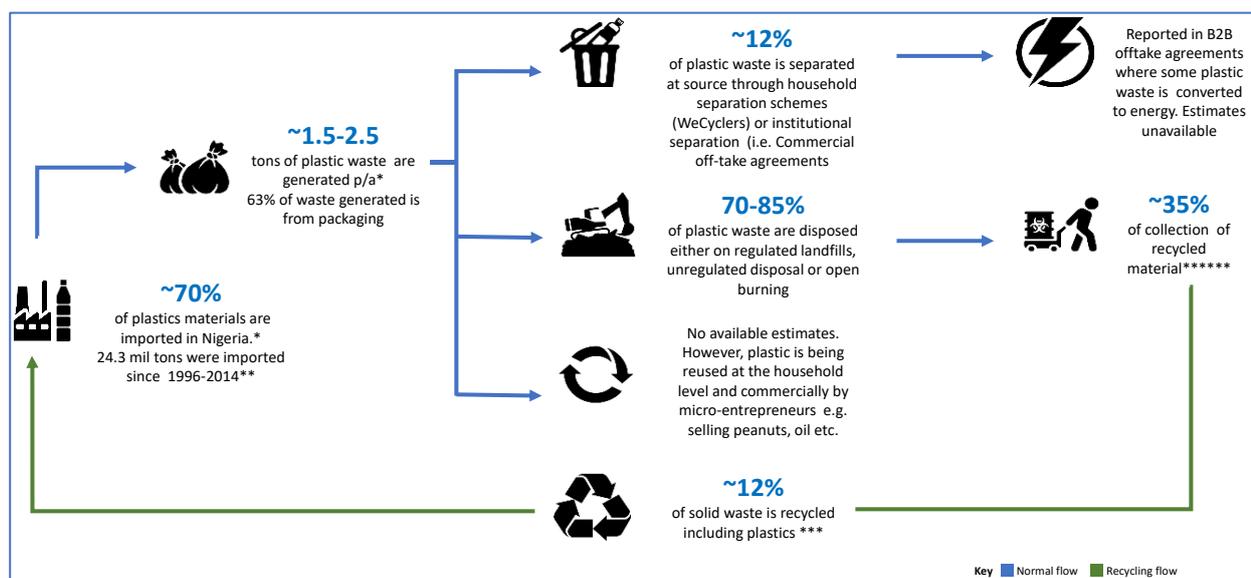
<sup>32</sup> Ministry of Foreign Affairs, Kingdom of the Netherlands. Scoping Mission Waste and Circular Economy to Lagos, Nigeria. Commissioned by the Netherlands Enterprise Agency. March 2020.

<sup>33</sup> Lacriarde, Michelle. "Beating Plastic pollution – a view from Nigeria". United Kingdom Foreign Commonwealth and Development Office. March 2019.

<sup>34</sup> Akinwale, Yekeen "Plastic Wastes: The silent killer Nigerians love." International Center for Investigative Reporting. December 13, 2019.

<sup>35</sup> <https://www.weforum.org/press/2021/01/nigeria-joins-forces-with-world-economic-forum-to-fight-plastic-pollution>

Figure 3: The Plastic Cycle in Nigeria



\*National Waste Policy on Plastic Management, Federal Ministry of Environment, Jan. 2020 (estimates are as high as 2.5 million tons)  
 \*\*Babayemi, Joshua O., et al. "Initial inventory of plastics imports in Nigeria as a basis for more sustainable management policies." *Journal of Health and Pollution* 8.18 (2018): 180601  
 \*\*\* Babayemi, Joshua O., et al. "Ensuring sustainability in plastics use in Africa: consumption, waste generation, and projections." *Environmental Sciences Europe* 31.1 (2019): 60.  
 \*\*\*\* Ngounou, Boris. Ogun NIGERIA: IFC releases \$39 million for Engage Manufacturing's recycling plant in Ogun. *Afriki* 21. Sept 4 2020.  
 \*\*\*\*\* Scoping Mission Waste and Circular Economy to Lagos, Nigeria, Ministry of Foreign Affairs and Netherlands Enterprise Agency, Kingdom of the Netherlands, March 2020  
 \*\*\*\*\* Awopetu, Michael S., et al. "Municipal solid waste management and the role of waste-pickers in Nigeria." *Int J Educ Res* 2 (2014): 1-12.

## Reuse and Recycling of Plastic

When it comes to channels for reusing and recycling waste, informal waste collectors account for a significant proportion. An estimated 35% of waste is purchased by off-takers for recycling. Informal waste collection mainly takes place at open dumpsites and is extremely dangerous, both in terms of onsite working conditions and long-term occupational health hazards.<sup>36</sup> In addition to being an inefficient way to collect plastic materials, payment terms for waste collectors are unreliable, with many having to wait extended periods to receive cash payments. In most cases, collectors live in precarious circumstances, and payment delays have serious consequences on their livelihoods.<sup>37</sup>

There are efforts underway by social entrepreneurs to improve household collection rates and provide incomes to vulnerable economic groups. The two most high-profile organizations are We-cyclers and Recycle Points, which use a points-based system facilitated via mobile phones, equating to approximately 15 Naira per kilogram of plastic collected. This incentivizes households to collect plastic waste that is aggregated and sold to the major recycling off-takers. These programmes account for approximately 1,000-1,500 tons of plastic waste on an annual basis. Approximately 70% of the collected material from these initiatives are PET bottles, which claim higher values for off-takers relative to other materials.<sup>38</sup>

<sup>36</sup> Awopetu, Michael S., et al. "Municipal solid waste management and the role of waste-pickers in Nigeria." *Int J Educ Res* 2 (2014): 1-12.

<sup>37</sup> Interview with multinational FMCG company. October 2020.

<sup>38</sup> Interview with Wecyclers. November 2020.

Off-take capacity for recycling plastic materials is estimated in the tens of thousands of tons per annum. The main recycling facility in Nigeria that has capacity to treat used plastic in industrial processes is Alkem, a plastic-to-fibre recycler based in Lagos. In late 2020, Engee, a local PET manufacturer announced plans to build a recycling, or continuous polymerization facility that will feed into its PET manufacturing processes in Ogun State which will be fully operational 2022. This will double existing plastic recycling capacity in Nigeria. Engee's plans for the facility are supported through a 39 million USD financing arrangement by the International Finance Corporation (IFC).<sup>39</sup>

In addition to these large-scale recycling facilities, smaller scale recycling operations exist, for example recyclers which convert plastic waste into toys, pots and - during the Covid-19 pandemic - face-shields. Another promising form of plastic conversion is plastic to bricks, tiles and other types of building material; and there are a number of entrepreneurs such as Brickify in Nigeria that produce recycled building materials.

An additional form of off-take is through the "co-processing" of waste as with the cement company Lafarge Holcim's Geocycle business, which converts plastic and other waste into fuel in its cement kilns. Co-processing is a service available to municipalities, however in the context of plastic waste large corporates also use this service to manage their environmental footprints and meet internal waste reduction goals. Lafarge currently operates two co-processing facilities in Nigeria. In 2018, the volumes of plastic collected by the company amounted to approximately 1,800 tons per year, with plans to expand ten-fold.<sup>40</sup>

## Government Measures

Federal and regional governments in Nigeria are actively addressing the country's plastic waste challenge. In 2014 the National Environmental Standards and Enforcement Agency (NESREA) introduced a national Extended Producer Responsibility Framework which stimulated the creation of the Food and Beverage Recycling Alliance, a consortium of companies in the food and beverage sector who have a common interest to address plastic waste under the EPR Framework. In 2020, the Nigeria Circular Economy Working Group (NCEWG) was initiated as a multi-stakeholder approach, responsible for developing a Circular Economy Roadmap for the country.<sup>41</sup>

Complemented by the introduction of standards for recycling PET bottles by the Standards Organization of Nigeria in 2019, this enabled recycled PET bottles to be used as food-grade packaging. The introduction of this standard has paved the way for recycling facilities like Engee to develop a business case for operating at scale. Increasing plastic recycling to just 50%, Lagos State's 1.3million tons of plastic generated, could yield a USD 250 million return for the industry. Such potential is being fast-tracked through collaborative platforms like Food and Beverages Recycling Alliance (FBRA), Nigeria Circular Economy Working Group (NCEWG) and Circular Economy Innovation Partnership (CEIP).<sup>42</sup>

In January 2020, the Ministry of Environment introduced a comprehensive policy on plastic waste management which outlined plans to phase out single use plastic and styrofoam by December 2028

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<sup>39</sup> NS Packaging. IFC approves \$39m financing for Engee's PET resin plant in Nigeria. September 2 2020.

<sup>40</sup> Ndiso, John. "Plastic, plastic everywhere but not for African recyclers". Reuters. August 9, 2019.

