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ECONOMIC CASE FOR A CIRCULAR PLASTICS ECONOMY IN AFRICA

FINDINGS AND RECOMMENDATIONS FOR CÔTE D'IVOIRE, KENYA AND SOUTH AFRICA

Authors: Hannah Benn, Lukhanyo Velelo and Deon Fourie (Pegasys), Riaan Rossouw (independent consultant)

Contributors: Sally-Anne Käsner (Circular Vision), Guy Pegram (Pegasys)

Reviewers: Lorren de Kock, Prahbat Upadhyaya (WWF)

WWF editorial team: Dimpho Lephaila

Text editor: Marlene Rose

Proofreader: Lindsaye Mc Gregor

Design and layout: Ink Design, Publishing Solutions, www.inkdesign.co.za

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For more information, contact info@wwf.org.za or call 021 657 6600.

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Informal collection of used plastic packaging in Kenya.

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Aggregation and storage area for collected materials with informal waste reclaimers in the background.

ABBREVIATIONS AND ACRONYMS

$	United States dollar (US$)
ACEA	African Circular Economy Alliance
ACEN	African Circular Economy Network
AfCFTA	African Continental Free Trade Area
AMCEN	African Ministerial Conference on the Environment
BAU	Business-as-usual
CGE	Computational general equilibrium
CO_2	Carbon dioxide
CO2e	Carbon dioxide equivalent
CSIR	Council for Scientific and Industrial Research
DFFE	Department of Forestry, Fisheries and the Environment
DRS	Deposit return schemes
DSI	Department of Science and Innovation
DTIC	Department of Trade, Industry and Competition
EPR	Extended producer responsibility
EU	European Union
GDP	Gross domestic product
GHG	Greenhouse gas
GTAP-10	Global Trade Analysis Project
IUCN	International Union for Conservation of Nature
KAM	Kenya Association of Manufacturers
MW	Megawatt
NRF	National Research Foundation
OPRL	On-pack recycling label
PACE	Platform for Accelerating the Circular Economy
R&D	Research and development
RDI	Research, development and innovation
SARChI	South African Research Chairs Initiative
SMMEs	Small, medium and micro-enterprises
UCT	University of Cape Town
UKZN	University of KwaZulu-Natal
UN	United Nations
UNEA	United Nations Environment Assembly
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
UWC	University of the Western Cape
WTO	World Trade Organization

GLOSSARY

Behaviour change: Any transformation or modification of human behaviour using various approaches that focus on the individual, community and environmental influences.

Bio-based plastics: Plastics that are made from bio-based feedstocks such as sugarcane, cassava and maize.

Bioplastics: A blanket term for plastic materials that are either bio-based (see bio-based plastics), biodegradable, or have features of both properties.

Circular economy: A systems solution framework that tackles global challenges such as climate change, biodiversity loss, waste and pollution. It is based on three principles, driven by design: (1) design out waste and pollution; (2) keep products and materials in use (at their highest value); and (3) regenerate natural systems.

CO2 equivalent (CO2-eq, CO2e): Carbon dioxide equivalent; a measure used to compare the emissions from various greenhouse gases based on their global-warming potential. The global-warming potential for methane over 100 years is 21, for example. This means that emissions of one million tonnes of methane are equivalent to emissions of 21 million tonnes of carbon dioxide.

Converter: A manufacturer of plastic products or packaging.

Compostability: A property of a material to break down or biodegrade in controlled conditions (including temperature, pressure and humidity) to become a usable soil conditioner.

Debris: Pieces of something that has been destroyed or broken down or pieces of rubbish or unwanted material that are spread around.

Downcycling: The recycling of waste where the output recycled material is of lower quality and functionality than the original material, due to poor design upstream and the use of additives. As a result, it is used in lower-value products.

End-of-life: A stage that starts at the end of the use in the life cycle of a material or product. In the case of packaging, the end-of-life stage starts the moment the product is consumed and when the material loses its original purpose. The so-called end-of-life options for single-use post-consumer packaging are to either treat it as waste or to recycle it, which has an impact on the sustainability of packaging.

Externalities: Industrial or commercial activity that affects other aspects of parties (e.g. the environment and society) negatively or positively, without these impacts being reflected in the market prices charged for the goods and services being provided.

Feedstock (fossil-fuel- or bio-based): The raw material to supply or fuel a machine or industrial process. In the case of plastic, the feedstock can be derived either from fossil fuel or from a bio-based source.

Informal collectors/reclaimers/waste pickers: People who collect recyclable materials from residential and commercial waste bins, landfill sites and open spaces in order to revalue them and generate an income.

Input recycling rate: The ratio of plastics collected for recycling to the total plastic entering the waste stream. The calculation point is where plastics in the waste stream are collected.