<sup>41</sup> <https://revolve.media/wp-content/uploads/2021/01/REVOLVE-38-Spotlight-on-Circularity-in-Africa.pdf>;

<sup>42</sup> <https://ceipafrica.org/events/ce/>; <https://gbfng.org/gbf-partners-with-lagos-state-on-circular-economy-roundtable-webinar/>

and to enforce design standards for plastic packaging to be recyclable, reusable, biodegradable or compostable by 2030. The policy also outlines plans to increase the scope and stringency of the Extended Producer Responsibility Framework and sets out expectations for the Federal and regional governments to mobilize behaviour change through legislation and enabling greater source separation at source.

At the regional level, Lagos State has been especially active in terms of policy implementing and regional objectives setting. The Lagos State Environmental Protection Agency (LASEPA) is for example working closely with NESREA to strengthen the EPR to introduce introducing fees for manufacturers, importers and assemblers to ensure the proper disposal of waste that reaches the market.<sup>43</sup> Another important organization is the Lagos Waste Management Authority (LAWMA), which oversees waste collection services in Lagos. LAWMA has a tradition of working with private partners, or "Private Sector Participants" who carry out waste collection. These collection services are unique insofar as the payment system is privatized, with LAWMA receiving a percentage fee from assigned PSPs. As payments to PSPs are often deferred, this has negative consequences for LAWMA's budget.<sup>44</sup>

Despite budgetary constraints LAWMA has recently launch the Blue Box Recycling Initiative to promote greater segregation of waste and continues to explore opportunities to partner with the private sector in order to accelerate activities that improve waste segregation to create productive waste streams for recycling, waste-to-energy conversion and composting.<sup>45</sup>

### **Private Sector Engagement**

The role played by multinational companies which have adopted zero-waste policies is also notable. As a result of increasing international regulation and stakeholder pressure, companies such as Coca-Cola, Nestlé, Unilever, Nigerian Breweries/Heineken have all adopted ambitious commitments to reduce their resource use and address the global plastic challenge head-on. Many of these companies are also signatories to global multi-stakeholder initiatives such as the Global Alliance to End Plastic Waste and the Global Commitment for a Circular Economy on Plastic.<sup>46</sup>

At the production level, many companies have realized their zero-waste goals by setting up business-to-business off-take arrangements with recyclers and up-cyclers. However, the costs and logistics of collecting and processing distributed products, which accounts for the bulk of waste produced, is reported to be very challenging. The costs of recovering plastics in the waste stream are high because plastic bottles are often not compressed before they are transported to off-takers. In fact, transport alone accounts for at least one fifth of the costs of recycling of PET in Nigeria.<sup>47</sup> Plastic that has lower density such as food packaging carries lower collection values and often remains uncollected. The additional challenge is that recycled PET, which is currently imported, costs significantly more than virgin plastic, making it an unattractive proposition in a highly competitive and price sensitive consumer environment.<sup>48</sup>

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<sup>43</sup> Ministry of Foreign Affairs, Kingdom of the Netherlands. Scoping Mission Waste and Circular Economy to Lagos, Nigeria. Commissioned by the Netherlands Enterprise Agency. March 2020.

<sup>44</sup> Ibid.

<sup>45</sup> Ibid

<sup>46</sup> Interviews with multinational FMCG companies.

<sup>47</sup> Ibid

<sup>48</sup> Ibid

## Circular Opportunities in Nigeria

Referring back to the Circular Economy Opportunity framework outlined in Section 2, with the right combination of financing and institutional support, there are some potential businesses that could support a transition to a Circular Economy for plastics in Nigeria.

### Business Models

From the "Regenerate" standpoint, there are some opportunities to build the market for biomaterials, although for the moment these opportunities are fairly niche at the national level. As a lush tropical country, Nigeria produces many materials which could be converted into compostable alternatives. A number of entrepreneurs are developing products made out of banana leaves and other agricultural by-products to create packaging and disposable tableware. Paper is also emerging as another alternative to Styrofoam and other plastics. Regardless, as cost, durability, scalability and health and safety remain pertinent issues, these businesses have the potential to provide alternatives to food vendors and to service small events; but they cannot serve as an alternative to high consumption goods such as water sachets. Support within the National Plastic Waste Management Policy for organic alternatives could however provide these companies with some opportunities to grow their markets. This could be achieved through city and state level procurement plans in the lead up to the 2030 packaging requirements, and through technical support offered to bio-entrepreneurs to improve accessibility of their products.

The opportunities for biodegradable materials are long-term because they face the same waste stream challenges as plastics insofar as they depend upon a comprehensive and integrated collection system. The efforts of regulators and waste management authorities such as NESREA, LASEPA and LAWMA to establish these systems could build opportunities in this arena.

The Optimize model is currently problematic in the Nigerian context due to the structure of the collection system, which is effectively a market-based one where source segregation and off-take capacity is limited. Although companies are making efforts to reduce their footprint using this approach, the consequence of limited off-take is that the product value in the waste stream is lower. This has led some executives in the beverages industry consider glass the primarily viable form of "circular" packaging for consumer products.

Recycling in Nigeria is currently inefficient although there are opportunities, particularly within the framework of the National Plastic Waste Management Policy. Supporting segregation at source in ways that benefit informal waste collectors is a priority. Scaling solutions that improve segregated disposal and collection of plastic materials could be one way to do this, especially by partnering with programmes such as LAWMA's blue box initiative. For example, this could be paired with collection systems that are incentive based, using USSD or mobile apps. These services have been successfully piloted in Côte d'Ivoire through the AfricWaste programme sponsored by Veolia and a similar start-up such as InCycle are running in Nigeria. A franchise set-up of aggregators which have access to low-cost baling and/or flaking machines could also dramatically lower the costs of recycling and improve the efficiency of the supply chain. Finally, introducing formal sorting systems at landfills can also improve collection rates and working conditions for collectors, although this may be more policy than business opportunity.

There are also opportunities to deploy new technologies for cleaning up waterways that have been developed by non-profit organizations such as The Ocean Clean-Up's interceptor, a solar powered device that uses a long barrier to catch floating debris in the sea. These types of systems could be introduced in a partnership set-up with waste management authorities, although they have been introduced without success in the past.

The value of plastic collected is nevertheless linked to the capacity for off-take and current off-take capacity in Nigeria is limited, with a strong tilt towards PET. As evidenced by the IFC's role in structuring the debt of Engee's recycling operations, development banks have a key role to play in terms of financing industrial-scale recycling operations. The business case to build this capacity could lie within a policy framework that requires recycled PET in packaging, however the feasibility of doing this when PET is the only food-grade recycled product available and plastic packaging is the main way of distributing essential consumer goods would need to be considered very carefully in coordination with all affected groups.

A potential growth area could exist with regard to using plastics for building materials as Nigeria's housing needs are substantial. The potential of setting up procurement arrangements with local authorities to build municipal areas and local estates should be investigated.

Exchange models are in very early stages, but also have significant potential, especially since many products sold in rural areas are sold in very small quantities using bottom of the pyramid strategies. Successful piloting of an exchange model would need to address issues such as product integrity, safety and storage and these are not easy challenges to overcome using a low-cost model.

## **Policy and Governance**

Policy efforts to address plastic waste at the national and state levels are significant and all levels of government have identified key policy tools to reduce waste and improve collection processes. Regardless, the public sector faces substantial resource constraints to implement a comprehensive agenda. A meaningful proportion of Nigeria's plastic waste problems are furthermore the result of underlying infrastructure challenges. As such, public-private sector coordination is a priority in terms of advancing the Circular Economy Agenda for plastics in Nigeria.

Public-private sector coordination was a theme of the Lagos State Roundtable on Circular Economy hosted by the Lagos State Government in collaboration with the Circular Economy Innovation Partnership (CEIP) on December 2, 2020, where there was near-universal agreement that private sector investment was critical for accelerating the Circular Economy transition in Lagos.

One opportunity for enhancing public-private sector coordination could be through the EPR industry self-regulation. The role of FBRA for example could be further strengthened through government mandated membership and reporting requirements, and the implementation of certain elements of the EPR could be channeled through them. In doing so, not only would the administrative burden of implementation fall on the private sector, but industry-level coordination which is so critical to advancing the Circular Economy could also be improved.

An area which may require limited resources yet have a meaningful impact is in circular economy procurement. Pathways to establish practical and effective circular economy procurement systems

could be explored in partnership with development partners who have experience with these programmes, in particular Finland, Germany and the Netherlands.

## Finance

The financing needs to facilitate Nigeria's transition towards a Circular Economy for plastics are substantial. High levels of fragmentation within the value chain also mean that investment in any one component of the sector is risky if there is not adequate support elsewhere. This is particularly visible in terms of building recycling capacity, where rates of collection and off-take must urgently be addressed to facilitate greater investment in recycling infrastructure.

As it stands these types of investments are not commercially attractive and are challenging to implement. One solution that could mobilize capital and improve coordination is the Sustainable Manufacturing Innovation Lab championed by FBRA, CEIP and the China European International Business School (CEIBS). The purpose of the Sustainable Manufacturing Innovation Lab is for the largest companies in the sector to identify shared interests around innovation in the manufacturing sector and develop an entrepreneurship programme around it, with the view that programme participants would ultimately engage with larger corporates as service providers. A programme such as this would be more likely to succeed if backed by relevant public support, for example an investment requirement through the EPR.