Litter: Products or materials at end-of-life that are discarded incorrectly, without consent, at an unsuitable location.

Monomer: Individual small particles that make up the polymer chain. Monomers that are found in many plastics include organic compounds like ethylene, propylene, styrene, phenol, formaldehyde, ethylene glycol, vinyl chloride and acetonitrile.

Output recycling rate: The ratio of plastics entering a recycling facility to the total plastics entering the waste stream. The calculation point is where washed flake enters the recycling operation for reprocessing.

Packaging: A product to be used for the containment, protection, handling, delivery, storage, transport and presentation of goods, from raw materials to processed goods, from producers to users or consumers, including processors, assemblers or other intermediaries.

Plastic leakage: The potential amount of macro- and microplastics that are not kept in a circular loop or properly managed at their end-of-life. As a result, they leak into the environment. Leakage is relevant to other materials as well.

Plastic waste: A plastic product or plastic material that is unwanted, rejected, abandoned, unusable or disposed of by the holder of the product or material and that has no economic value.

Plastics transition: A transition from the current linear plastics system to a plastics system that is aligned to the principles of a circular economy where (1) waste is designed out of the system; (2) plastic remains at its highest value in the economy; and (3) natural systems are regenerated as fossil-fuel consumption is reduced.

Polymer: The large molecules that make up plastics. A polymer is a very large, chain-like molecule made up of monomers, which are small molecules. It can be naturally occurring or synthetic. The length of these polymer chains determines the properties of plastic.

Post-consumer: ISO 14021's use of the term clarifies post-consumer material as material generated by households or by commercial, industrial and institutional facilities in their role as end users of the product, which can no longer be used for its intended purpose.

Problematic and unnecessary plastics: Plastic which:

- Is not reusable, recyclable or compostable (as per the definitions in this glossary)
- Contains, or its manufacturing requires, hazardous chemicals that pose a significant risk to human health or the environment (applying the precautionary principle)
- Can be avoided (or replaced by a reuse model) while maintaining utility
- Hinders or disrupts the recyclability or compostability of other items
- Has a high likelihood of being littered or ending up in the natural environment.

Producers: In the context of the plastics value chain, all organisations involved in the production, manufacturing and use of plastic packaging.

Recyclable: A characteristic of a product, packaging or associated component that can be diverted from the waste stream through available processes and programmes. The product can be collected, processed and returned to use in the form of raw materials or products.

Recyclable packaging: Packaging or a packaging component is recyclable if its successful post-consumer collection, sorting and recycling are proven to work in practice and at scale.

Recyclate: Recycled material that can be used to manufacture new products.

Recycling (material recycling): Reprocessing, by means of a manufacturing process, of used packaging material into a product, a component incorporated into a product, or a secondary (recycled) raw material. This excludes energy recovery and the use of the product as fuel.

Repurpose: To use something for a different purpose to the one for which it was originally intended. In the case of packaging, using the packaging for storage or holding food instead of the original purpose of containing the original product purchased, for example.

Reusable packaging: Packaging that has been designed to accomplish, or that proves its ability to accomplish, a minimum number of trips or rotations in a system for reuse.

Reuse: An operation by which packaging is refilled or used for the same purpose for which it was conceived, with or without the support of auxiliary products present on the market, enabling the packaging to be refilled.

Single-use plastics: Products that are made wholly or partly from plastic and that are not conceived, designed or placed on the market to be used multiple times for the same purpose. According to the European Union Plastics Directive, the definition should exclude plastic products that are conceived, designed and placed on the market to accomplish within their lifespan multiple trips or rotations by being refilled or reused for the same purpose for which they are conceived. Single-use plastic products are typically intended to be used just once or for a short period of time before being disposed of. Single-use plastic products include a diverse range of commonly used fast-moving consumer products that are discarded after having been used once for the purpose for which they were provided; are rarely collected or recycled; and are prone to becoming litter.

Upcycling: The process of transforming by-products, waste materials and useless or unwanted products into new materials or products perceived to be of greater quality, such as products with artistic or environmental value.

KEY MESSAGES

1. This study shows that implementing measures towards a circular plastics economy leads to positive cumulative effects at the end of the period (2050) for Côte d'Ivoire, Kenya and South Africa. A transition to a circular plastics economy results in more economic activity than the business-as-usual scenario, which means that consumers receive more income, leading to more spending on goods and services.
2. The results of the study also show that the rate at which these structural changes are implemented must be judged against a country's specific macroeconomic structure and starting point, as well as the wider social and environmental cost of inaction. The study's headline results include:
    - An Immediate implementation option enables **Côte d'Ivoire** to benefit from additional GDP growth of $1,1 billion[1] over a business-as-usual outcome and savings of over $200 million by 2050, by avoiding the costs arising from the externalities of the linear plastic packaging model.
    - **Kenya** could also immediately implement structural changes towards a circular plastics economy to benefit from additional GDP growth of $2,53 billion and savings of over $425 million by 2050 by avoiding the costs of externalities that would accumulate in the business-as-usual scenario.
    - The immediate implementation of structural changes leads to the circular plastics transition having a negative impact on **South Africa**'s economy in the short term. However, delaying implementation leads to an accumulation of costs of over $475 million by 2050 associated with the business-as-usual scenario. Incremental implementation of the transition to a circular plastics economy would enable the country to implement the necessary measures to minimise any negative impacts on the current value chain and still benefit from additional GDP growth of $7,2 billion.
3. The circular plastics economy leads to an overall increase in the demand for both skilled and unskilled labour, which suggests that there is strong potential for an inclusive circular plastics transition. The results also show that a significant number of informal waste-sector workers and waste-sector dependants stand to benefit from a transition to a circular plastics economy.
4. Employment is expected to decline in primary plastics sectors over the transition period. However, these sector-specific employment losses will be absorbed by growth in the secondary plastics and services sectors. This has implications for the need to design and ensure an inclusive plastics transition.
5. Given the economic linkages across borders, consumption of goods in one region has an impact on the production of goods, and material extraction, in other regions. When looking at the volume of total imports and exports of primary and secondary plastic goods and the volume of recycling by region, the modelling results show that countries in eastern and western Africa will benefit from a shift to a circular plastics economy by 2050. These dynamics also show the benefit of localising the regional value chain for circular plastics on the African continent.
6. To stimulate action at the national level, African governments have the opportunity to implement economic policy instruments across the full plastics life cycle, depending on their national context, priorities and plastics sectors. Economic instruments need to incentivise (or disincentivise, as the case may be) in ways that make smart use of government resources and capacity, and encourage participation of all industry players.
7. To foster regional collaboration, there is a need to build on existing momentum by using the actors who are already driving execution and building their capacity to lead the transition and act as champions in the broader stakeholder landscape. African governments should develop a **regional strategy that is aligned with global actions and that takes national contexts into consideration**, with a focus on **leveraging trade agreements to enhance a continental circular plastics economy**.
8. At a global level, **a new legally binding global treaty to combat plastic pollution provides the opportunity to harmonise, coordinate and initiate regulatory measures to address plastic pollution holistically** and comprehensively. African governments should actively participate in negotiations towards such a treaty to offer perspectives and priorities from the African context.

1 All dollar ($) amounts in this report refer to US dollar.

ABOUT THIS REPORT

This report explores the economic case for transitioning from the current linear model of plastic production, use and disposal to a circular plastics economy by 2050, with a focus on plastic packaging in three African countries.

A great deal of research has been undertaken in the past 10 years on the scale and impacts of plastic pollution on the environment (terrestrial, freshwater and marine), communities and human health. However, evidence on the impact of a linear plastics model on the regional, national and global economy has only recently emerged. The first notable early research on the economic benefits of the transition to a circular plastics economy was the publication *Towards the Circular Economy: The economic and business rationale for an accelerated transition in the European Union* by the Ellen MacArthur Foundation in 2013.

This report is the first of its kind for Africa, using the same economic modelling approach as the research done for the European Union. The research looks at the economic benefits of the transition to a circular plastics economy by taking into account not only the market and indirect costs or externalities of the linear plastics economy, but also the net material savings, mitigation of price volatility and sectoral shifts that would result in job creation and improved welfare and household income in the selected African countries. It demonstrates that a transition to a circular plastics economy in Côte d'Ivoire, Kenya and South Africa enables each country to benefit from the additional economic activity and diversification that are not possible in the current linear model. Recommendations for policymakers are also included to support the realisation of these economic benefits nationally and in the region.

The report focuses on plastic packaging at the macroeconomic level and therefore considers plastics in aggregate, rather than a delineation of the different types of plastic in detail. It is aimed at stakeholders in the government, industry and academia, as well as civil society and non-governmental organisations in Africa. It presents an economic case for the transition to a circular plastics economy, acknowledging the pressures to develop the national economies and create business opportunities for citizens in each country.

Plastic trash gathered at one end of the beach on Rubu Island, one of the many islands situated in Kiunga Marine National Reserve on the north Kenyan coast.

RESEARCH CONTEXT

This research supports the aims and outcomes of the WWF Regional Policy programme, which seeks to establish policy advocacy and action by assessing the economic case for a circular plastics economy in Africa.