Given the wide-ranging needs to facilitate a broader circular transition further work could also be undertaken to document and categorize investment opportunities available to enable a deeper assessment of possible funding strategies.

## South Africa

### Production and Consumption of Plastic

South Africa (SA) is one of Africa's most industrialized and diversified economies, with an estimated GDP of USD 351.4 billion in 2019 – the second-largest economy in Africa after Nigeria.<sup>49</sup> Due to COVID-19, SA's economy was predicted to contract by 16% between the first and second quarters of 2020; however, it is expected to recover in 2021 as domestic and foreign demand revive.<sup>50</sup> Moreover, SA is a large and growing consumer population with a growth rate of 1.4%. SA population could reach 67 million by 2030 and is one of Africa's largest consumer markets, besides Nigeria and Egypt.<sup>51</sup>

In terms of plastic production, SA is a prominent player in plastic production and consumption. The plastic industry contributes about 18.5% to South Africa's manufacturing industry, with a market size of approximately USD 4.59 billion.<sup>52</sup> Plastic products are mostly packaging materials which make up about 49% of total products, followed by construction materials and agricultural products. The industry has a vibrant ecosystem of nearly 1,800 enterprises employing about 60,000 South Africans. With a growth

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<sup>49</sup> World Bank,

<sup>50</sup> Department of Statistics South Africa, [Steep slump in GDP as COVID takes its toll in the economy](#), 2020

<sup>51</sup> Brookings, [Africa's consumer market potential](#), 2018

<sup>52</sup> Plastic SA, [Annual Report](#), 2019, exchange rate estimated by google 2021

rate of 3-5% in the past 10 years and a growing consumer population, the plastic industry is expected to continue expanding.

The increase in plastic consumption coupled with weak waste management has caused poor plastic waste management, leading to environmental and health concerns. South Africa's per capita consumption of plastics is about 27 kg or a total consumption of about 1.8 million tonnes of plastic materials in 2019.<sup>53</sup>

The increase in plastic waste has caused the emergence of a vibrant recycling industry in South Africa. The recycling industry contributes about 2.3% to South Africa's GDP<sup>54</sup>, created more than 7,892 formal jobs and 58,470 livelihood opportunities for South Africans.<sup>55</sup> Although SA is actively recycling and reusing plastic waste, ~56% of this plastic ends up in the environment due to several challenges facing the waste management sector.<sup>56</sup>

### Challenges of Managing Plastic Waste in South Africa

The mismanagement of plastic waste in South Africa is mainly due to inadequate collection infrastructure and separation at source schemes. According to The State of Waste report, 34% of South Africans do not have access to waste management services, while 29% of the total domestic waste generated is not formally disposed of.<sup>57</sup> This has led to unregulated waste disposal, including plastics at illegal dumping sites and street litter. Moreover, the plastic waste collected through formal channels is not separated at the source due to the lack of infrastructure. Thus, recyclable waste plastic waste ended up with organic waste and is transported to landfills. Retrieving recyclables from landfills increases recycling costs due to cross-contamination with organic waste and the intensive labor needed to sort plastics on site.

Informal waste pickers drive plastic waste recovery from landfills in South Africa, collecting 80-90% of the plastic collected for recycling.<sup>58</sup> However, the process is inefficient, given the lack of infrastructure forcing the collection and sorting to occur at landfills. Collecting at the source then remains the best feasible option. Informal pickers are a vector to help reach people's homes and directly collect waste from them, minimizing landfill overflows and environmental pollution.

Empowering informal pickers with policies and systems that enforce separation at source could increase the high-quality plastic collection rate in South Africa. Other incentives such as health benefits and gears such as bicycles could help them operate more efficiently. Several ongoing end-user collection initiatives, such as the Packa-Ching project, collect recyclables at end-user in communities without collection services.<sup>59</sup> However, there are no policies obligating consumers to separate waste at the end-user, making it challenging to collect separated plastics at source efficiently.

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<sup>53</sup> Plastic SA, [Annual Report](#), 2019

<sup>54</sup> SAPRO, [About-us](#), 2019

<sup>55</sup> SAPRO, [About-us](#), 2019

<sup>56</sup> Scielo, [South Africa Journal of Science](#), 2020

<sup>57</sup> Ibid

<sup>58</sup> UNIDO, [Helping South Africa's Waste Pickers face COVID-19 crisis and beyond](#), 2020

<sup>59</sup> Packa-Ching, [About](#), 2020

Running profitable plastic recycling companies is challenging as oil prices and recyclate volumes fluctuate often. For example, at the end of March 2020, oil prices reached a low of \$20/barrel, causing significant challenges for the plastic recycling sector globally.<sup>60</sup> Two major plants, namely Transpaco's polyolefin recycling plant, and Mpact's PET bottle-to-bottle recycling facility, closed in 2019 for such reasons. The Mpact facility reported unprofitability because of non-competitive prices for recycled plastic and other operational challenges.<sup>61</sup> As a result, recycled plastics are still expensive than virgin plastics making it difficult for consumers to purchase recycled plastics.

Covid-19 has also presented a challenge in plastics recycling by forcing single-use plastic items such as masks and gloves. Even though PET recycling was barely affected by the pandemic<sup>62</sup>, the virus has increased demand for single-use plastic items. Most of these items have managed to find their way into the country's water bodies.<sup>63</sup>

### Reuse and Recycling of Plastic

South Africa has a vibrant plastic recycling industry with several ongoing initiatives. In 2019, South Africa collected 503,600 tonnes of plastic waste for recycling, giving the country an input recycling rate of 45.7%.<sup>64</sup> The most recycled material was PE-LD and PE-LLD packaging films, followed by PET bottles, then PE-HD bottles, drums, and crates.<sup>65</sup> More likely, Plastic packaging, mainly PE bottles, make up 71% of the plastic recyclables.<sup>66</sup> Recyclers convert most of the recycled plastics to Polyester staple fibers (PSF) and food-grade rPET.<sup>67</sup>

Plastic conversion facilities in South Africa are made up of small, medium, and large size businesses. The small to medium-sized firms are mostly family-owned,<sup>68</sup> with the most outstanding facilities focusing on converting plastic waste into fuel. An example of small to medium-sized plants is the one developed by EPCM Holdings. The plants are designed to fit into a truck and reach remote locations. The goal is to provide diesel access to remote parts of Africa where the fuel can be pricey but is the only readily available energy source. The company also offers to finance projects that aim to utilize this technology.<sup>69</sup> Large facilities such as the JICA plant (funded by the Japan International Cooperation Agency) in Cape Town can convert 500kg of plastics into fuel per day; as of 2015, 70% of the energy produced was used to run the plant itself, while 30% was used to run other machinery that requires diesel.<sup>70</sup>

In off-take, informal waste pickers play a significant role in plastic waste collection and recycling. Informal pickers are estimated to be around 60,000, saving municipalities about USD 42 million each year by keeping waste away from landfills.<sup>71</sup> Approximately 504K tonnes of plastics were collected for recycling by informal pickers in 2019. However, Informal pickers are overexploited, under-equipped, and work in unsafe conditions. As a result, the collection is still low, affecting the overall recycling initiative.

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<sup>60</sup> WWF, [Plastics: Facts and Futures](#), 2020

<sup>61</sup> WWF South Africa, [Plastics: Facts and Futures](#), 2020

<sup>62</sup> Recycling International, [High hopes for PET recycling in South Africa - despite loss in capacity](#), 2020

<sup>63</sup> News24, [Opinion: Fighting Covid-19 should not result in losing the war against pollution](#), 2020

<sup>64</sup> Plastic SA, [Annual Report](#), 2019

<sup>65</sup> Plastic SA, [2018-2019 Annual report](#), 2019

<sup>66</sup> Borgen Magazine, [Plastic in South Africa: Eliminating Waste in Sustainable Ways](#), 2020

<sup>67</sup> Petco, [Plastic bottles are not trash](#), 2020

<sup>68</sup> The DTI, South African Plastic Market Status: Consumption in South Africa, pdf

<sup>69</sup> HOW WE MADE IT IN AFRICA, [Business opportunity: Convert plastic into diesel anywhere in Africa](#), 2020

<sup>70</sup> JICA, [Celebrating the birth of the new Waste to energy plant](#), 2015

<sup>71</sup> Prevent waste, [EPR toolbox](#), 2020

The government has transfer stations such as the Kraaifortune Integrated Waste Management Facility in Cape Town to facilitate collection. The station serves as an intersection point to assist with a waste collection where providers of such services reside far. The facility accepts all general waste, but the waste is usually pre-sorted by the householder before collection.<sup>72</sup> The prominent recyclers are individual companies that either turn the recycled plastic into new products or sell them to other companies. Additionally, there are several reuse forms in South Africa, mainly within households and small businesses. There are no laws or regulatory bodies responsible for enforcing reuse models.