For African countries, the economic case for a transition to a circular economy must align with needs to create local economic opportunities and upliftment. Therefore, this research builds on the existing body of work by WWF to provide economic evidence in support of a transition to a circular plastics economy, through the analysis of opportunities in Côte d'Ivoire, Kenya and South Africa. The study uses macroeconomic modelling methods to assess the plastics packaging value chain, interactions between different economic sectors, and structural changes in order to identify the opportunities for, and implications of, driving a transition to a circular plastics packaging economy in these African countries.

WWF-led research building evidence for and understanding of the transition to a circular plastics economy in South Africa and the rest of Africa.

REPORT STRUCTURE

The report outlines the current economic context, briefly highlighting why plastics have become ubiquitous, and the costs associated with the current linear model of plastic packaging production, use and disposal. It shows how the three countries under review – Côte d'Ivoire, Kenya and South Africa – might move towards a more circular plastics economy. The enabling environment in each country is described, identifying key opportunities and entry points for the circular plastics transition, whereupon the macroeconomic modelling analysis and the economic rationale for a circular plastics economy in each country are introduced.

The report highlights the impact of a circular transition on each country's GDP, the demand for skilled and unskilled labour, the effect on welfare and household income experienced by consumers, as well as the impact on the avoided cost of environmental externalities associated with a business-as-usual scenario. The report concludes with economic policy recommendations.

INTRODUCTION

What will circular plastics economies look like in Africa? This report investigates this question and presents the economic case for a circular plastics transition in Côte d'Ivoire, Kenya and South Africa.

A CIRCULAR ECONOMY SEES PRODUCTS AND MATERIALS REUSED, REPAIRED AND RECYCLED

Is it possible to rethink the way in which we design, use and reuse plastics to create a circular economy for plastic packaging? A circular economy sees products and materials reused, repaired and recycled. Waste from one industrial process becomes an input into another (Chatham House, 2020). The overarching principle is that a circular economy is restorative and regenerative by design. For plastic packaging, a circular economy seeks to retain the value of plastic material in the economy, without leakage into the natural environment.

Côte d'Ivoire, Kenya and South Africa (Figure 1) represent distinct regions, consumer patterns and policy environments in Africa, but face common challenges. These span infrastructure development, raising public awareness and fast-tracking innovation that can be deployed to address the challenges of plastic pollution and facilitate the transition to a circular economy.

The African Circular Economy Alliance (ACEA) has identified plastic packaging as an area that offers **immediate opportunities for increased circularity** (ACEA, 2021). African demand for plastic products, and packaging in particular, has grown significantly, driven by growing populations, rising income levels, urbanisation, improved market access and industry growth, product expansion and diversification, and increasing household consumption. The plastics industry is essential to the supply chains of a wide range of strategic areas of the economy; therefore, the added value plastic brings to other sectors is one of the most remarkable features of the plastics industry (DTIC, 2020).

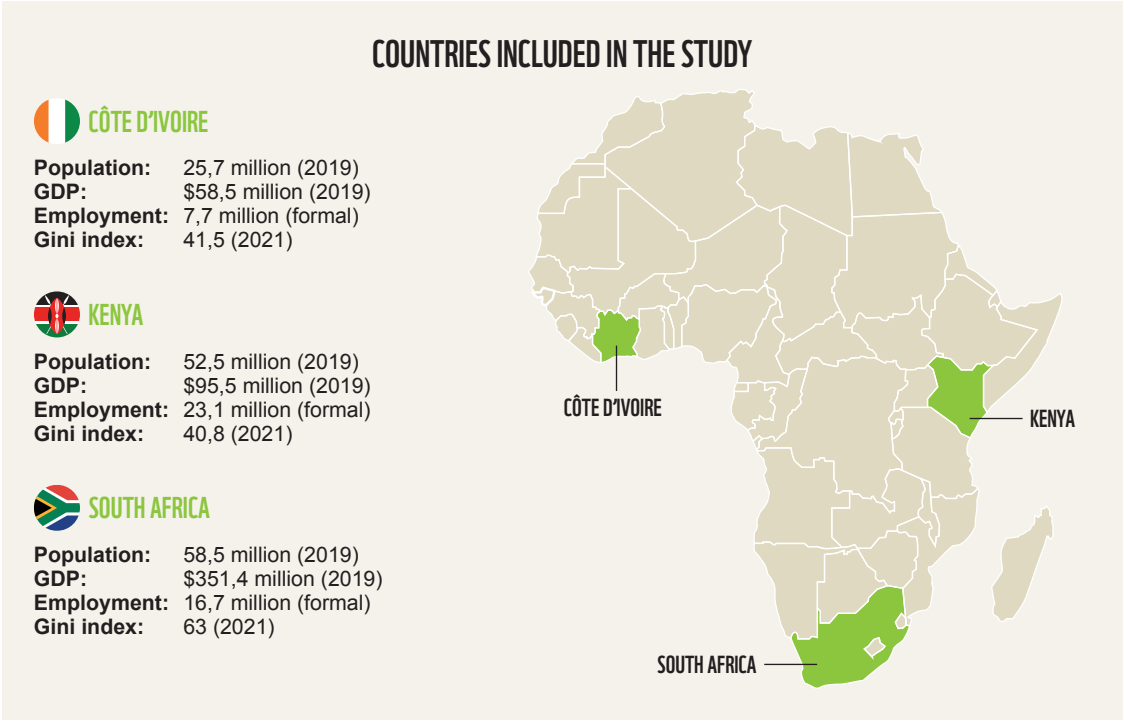
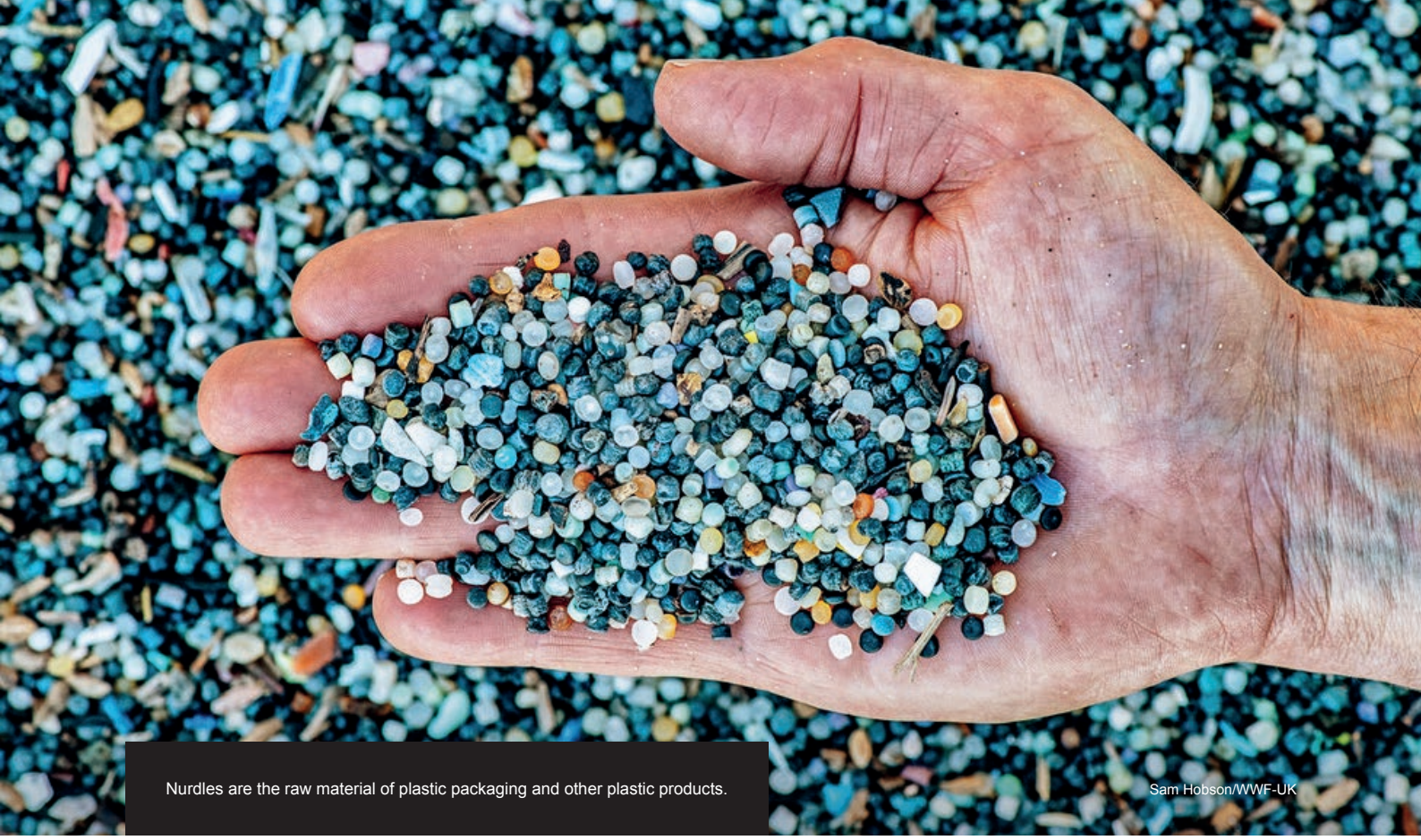


Figure 1: Map showing the location of the countries surveyed during the assessment



Nurdles are the raw material of plastic packaging and other plastic products.

Sam Hobson/WWF-UK

The nature of the plastics industry in Côte d'Ivoire, Kenya and South Africa respectively provides an indicative snapshot of the variation and diversity in this sector across the African continent.