The private sector and the government are the main financiers of plastic recycling, e.g., individual companies such as EPCM Holdings above and government grants. In 2013, the government approved roughly USD 14 million in grants into the plastic sector for the 2014 fiscal year alone. From 2012 to 2014, more than USD 32 million in grants were approved, with 3% being focused on recycling.<sup>73</sup> PETCO South Africa is also at the forefront of recycling PET plastics. The industry-driven and industry-financed firm aim to catalyze recycling activities throughout the value chain from collecting, recycling, and expanding markets for recycled plastics.

South Africa has an advanced recycling industry that contributes to its economic development and environmental sustainability. Additionally, SA has opportunities to increase recycling to enhance environmental conversation, saving 244,300 tonnes of CO<sub>2</sub> pollution.<sup>74</sup>

### **Government Measures**

Government efforts to reduce plastic pollution include redirecting plastic waste into construction materials, enforcing EPR schemes, and creating policy frameworks as a guideline for plastic waste management. The government diverted a fraction of collected plastics into construction activities. A famous example is the Shisalanga construction project that utilized melted plastic bottles to renovate roads. Given that potholes cost the government ~3.4 billion USD per year, using plastic bottles was a high-cost saving.<sup>75</sup>

South Africa has also introduced a mix of policy tools to help curb plastic waste. Since 2004, the country has imposed levies that have led to a reduction of lightweight plastic use.<sup>76</sup> The value of levies increased by more than doubled from 12 cents to 25 cents on plastics bags as of 2020. Since 2004, the government has collected USD 134 million through the levy on plastic carrier bags.<sup>77</sup> However, the levies are said to be ineffective because little has been achieved in environmental cleanups. Also, stakeholders were not consulted in the levies policy decisions, and lack of transparency in using funds collected to reduce plastic waste.

The government also uses EPR regulations to ensure corporate that utilize plastics are accountable for post-consumption waste. The current scheme focused on PET and polyolefins recycling, among others. Recently, the government published and gazetted policies that would make plastics EPR mandatory,

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<sup>72</sup> City of Cape Town, [Kraaifortune Intergrated Waste Management Facility](#), 2021

<sup>73</sup> The DTI, South African Plastic Market Status: Consumption in South Africa, pdf

<sup>74</sup> SAPRO, [About-us](#), 2019

<sup>75</sup> Borgen Magazine, [Plastic in South Africa: Eliminating Waste in Sustainable Ways](#), 2020

<sup>76</sup> Prevent waste, [EPR toolbox](#), 2020

<sup>77</sup> Business Insider SA, [You'll soon pay 13c more for every plastic bag](#), 2020

making EPR schemes more effective. Efforts to institute a new EPR scheme that is mandatory started as early as 2017.

There was an old Section 28 Notice – EPR, which was withdrawn in December 2019 and replaced by the new Section 18 Notice – EPR.<sup>78</sup> The government is also setting up working groups responsible for standards and regulatory investigations in packaging, especially multi-layered packaging. To help curb waste management during the pandemic, the government has also enacted the waste management response to the covid-19 plan alongside other health plans.

Furthermore, to emphasize the importance of collection at the end-user, the government developed a guideline. The guide aims to give all stakeholders a deep understanding of separation at source, touching upon different matters, including legal frameworks, locations, and consumer behavioral change.<sup>79</sup>

### **Private Sector Engagement**

The private sector is also active in supporting collection and recycling, redesigning products, and making commitments to use alternative ways to reduce, reuse, and recycle plastics. Organizations such as PETCO, SAPRO, Averda, and POLYCO lead the plastic collection and recycling movement. Their efforts create jobs and business opportunities. Companies such as Mpact and ALPLA are developing creative and recyclable packaging materials, while other companies such as Coca-Cola, Toyota, and Airbus have shown commitments to using biomaterials.<sup>80</sup>

Although there has been little to no information on informal women pickers, women MSMEs are an active part of plastic recycling. For example, the Masupatsela Women's Cooperative collected recyclables from 600+ places, including homes, shopping centers, and schools, and sold them to factories. Another group called the Uitenhage Recycling Mula Swop Shop project had organized over 700+ children to collect recyclables in exchange for things like toys and toiletries. These initiatives have benefited over 300 households and removed 74 tonnes of plastics from South Africa's environment.<sup>81</sup> In 2016, all-women recycling groups recycled over 1.2M plastics bottles turning them into gift boxes. Empowering these MSMEs and companies with financing and means to scale could be crucial to separation and collection at source.

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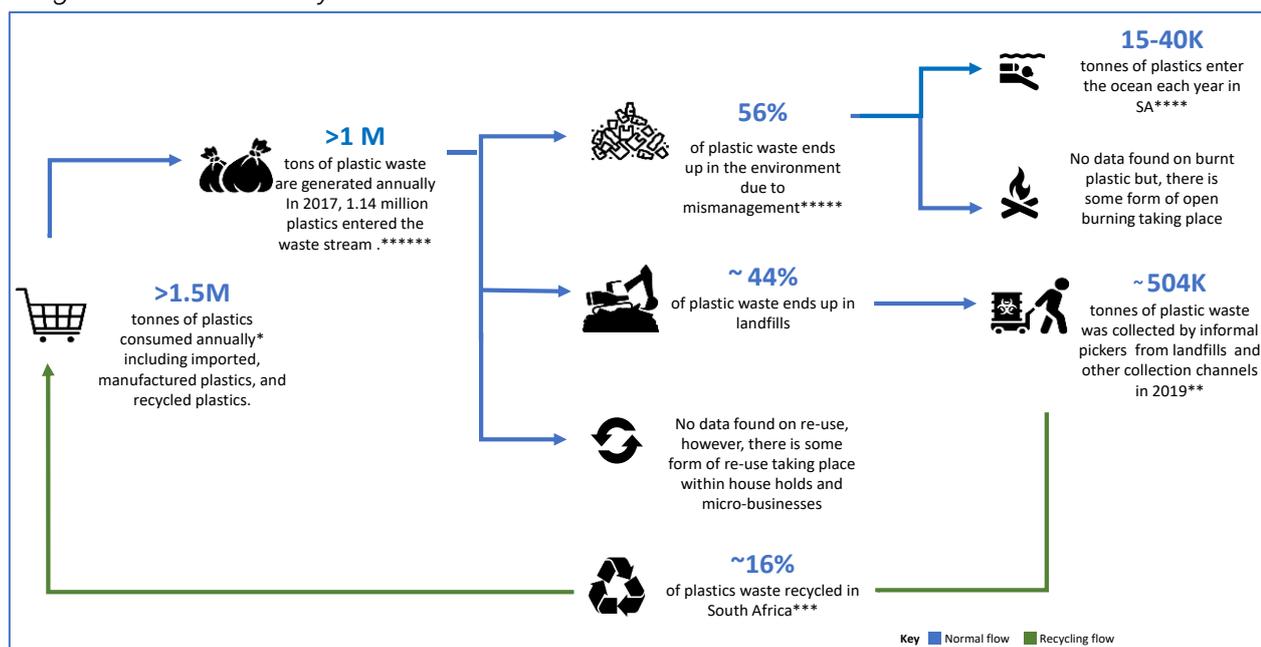
<sup>78</sup> Prevent waste, [EPR toolbox](#), 2020

<sup>79</sup> West Cape Government, [A guide to separation of waste at source](#), 2019

<sup>80</sup> The Daily Mervic, [The future of chemicals is in your dustbin](#), 2020

<sup>81</sup> Global Citizen, [5 South African women who are using plastics to drive change in their communities](#), 2018

Figure 4: The Plastic Cycle in South Africa



\*Plastics SA, 2016b, Department of Environmental Affairs PPT, \*\*SAPRO, \*\*\*WWF, \*\*\*\*South African Journal of Science, \*\*\*\*\* Department of Environmental Affairs, \*\*\*\*\*AfricImpact, ESI Africa

## Circular Opportunities in South Africa

The central circular opportunities in plastics recycling in South Africa are tied to new innovative business models, empowering collection at source through marginalized groups and businesses, and developing new alternatives, such as biodegradable plastics.

Reuse business models can curb plastic production rates as well as single-use plastics primarily. However, there are initiatives from individual companies such as Mpact that tirelessly work with consumers, businesses, and the government to increase reuse within the county, especially with packaging.<sup>82</sup> Another innovative business model comes from companies such as Pikitup, having a list of recycling buy-back centers. Pikitup also runs separation and collection at source schemes by providing containers for depositing reclaimable materials such as plastics and paper.