Côte d'Ivoire

Côte d'Ivoire has the second-largest economy in West Africa. The civil unrest between 2002 and 2011 contributed to the degradation of natural resources and the environment. This adversely affected local livelihoods, as well as broader economic growth and development. Another major consequence of these conflicts in the country has been mass migration towards urban centres in search of economic opportunity. Most of the industrial activity in Côte d'Ivoire, and thus the subsequent industrial pollution, is concentrated in three urban areas – Abidjan, Bouaké and San-Pédro (UNIDO, 2015). Over half of the entire Ivorian population lives in these three cities, which are rapidly growing and will continue to serve as key industrial production sites in future. Abidjan is the economic capital of Côte d'Ivoire, housing 19% of the Ivorian population and 80% of the country's industry. It generates 27% of the GDP and provides over 50% of secondary and tertiary sector employment (UNIDO, 2015).

The plastics sector in Côte d'Ivoire is very small. The plastic packaging value chain is limited, in that there is no primary production of virgin material and a very limited recycling infrastructure. All virgin material and most packaging are imported, but there is a small local plastic packaging manufacturing sector that converts imported virgin material into packaging.

Côte d'Ivoire is characterised by very little formal waste management. According to the Ivorian Ministry of Environment and Sustainable Development, the country produces more than 40 000 tonnes of plastic waste every year. More than 50% of this waste is littered directly into the streets, while less than 20% is sorted and recycled. There is limited knowledge of whether recycling activities are actually taking place.

The large variety of retail institutions affects the management of the plastics value chain. Consumers access packaged products from large formal corporate retailers, such as Carrefour and other French supermarket chains, alongside small-scale, informal market traders. The waste management and plastics sectors are dominated by small-scale private and informal operators, active predominantly in Abidjan and a few other urban nodes. Circular economy activities in the plastics sector are nascent, driven by voluntary public and private-sector company associations and social enterprises engaging meaningfully with the informal sector.

50%

OF PLASTIC WASTE IS LITTERED DIRECTLY INTO THE STREETS

20%

OF PLASTIC WASTE IS SORTED AND RECYCLED

Kenya

Kenya is the most industrially developed country in East Africa and the region's financial and transport hub (The National Treasury of Kenya, 2021). About 27% of Kenyans live in urban areas, and Kenya is urbanising at about 4,3% a year (World Bank, 2016). The country's main urban nodes for plastics production and consumption are Nairobi, Mombasa, Kisumu and Nakuru (UNEP and IUCN, 2020a).

Kenya's plastics value chain is reflective of its majority "kadogo" economy (a local word for "informal economy") (EC, 2020). The major trend this economic format has introduced is the selling of conventional bulk products in smaller, typically single-use, units. Approximately 70% of fast-moving consumer goods come from this sector (Onyango, 2019). Sadly, this exacerbates the use of single-use packaging formats such as laminated plastic pouches and metallic foils used for snack packets. These formats offer very little intrinsic material value on their own and have therefore typically no end-use market (due to a lack of demand) and local technology solutions in place.

Kenya uses a total of 514 000 tonnes of plastic for packaging per year. The Kenyan plastics sector as a whole is 38 times smaller than that of South Africa.

South Africa

South Africa is one of Africa's most industrialised and diversified economies (ACEA, 2021) and southern Africa's economic hub. South Africa is urbanising rapidly: 63% of South Africans are already living in urban areas, with this figure expected to rise to 71% by 2030, increasing demand for basic goods and infrastructure (Parliamentay Monitoring Group, 2020). Owing to the size of South Africa's economy and consumer market (relative to other African countries), the scale of plastic production and consumption is large. South Africa has a complete plastics value chain where the raw material is processed, manufactured and sold locally and exported, in contrast to many African countries that primarily import finished products. Furthermore, certain types of post-consumer plastics can be recycled, sold and reprocessed into new applications locally or exported for further processing.

The plastic production system largely hinges on fossil-fuel-based virgin materials and the unsustainable, non-circular design of products and packaging (Sadan and De Kock, 2020). In South Africa, a little over 2,5 million tonnes of plastic are consumed annually. More than half (54%) of post-consumer plastic is uncollected, improperly disposed of, or leaks into the environment as plastic pollution (IUCN et al., 2020b). A weak and already strained waste management system is supported by a marginalised but growing informal waste sector. Informal waste reclaimers play an important role in the collection of recyclables (paper and packaging) in South Africa. The latest research has found that informal reclaimers are responsible for about 51% of all paper and packaging waste collected in South Africa in 2017 (Godfrey, 2021).