Mywaste is a mobile application that allows consumers to find a list of recycling centers near them.<sup>83</sup> Safer schools have introduced a new model as well, creating a guide that aids students set up recycling committees at their schools and provides information on what is possible to recycle.<sup>84</sup> Other business models include waste separation/sorting services offered by companies such as Atlantic plastic recycling<sup>85</sup> and awareness offerings provided by companies such as Rhino recycling.<sup>86</sup>

<sup>82</sup> Mpact, [Home](#), 2020

<sup>83</sup> Mywaste, [Home](#), 2020

<sup>84</sup> SaferSchools, [Collect a can](#), 2020

<sup>85</sup> Atlantic Plastic Recycling, [Home](#), 2020

<sup>86</sup> Rhino recycling, [Home](#), 2020

The most lucrative and innovative form of alternative currently being discussed in South Africa is biomaterials development. With a compounding annual growth rate of 14.6%, the biomaterials market is expected to grow from US\$95,090.52M in 2019 to US\$215,920.01M in 2025.<sup>87</sup> Initiatives to spearhead biomaterials production in South Africa began in 2009.<sup>88</sup>

Given its strong technological base and rich agricultural environment, bio-based feedstocks' development presents a unique opportunity for the country to become a biomaterial production leader. Currently, the Department of Science and Innovation (DSI) and the Council for Scientific and Industrial Research (CSIR) are leveraging skills and competencies to spearhead research into biomaterials. There is also a project dedicated to building five biorefineries, with one already in use at eThekweni.<sup>89</sup>

TIPS, UN-PAGE, and South Africa's government will collaborate to create an action plan and strategy implementation focused on furthering biomaterials' development. The Department of Trade and Industry implemented a liaison group to match consumers and producers of biomaterials. In late August 2020, PAGE with the digital Bio Africa Convention hosted a side event that identified biomaterials as a promising green trade and industrial opportunity.<sup>90</sup>

## Kenya

### Production and Consumption of Plastics

Kenya does not process petroleum to manufacture plastics; thus, most of the plastic consumed in the country imported. Kenya imports plastics in three forms. Plastic polymers enter the country as raw materials that get processed into plastic products, readily made plastics imported as products or packaging materials, and plastic waste material. Overall, Kenya consumes about 500,000 to 800,000mt annually.<sup>91</sup>

Kenya's growing economy and population will increase product and service consumption, including plastic. Kenya is currently the largest economy contributing more than 40% of its GDP, the largest East African economy.<sup>92</sup> Despite the decline in economic growth due to COVID-19, the government forecast a 6.4% growth this year.<sup>93</sup> In 2018 -2019, plastic imports were among the fast-growing import category in Kenya, growing at 7.7% and valued at about USD828.4M.<sup>94</sup> This rate is likely to increase as Kenya's population continues to grow at an annual rate of 2.3% to reach about 66.4 million by 2030.<sup>95</sup>

### Challenges of Managing Plastic Waste in Kenya

Although plastic is valuable to the economy, plastic waste management is alarming as recycling efforts remain minimal in Kenya. Large cities like Nairobi, with approximately 4.6 million people, generate

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<sup>87</sup> ReportLinker, [Global biomaterials market](#), 2020

<sup>88</sup> Siyabona Africa, [Biomaterials Africa 2009 conference](#), 2009

<sup>89</sup> The Daily Mervic, [The future of chemicals is in your dustbin](#), 2020

<sup>90</sup> PAGE, [Developing the biomaterials market in South Africa](#), 2020

<sup>91</sup> KPAP, [Accelerating a Circular Economy in Kenya](#), 2019

<sup>92</sup> Brookings, *Africa's Powerhouse*, 2014

<sup>93</sup> Reuters, *Kenya's economic growth to rebound next year, World Bank says*, 2020

<sup>94</sup> Daniel Workman, *Kenya's Top 10 Imports*, 2020

<sup>95</sup> World Population Review, [Kenya's Population](#), 2020

roughly 3,000mt of municipal solid waste. Of the waste generated in Kenya, 15% ends up in landfills or incinerated, 15% is recycled, and about 70% end up in the environment or dumped in illegal dumpsites.<sup>96</sup> Plastic makes up approximately 9-15% of the waste, mostly from packaging material.<sup>97</sup>

Inadequate plastic waste management in Kenya is characterized by in-efficient waste collection infrastructure as most collection systems are non-existing in some counties. The local government, such as the Nairobi City County Government, is mandated to collect waste. However, government services are yet to meet the growing demand for waste management in Kenya. Although the collection rate is debatable, some waste management experts estimate that collection is about 100% in high-income areas, although covering only 13% of Kenya's population. The rate is around 35-52% in low-medium income areas, making up most of Kenya's population. Overall, Kenya's total collection rate is about 25% and depends on the area's level of income.<sup>98</sup> This explains the low collection and recycling rate of plastic waste, which accounts for less than 10% of the generated plastic waste.

Due to the government's failure to collect and separate plastic waste efficiently, informal waste pickers have been at the core of plastic collection and separation. Plastic waste is usually collected as a whole-organic and recyclable are transported to landfills because there are no waste separation schemes in Kenya. This makes retrieving recyclable plastics from waste a challenging and labor-intensive task. As a result, informal waste pickers have become the main actors in plastic recovery. Informal pickers recover about 0.02 tons of plastic recyclables per day from landfills. With an estimated 6,000 waste pickers at the Dandora dumpsite, waste pickers could collect up to 42% of plastic recyclables daily.

Despite the efforts to recover plastics, waste pickers working conditions remain dangerous and cause long-term health risks. Informal pickers lack proper PPE gear to collect plastics effectively as well as protect themselves from hazardous working conditions. Due to the recyclables trade informality, there are no clear laws or policies that govern dumpsites. Although functional, the system leaves waste pickers vulnerable to low income and hazardous working conditions, despite their integral role in plastic recovery from the environment.

Low collection of plastics increases the cost of recycled plastics and makes the recycling business unprofitable. The cost of collection is mainly due to high transportation costs and the processing of contaminated plastic waste.<sup>99</sup> In Kenya, the high logistics cost is attributed to the low volume to value ratio of plastics waste and transport levies at each county border.<sup>100</sup> Additionally, informal waste collectors tend to collect only enough plastic waste to get enough income to meet their daily needs. As a result, the plastic volumes collected are not enough to conduct a profitable business in recycling.

Indeed, some recycling facilities in Kenya operate at 1/3 of their processing capacity due to low plastic volumes.<sup>101</sup> Furthermore, recycling companies incur high processing costs caused by collecting dirty and contaminated plastics from landfills or illegal dumpsites. There is a desperate need to separate plastic at the source and increase collection efficiency to run a profitable recycling business. Due to

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<sup>96</sup> LEAD Journal, [Circular Economy Measures: An Opportunity to Rethink Plastic Waste in Kenya](#), 2019

<sup>97</sup> KPAP, Kenya Plastic Action Plan, 2019

<sup>98</sup> KPAP, [Accelerating a Circular Economy in Kenya](#), 2019

<sup>99</sup> MDPI, Designing Business Solutions for Plastic Waste Management in Kenya, 2018. pdf

<sup>100</sup> KAM, [Kenya Plastic Action Plan](#), 2019

<sup>101</sup> Reuters, [Plastic everywhere but not for African recyclers](#), 2019

high recycling costs, recycled plastics sell at high prices compared to virgin plastics. Therefore, there is fierce competition between the two catalyzed by every time oil prices decline.<sup>102</sup>

### **Reuse and Recycling of Plastic**

Reusing and recycling plastic waste in Kenya is done through formal and informal channels. Formally, plastic waste recycling in Kenya is mainly done through private companies that access plastic waste from formal and informal aggregators. The waste is then sorted, washed, shredded, then processed, and fed into new production processes. Some companies like WEECO are currently working in partnership with Producer Responsibility Organizations such as PETCO to increase Kenya's recycling rates. On the other hand, MSMEs and informal recyclers have varied activities; Some upcycle plastic waste into other products such as plastic bricks and roofing materials. Some reuse plastic containers for domestic use or as packaging for informal businesses such as oil products, juice, and water.

### **Role of the Private Sector**

Business models will be crucial if Kenya is to ramp up its plastics recycling activities. As mentioned before, companies such as Mr. Green Africa are taking the lead in integrating informal workers into their value chain.<sup>103</sup> The company focuses on PET plastic recycling, offering 25+ collection centers for informal workers to deposit the collected waste. Another notable model comes from Taka Taka Solutions, which operates dominantly in Nairobi. The company sources waste directly from hotels, malls as well as national and international bodies. The waste is then separated into 45 different fractions (among them plastics) within their two sorting facilities, located in the capital. 95% of the waste they collect is either recycled by them or other recyclers and converters.<sup>104</sup>

The private sector is also instrumental in mobilizing finances and implementing recycling initiatives. Several organizations have created Producer Responsibility Organizations (PRO) in Kenya to support recycling efforts and fulfill their EPR requirements. PETCO is the PRO made up of international companies that utilize plastics (PET) such as Coca-Cola, Unilever, Almasi Beverage Limited, BIDCO Africa, etc. In 2019, PETCO committed to collect 5,900 tonnes of plastics, which is about 30% of Kenya's PET waste.<sup>105</sup> The initiative has led to several plastic recycling value chain interventions, including financing recycling companies, providing bailing machines to facilitate plastics' transportation, and providing PPE for waste pickers. However, the initiative is voluntary; hence only a few corporates are part of the effort to clean up plastic pollution, while others don't take responsibility for the plastic waste they produce.

### **Government Measures**

The government of Kenya has regulations outlining plastic waste management; however, the circularity of plastic in Kenya has a long way to go. The Third Medium Term for 2018-2022, Kenya's Green Economic Strategy, calls for separation and waste collection at the source. The strategy aims to recover 50% of recyclable waste and composting. The Green Economy Strategy and Implementation Plan

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<sup>102</sup> Dalberg interviews, 2021

<sup>103</sup> Markus Gall et al. [Building a circular plastics economy with informal waste pickers](#), 2020

<sup>104</sup> KAM, [Kenya Plastic Action Plan](#), 2019

<sup>105</sup> Reuters, [Plastic everywhere but not for African recyclers](#), 2019

(GESIP) also states implementing EPR schemes and a ban on single-use plastic bags, enacted in 2017. Although goals are set to address the plastic crisis, regulations are vague and without concrete implementation or enforcement measures.<sup>106</sup> Separation at source is still low in Kenya as there are no policies obligating consumers to separate recyclables from organic waste. Also, voluntary EPR schemes are unsuccessful in pushing the recycling agenda in Kenya.

Kenya Association of Manufacturers (KAM) has two essential strategies/plans by 2030 to help curb plastic pollution. The first is to achieve a 30% recycling rate by 2030, with a 6% growth rate from January 2020. They were followed by a shorter plan of three years to operationalize EPR in all plastics streams.<sup>107</sup> Efforts to remove plastics from the environment are ongoing; however, they are insufficient due to inadequate recycling infrastructure and recycling schemes. Kenya produces 820,000 tons of plastic packaging waste annually, recycling less than 10% of plastic collected<sup>108</sup> and dumping the rest in regulated and legal and illegal landfills, water bodies, or burning sites.<sup>109</sup>

The Nairobi City Government is responsible for waste collection; however, an informal group of collectors known as informal pickers became a powerful means of collection because of insufficient public services. Some formal collection systems are documented within counties. However, they have many irregularities, and some are non-existent.<sup>110</sup>

The Ministry of Environment and Forestry has announced moving towards a ban on PET bottles and encouraging companies to recycle PET bottles. Not having a single stance makes it challenging for stakeholders to commit since recycling infrastructure is expensive. Investing in infrastructure in the face of a potential ban is risky.<sup>111</sup> Although still minimal, the private sector is taking initiatives to clean up plastics from the environment. Therefore, creating the recycling infrastructure, such as recycling plants, requires large amounts of financing and long-term commitments. Incentives such as tax breaks must be considered to enable investors and stakeholders into the recycling space. Other incentives could take the shape of the machinery supply to construct the plants and VAT exemptions.

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<sup>106</sup> KAM, [Kenya Plastic Action Plan](#), 2019

<sup>107</sup> KAM, [Kenya Plastic Action Plan](#), 2019

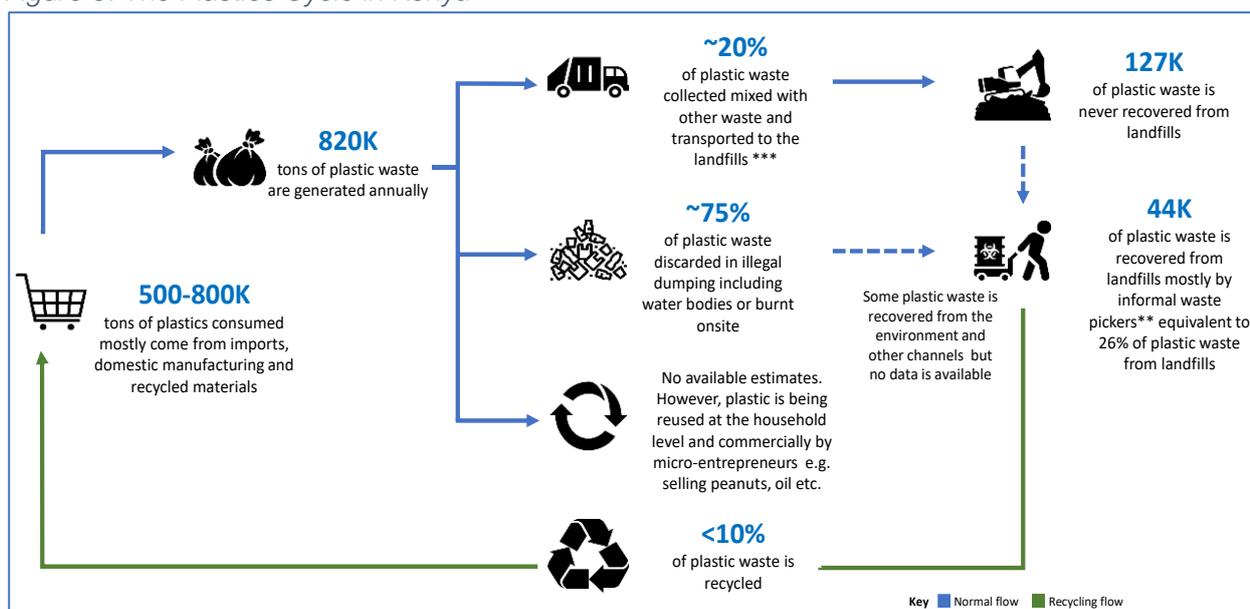
<sup>108</sup> Mass Flow Kenya, [https://eng.mst.dk/media/189822/kenya-plastic-packaging-report\\_final.pdf](https://eng.mst.dk/media/189822/kenya-plastic-packaging-report_final.pdf)

<sup>109</sup> KAM, [Kenya Plastic Action Plan](#), 2019

<sup>110</sup> KAM, [Kenya Plastic Action Plan](#), 2019

<sup>111</sup> KAM, [Kenya Plastic Action Plan](#), 2019

Figure 5: The Plastics Cycle in Kenya



\* 1.7 tonnes of waste is collected in Kenya and 9.5% is plastics equivalent to 171K tonnes of plastics. Dalberg Analysis

\*\*waste collectors recover. 0.02 tonnes/day/waste picker, there are about 6000 waste pickers who collect 120 tonnes a day thus, approximately 43,800 tonnes annually. Dalberg Analysis

\*\*\* 7 million waste is generated in Kenya, 25% is collected and 9.5% is plastics  
KAM, [Kenya Plastic Action Plan](#), 2019

## Circular Opportunities in Kenya

The main circular opportunities in plastics recycling in Kenya lay in encouraging innovative business models. In second comes ensuring regularities in policies and their incentives for private stakeholders. Lastly, empowering collection and separation at source through marginalized groups and enforcement. Business models around recycling in Kenya are still in the nascent stage as the sector is not as profitable for investors and businesses to tap into. However, several enterprises in the spaces utilize circular business models to reduce plastic waste in the environment, including upcycling plastic waste into other materials and recycling.

In terms of collection, the general businesses are usually informal aggregators who pay a small fee to informal pickers and then sell to large aggregators or directly to recyclers. Large recyclers such as WEECO Regeneration Environmental Services LTD Kenya (RES) recycle plastics into construction materials. The company is partnering with the FlipFlopi team to recycle waste plastics collected from the Kenyan coastline and turn them into different boat parts, from the keel to the planks and the deck. Others, such as Gjenge, collect and use plastic waste to create bricks.

Like in other countries, several alternatives to using plastics are emerging, including biodegradable plastic materials. In Kenya, the concept of biodegradable plastics emerged after the ban on single-use plastic bags. Packaging industries Limited, the sole producer of biodegradable plastic in Kenya, started producing bags at a price point of \$0.5 to \$1, depending on their size. The product was sold exclusively in supermarkets and adopted by all businesses as expected. Hence, a small segment of the population used these products as most Kenyan buy their needs in local markets. However, the concept is still debatable as biodegradable plastic waste will need industrial composting to convert them into biomass,

water, and carbon dioxide (or in the absence of oxygen, methane rather than CO<sub>2</sub>) to eliminate them from the environment. This means that collection and sorting infrastructure must be in place to manage the biodegradable waste successfully.

Bio-based plastic is another sub-group of alternatives to redesigning plastic products. These are plastics made from mostly plant-based polymers from bio-commodities such as corn, sugar, etc. Several companies in Kenya are already doing this, such as Novamount Kenya Limited which, created Cassava Bags. However, there are several concerns that bio-based plastics compete with the demand for food, particularly on the continent that is already vulnerable to food scarcity.

## V. PATHWAYS TOWARDS THE CIRCULAR ECONOMY FOR PLASTICS IN AFRICA

This section describes the interventions that can catalyze the most meaningful change and discuss how they can be successfully implemented, drawing attention to important lessons from countries surveyed.

### Recommendations

"Circular Economy is much more than recycling" is an observation that we have encountered consistently throughout our research. While this may be the case, our survey indicates that alternatives to existing plastics are either not yet feasible in African markets, cannot be scaled to address significant consumer waste generation, or at early stages of development in the innovation cycle.