There are at least 300 plastic recyclers that process low-density polyethylene (LDPE), high-density polyethylene (HDPE) and polypropylene (PP), and a few that process polystyrene (PS), polyethylene terephthalate (PET) and polyvinyl chloride (PVC) (DTIC, 2020). There are about 58 500 jobs in the entire collection value chain (of which at least 7 892 are at recycling plants). In South Africa, there are 1 800 plastics converters and manufacturing companies that are mostly small, medium and micro-enterprises (SMMEs) (Sadan and De Kock, 2020).

PLASTIC PACKAGING SYSTEMS TODAY

The plastics economies in Côte d'Ivoire, Kenya and South Africa are almost entirely based on the linear "take-make-waste" model. The system summary infographic (Figure 2) demonstrates what the plastics packaging value chains look like in each country, highlighting some of the common challenges in the linear plastics economy. All three countries also show a strong dependence on imported virgin plastic and/or products. Limited reuse of plastic is evident, and a significant amount of plastic is lost from the value chain at the end-of-life stage, when it is disposed of in landfills, mismanaged, burnt or leaked into the environment as litter.

The defining characteristic of the linear model for the production, use and disposal of plastic packaging is the missed opportunity of retaining the value of plastics in longer life cycles and diversifying markets and value chains for this omnipresent material. Whereas there is some recycling of plastic packaging, it is rarely converted into new plastic packaging. Instead, the plastic is used in other secondary markets and "downcycled" plastic products. Reuse, as the most effective mechanism to keep plastic packaging in the economy for longer periods, is still nascent with volumes too small to be considered. The activity of repurposing plastic

packaging, where packaging is used for other purposes than originally intended, is present in the three countries at very small volumes.

This report notes the drastic impact that the global Covid-19 pandemic had on consumption patterns in general, and the use of plastic packaging in particular. The pandemic required a significant increase in the production of masks, gloves and certain types of single-use plastic packaging.

This had a significant impact on efforts to manage plastic pollution at the household level (e.g. see Filho et al., 2021) as well as in society and the broader environment (as documented by the European Environment Agency, 2021). Whereas this report is not focused on the specific impacts of the Covid-19 pandemic on plastic pollution, its findings and recommendations are relevant for and could be incorporated into recovery planning that prioritises green and circular economic imperatives.