Nevertheless, Africa could manage its plastic waste in three ways. **We could either increase the recycling of plastic waste, reduce plastic waste generation, or eliminate plastics. The latter is challenging to achieve as it is costly, and the technical feasibility to scale is challenging.** Thus, redesign plastics so that they are easy to recycle or eradicate from the environment is the best available option. Managing plastic waste cannot be done by just picking and choosing one of the options. Unlocking the plastic waste crisis will require a great deal of coordination across various stakeholder groups.

### Recycle More Plastics

To increase the recycling of plastics, we must improve plastic waste collection efficiency, invest in recycling industries, and expand markets for recycled products.

### Increase Collection of Plastic Waste

Improving collection and coordination within the waste management system remains a critical and under-funded pathway to facilitate the Circular Economic transition in Africa. Additionally, collection systems can fundamentally change the economy of a range of recycling processes, support border-based job creation, and significantly reduce plastic waste from the environment. To improve collection, stakeholders could look at several areas of interventions, including:

***Evaluation of and investment in successful schemes have led to social and economic improvements for the informal sector*** – In all countries surveyed, the informal sector plays a critical role in waste collection. Yet, they are disenfranchised groups that suffer from significant social and economic hardships. Improvements to collection models should support informal waste collectors' economic and social development and their insertion in regulated value-chains. Nonetheless, changes to collection processes, such as source separation, can make high-value waste less accessible to the informal sector. Several schemes address these types of challenges and have led to varying levels of success in improving social and economic outcomes. A systematic evaluation of these schemes combined with improved funding to grow them, most likely through private and donor agencies, will help regulate and leverage the informal sector's meaningful role.

***Improve coordination between the public-private sector to grow investment on separation and collection schemes*** – Waste management services across all countries surveyed were only partial. However, there are examples of the private sector funding or implementing waste management activities, primarily through EPR initiatives. Improved coordination, driven by public waste management authorities, could help channel resources more efficiently and improve information sharing between different types of waste management activities. Statutory requirements for industry organizations to administer local collection programmes in coordination with recyclers could be one avenue to explore.

***Investigate mechanisms to increase the value of collected materials, particularly lower-cost plastics***- In consumer packaging, waste collection for recycling is centered mainly on PET which is easier and more valuable to collect. Other types of plastic packaging, particularly flexible plastics, do not have as many recycling applications and are lighter in weight. While taxation is an obvious way to incentivize collection, essential products need to remain affordable to consumers, so alternative approaches, which combine incentives, investment in new technologies, and strengthen policy enforcement, need to be tested.

***Support digitization of payment and collection systems***- Digitization is promising for many aspects of collection and recycling. In the first instance, leveraging technology to facilitate payment and waste tracking and separation systems is a priority.

### **Invest in Recycling Industries**

Investing in recycling infrastructure and recycling facilities is significant to increase the demand for plastic waste. For this to happen, stakeholders should:

**Develop policies and explore PPP to increase investment in recycling plants:** From our research, the plastics recycling value chain is not as efficient across the continent. As a result, most companies are operating at a loss due to high costs. Although some Producer Responsibility Organizations such as PETCO have intervened to provide a cushion on the cost of recycling, more must be done to keep the companies up float until the industry is profitable. This will require governments to use market-based policies such as taxes, subsidies, and EPR schemes to provide incentives for the private sector to invest in plastic waste management infrastructure.

***Establish dynamic requirements for recycled products*** – The countries surveyed are in the process of introducing stringent requirements for packaging to meet standards of recyclability and re-usability. A

roadmap could be established in partnership with the private sector to identify the investment and capacities needed to meet these requirements and to set and adjust regulatory targets accordingly.

### Expand Markets for Recycled Products

It is impossible to recycle without a market to consume recycled products. Therefore, expanding markets for recycled goods could be an incentive to strengthen business models along the plastic recycling value chain. If the demand for recycled plastics increases, then the collection and processing of recycled plastics will likely increase. Although market readiness for recycled plastics and materials is still limited, opportunities should be monitored in partnership with waste management authorities and product innovators to increase the market acceptability of recycled products. Several steps can be explored to expand these markets.

#### **Increase corporate involvement and public procurement to expanding markets for recycled products:**

In South Africa, several industry-led organizations such as the South Africa Plastic Pact committed to using an average of 30% recycled content across all plastic packaging by 2025.<sup>112</sup> The government has also enacted a green procurement policy that will also expand the market for recycled plastics.<sup>113</sup> However, more such initiatives should be done to increase the offtake of recycled plastic products and, consequently, the demand for plastic waste.

**Develop production standards:** This will be essential in ensuring safety and consumer protection using recycled products, particularly in food and construction materials made from recycled plastics.

### Reduce Production and Consumption of Plastics

Investing in methods to reduce plastic production or replace plastic with other biodegradable alternatives forms such as paper and banana leaves will generally reduce plastic consumption and reduce plastic waste, especially in areas with inadequate waste management infrastructure.

Companies globally adopt new packaging methods that are either wholly degradable in the environment or could be easily recycled by reducing the amount of plastic used in packaging. An example of entirely biodegradable packaging is Rimping, a grocery store in Thailand that has redesigned the way it serves its clients. Instead of plastic bags or plastic packaging, the store uses banana leaves to wrap products and hold them together using bamboo.<sup>114</sup>

In reducing plastics used in packaging, Coca-Cola has taken the pioneering initiative as early as 2009 with its PlantBottle. The bottle was the world's first fully recycled PET bottle, with 30% being made from sugarcane and other plants. Since then, the company has continued striving to include recycled plastic in its PET bottle production.<sup>115</sup>

Other business models such as exchange and optimization exist outside the realm of completely degradable materials and reduction of plastic in packaging production. Pilot projects for the

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<sup>112</sup> The Plastic Pact, [The Road Map to 2025](#), 2020

<sup>113</sup> Dalberg Interviews, 2020

<sup>114</sup> Reader's Digest, [13 Brilliant Ways Other Countries Are Replacing Plastics](#), 2019

<sup>115</sup> Coca-Cola, [What is PlantBottle packaging?](#), 2009

development of exchange models are worthy of exploration in partnership with FMCG companies. Market readiness for optimized materials is still limited. However, opportunities should be monitored in partnership with waste management authorities and product innovators.

**For reduction to occur, all stakeholders, including national and local governments, FMCG companies, incubators, and research organizations (to name a few), need to get involved.** Engaging companies to shift into other forms of packaging will significantly decrease the need for virgin plastic production. Piloting exchange models for BOP consumers will reduce the amount of plastic they consume and discard into the environment. Engaging with innovators to optimize packaging will reduce the amount of plastic used in packaging, which is the leading cause of plastic pollution in the environment.

## Redesign Plastics

Although eliminating plastics is technically possible, it is economically undesirable due to its economic contribution and inadequate supply of affordable alternatives to plastic materials. In SA alone, plastics contribute up to 14.2% to the manufacturing GDP. Therefore, better designs of plastics could reduce the impact of plastic waste on the environment. Stakeholders can start to explore other technologies to develop plastics that are less harmful to the environment, such as biodegradable plastics and biomaterial-based plastics.

However, there are concerns about these options. Not all biodegradable plastics can decompose in the environment; therefore, some need to undergo industrial composting to decay. Biomaterial-based plastics could have an impact on food chains and food security. Despite these challenges, gradual transitions could be made to achieve a sustainable alternative to conventional plastics from fossil origins.

**Establish working groups to investigate the development of alternative these plastics and how to manage post-consumption:** This could take the shape of a round table with researcher, investors, and financiers to explore technical funding to support product development, the development of the collection, and composting infrastructure, as well as addressing health and safety concerns.

**Invest in research and development to explore polymers for biomaterial-based plastics that don't compete with food crops:** Investing in non-competing bio feedstock such as algae and the technology to convert food waste into bio-plastic materials could serve as an alternative to food crops. This will go hand in hand with investments in appropriate infrastructure to manage biomaterial plastic waste will be necessary to realize biomaterial-based plastics' potential.<sup>116</sup>

## Cross-Cutting Issues

### Policy and Governance

A Circular Economic transition is defined by coordinated action across multiple levels of the public and private sectors. While government support is critical for a shift towards CE for plastics, administrative action needs not to sit with public sector agencies alone. Much of the resources to facilitate the transition can be more efficiently leveraged from the private sector. Given the significant resource constraints and

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<sup>116</sup> EC. [Redesign Plastics](#). 2011

a long list of agenda items that government agencies must tackle, public policy and goal setting should create incentives for private sector participation and investment in problem-solving. The EPR regimes do not appear to have been fully exploited within the countries surveyed in this regard. Working with industry bodies to establish a well-coordinated system of enforced industry self-regulation could be one way to channel administrative and investment responsibilities to the private sector and to improve industry-based coordination.

National initiatives should be aligned with state-level and city-level initiatives. As is the case with the "Circular Lagos" initiative, governments at the state level have a meaningful role in mobilizing resources and constituents to engage in the CE agenda. In Nigeria, this complements the National Circular Economy Programme facilitated by the National Circular Economy Working Group (NCEWG). It is expected that establishing local CE hubs will improve cross-sectoral communication and investment as local organizations work together to define a shared agenda, especially when it comes to mobilizing communities to address local-level waste collection challenges.

Given that many countries are in the early stages of implementing national plastic policies, policy learning should be encouraged at the regional level. The African Circular Economy Alliance (ACEA) provides an ideal platform for policy-makers and targets constituents to share lessons and best practices on policy development and implementation. The development of a policy evaluation clearinghouse can furthermore support the development of Circular Economy policies beyond plastics.

## **Financing**

This survey has presented a wide range of programmatic interventions and potential solutions to accelerate the transition towards a Circular Economy for Plastics in Africa. Different funding instruments are available depending on the intervention type, including private-sector obligations made through EPR, development banks, and impact-oriented venture capitalists. A summary of investment schemes surveyed is included in table 1 below.

Table 1: Circular Plastics: Types of Financial scheme and investment allocation

Financial Scheme	Investment Allocation	Cases
Development Finance	Invest in projects with new designs or business models, policy development, and capacity-building	MARPLASTICCs providing funding of up to US\$50,000 for a project by Watamu Marine Association, aimed at plastic recycling and empowering community-based small businesses enterprises in Kenya
Blended Finance	Invest in large investments and infrastructure projects aimed at plastic recycling that has not yet been tested or have a commercial track record, such as regional recycling facilities across Africa	FINLOOP aims to optimize the sorting and collection of household waste and reduce the usage of plastic using a west business diamond approach in Africa and Asia
Venture Capital	Invest in profit-making innovative business models aimed at scaling recycling activities	GIF's US\$1M to Mr. Green Africa in Kenya, which offers an in-house end-to-end process for recycling, purchasing directly from their sourcing agents; waste pickers who are some of society's most marginalized people

Given the scale of investment needed, further evaluation of novel instruments such as "plastic" bonds and crowdfunding could unlock new opportunities for the growing numbers of impact-oriented institutional and individual investors. Collaborative business participation in establishing and running incubator and accelerator schemes for local entrepreneurs could also help prepare them to meet business needs while simultaneously stimulating job creation.

A broad-based investment plan to support the transition towards CE for plastics should recognize that some investments into programmes are sunk costs: while instrumental in facilitating business growth, the creation of policy and local industry networks are unlikely to be self-funding in the medium term. As such, a long-term funding plan for network initiatives should be established with founding partner organizations.

## VI. ANNEX

Table 1: Stakeholders Addressing the Plastic Challenge in Africa

Organization	Nigeria Examples	South Africa Examples	Kenya Examples	Contributions	Challenges
<b>Informal Waste Collectors</b>	Active in areas of high waste density (i.e., dumpsites)			Account for a large proportion of waste that is channeled to recyclers	Working and payment conditions are challenging. Collection from mixed waste sources is inefficient
<b>Social Entrepreneurs</b>	Wecyclers, Recycle Points, Chanja Datee Recycling	Masupatsela Women's Cooperative, Uitenhage Recycling Mula Swop Shop project, Safer Schools	Watamu Community Solid Waste Management	Facilitate greater collection at the household level. Enables greater segregation and empowers economically vulnerable groups to collect waste in a healthy way	The capacity to scale to meet national waste recycling goals is limited
<b>Entrepreneurial Recyclers</b>	Brickify	Mpact, Pikitup	Mr. Green, Taka Taka Solutions, Continental Renewable Energy Co. Ltd, Green Pavers, EcoPost	Converts plastic into long-use essential products. They also facilitate and support the collection of waste either at source or via informal collectors	Scalability is currently low due to the low percentage of PET in the composite. Demand for the product could improve with off-take agreements from construction or other industries
<b>Industrial Recyclers, Co-processing and conversion</b>	Alkem, Engee, GeoCycle, West Africa ENRG	EPCM Holdings, JICA Plant, Transpaco's polyolefin recycling plant	WEECO Limited	Off-take Plastic waste for a fee from collectors and diverts waste from landfills into energy recovery processes. Also, support the generation of new uses of plastic and products	Volumes are currently low, reducing off-take prices. High capital costs of setting up facilities introduce risk in a market where collection mechanisms and demand are unstable. The conversion of plastic to new products ultimately puts them back in the waste stream. Also, logistical challenges increase these processes' cost, and the process is not precisely "circular," so it has a higher emissions impact.
<b>Multinational and Local Companies</b>	Nestle, Coca-Cola, Unilever, Heineken, Engee	Nestle, Coca-Cola, Unilever	Nestle, Coca-Cola, Unilever	Motivated by global commitments and the EPR to reduce plastic waste. Already have some form of circular initiatives going that focuses on either recycling of plastics or product redesign	Constrained by competition to use recycled materials. Even in a regulated environment, costs may prohibit access to essential goods like water
<b>Industrial Associations</b>	Food and Beverage Recycling Alliance	PETCO, SAPRO, POLYCO	PETCO, Clean Green Kenya (CGK), Alliance to End All Plastic Waste (AEPW)	Supports coordinated action across the business. Key inputs on the feasibility of regulation. Spearheads EPR initiatives within the industry	Similar to industry
<b>National Government</b>	NESREA, Ministry of Environment	Ministry of environment, DTI	Ministry of Environment and Forestry, National Environmental Management Authority (NEMA)	Introduce frameworks to address plastic waste such as the EPR and Plastic Waste Management Policy	Funding structures and detailed agreements about implementation are not fully established
<b>State Government</b>	LASEPA, LAWMA	City of Cape Town	Each county has a government agency, e.g., Nairobi City County Government	Track record of working with the private sector. High levels of involvement to work out the details of the implementation of EPR and other environmental protection programmes	Limited budget to carry out large scale activities
<b>Investors</b>	IFC	None found yet	None found yet	Financed the development of infrastructure projects such as recycling facilities	High levels of work needed to structure an investment mandate which meets investor, entrepreneurial and public interest requirement

Table 2: A summary of Recommendations

Goal	Recommendation	Action Required	Impact	Players
<b>Recycle Plastics</b>	Increase collection of plastics	<ul style="list-style-type: none"> <li>*Develop dynamic policies and guidelines for recycled products</li> <li>*Mobilize funds to invest in collection schemes</li> <li>*Evaluate successful schemes that have led to social and economic improvements for the informal sector</li> <li>*Improve coordination between public-private sector to grow investment on separation and collection scheme</li> <li>*Support onsite improvements for formal and informal disposal areas</li> <li>*Investigate mechanisms to increase the value of collected materials, particularly lower-cost plastic waste</li> <li>*Establish a database of a different initiative to improve collaboration</li> <li>*Support digitization of collection systems</li> <li>*Investigate PP partnerships to deploy new technologies</li> <li>*Support development of community-based collection programs</li> </ul>	<p>Improvements in collection systems can fundamentally change the economy of a range of recycling processes and support broader-based job creation</p> <p>Mobilize diverse groups to improve collection rates</p>	All constituents led by state/national government and larger private sector organization
	Invest in Recycling Industries	<p>Improvements in collection systems can fundamentally change the economy of a range of recycling processes and support broader-based job creation</p> <p>Mobilize diverse groups to improve collection rates</p>	Increase the demand for plastic waste	State and local level government authorities, construction and plastic-to-building materials conversion companies
	Expand markets for recycled plastics to increase offtake	<ul style="list-style-type: none"> <li>*Pilot CE procurement schemes</li> <li>* Engage with the Netherlands and Finland, and other countries that have successfully set up procurement systems</li> </ul>	*Improve the demand for recycled plastic products	State and local level government authorities, construction and plastic-to-building materials conversion companies
<b>Reduce Plastic Consumption</b>	Explore alternatives to replace the use of plastics, e.g., paper and bamboo leaves	* Engage companies to shift into other forms of packaging, e.g., Coca-Cola's PlantBottle and Rimping in Thailand's banana leaves and bamboo packaging style	* The decrease in plastic waste pollution, especially in areas without proper waste management infrastructures	FMCG companies, national and local governments
	Support exchange models - new types of sharing models for low-income consumers	* Pilot exchange models for consumer goods for BOP consumers	* The decrease in plastic waste pollution, especially in areas without proper waste management infrastructures	FMCG companies, incubators
<b>Redesign plastics</b>	Invest in regenerative materials to manufacture plastics, e.g., Biodegradable and Bio-based materials	<ul style="list-style-type: none"> <li>*Leverage state-procurement policies</li> <li>*Seek technical funding to support product development</li> <li>*Establish working groups within national or state level circular economy programs to investigate the development of composting infrastructure</li> <li>*Engage with innovators on Africa "Optimize" challenge</li> </ul>	<ul style="list-style-type: none"> <li>*Develop niche local packaging markets</li> <li>*Although infrastructure not available at the moment and the current impact are marginal, the long-term impact is high</li> </ul>	All constituents led by state/national government and larger private sector organization, researchers, and incubators