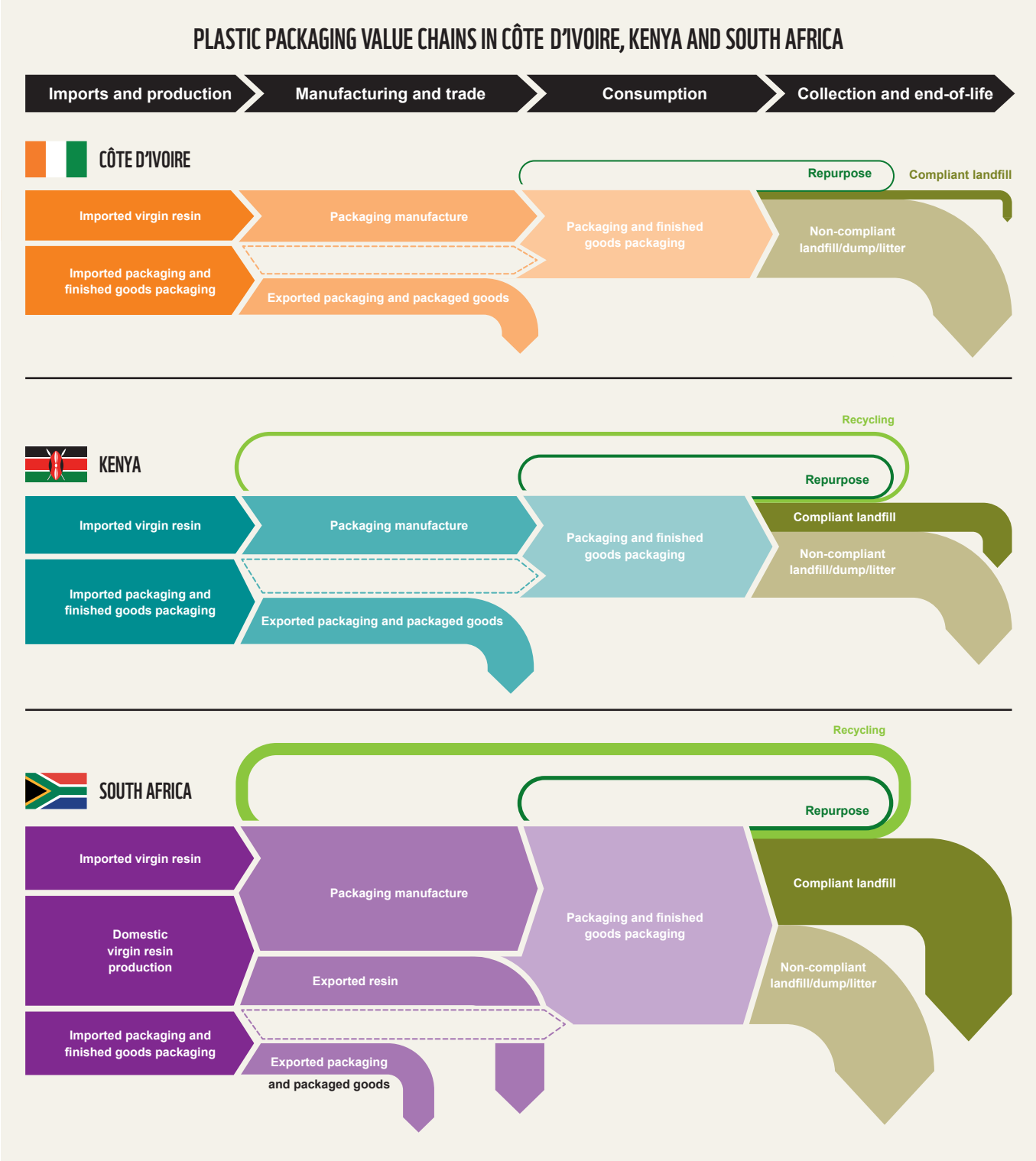


Figure 2: System summary infographic to represent the annual flow of plastic packaging in Côte d'Ivoire, Kenya and South Africa

ECONOMIC CONTEXT

Between 1950 and 2018, the global production of plastics has increased significantly, from 2 million tonnes to 359 million tonnes, to reach an industry value of $522,6 billion (PEW and Systemiq, 2020).

CURRENT PLASTIC PACKAGING PRODUCTION, USE AND DISPOSAL

Since its invention in the 19th century, plastic has been used progressively and ubiquitously as a versatile and convenient material. It is characterised by flexibility, colourability, preservability, durability, variety and, for some polymers, recyclability. Plastics are also widely used for their light weight, low cost and insulating properties. These factors have contributed to the proliferation of plastic and its application to millions of products humans use in everyday life across virtually all economic sectors. If the current scale of plastic use continues, it is projected that plastics production will nearly double to around 696 million tonnes by 2040 (PEW and Systemiq, 2020; WEF, 2021b).

Plastic has become the most favoured type of packaging for consumer goods, food and beverages, and represents 35% of the volumes of all plastic products produced globally (Barrowclough et al., 2020).

However, the growing use of plastic, and packaging in particular, has not occurred in ways that preserve material value throughout the plastic life cycle. Plastic use follows a predominantly linear process in which finite raw materials are transformed into plastic products with short lifespans.

Waste accumulating in a river in Cape Town, South Africa.

© The Litterboom Project

The lifespan of plastic products

Nearly 50% of all plastic products produced, of which the majority comprises plastic packaging, is designed to have a lifespan of less than three years. Despite this, plastic takes hundreds to thousands of years to fully degrade. During this process it disintegrates into microplastics, which makes it impossible to recover the material over time (De Wit et al., 2021).

These short-lifespan plastics are then sold to consumers and subsequently discarded as waste; a process commonly referred to as the **linear "take-make-waste" model** for each of the countries in this study (see Figure 2). This model characterises the prevailing economics of plastic, and involves wasteful and unsustainable processes, forgone value and significant social and environmental costs. Following this model means that opportunities are missed to create long-term value through multiple plastic product life cycles and minimal resource exploitation.

COSTS OF A LINEAR PLASTIC PACKAGING MODEL

The current linear model of plastic packaging production, use and disposal produces more economic costs than benefits. The largest costs are visible in the form of plastic pollution. The linear model fuels plastic pollution because it creates broad social and economic impacts that are not internalised in current production and consumption systems. Estimating the monetary value of these impacts highlights the forgone value and opportunity costs of the current linear system.

Loss in material value of plastic packaging

It is estimated that at present only 2% of global plastic packaging is effectively recycled or upcycled into similar-quality applications (WEF, 2016). In monetary terms, this translates to a material value of between $80 billion and $120 billion (or 95% of the material value of plastic packaging) that is lost to the global economy every year (WEF, 2016).

GLOBAL FLOWS OF PLASTIC PACKAGING MATERIAL

There are both direct and indirect costs associated with plastic pollution, primarily driven by the linear plastic packaging model.

Direct economic costs are more easily quantified (in monetary or market terms) as they encompass measurable explicit damage and the related expenditure incurred as a result of plastic pollution (Arabi and Nahman, 2020; Mouat et al., 2010; Viool et al., 2019).

Indirect economic costs occur outside the market and involve externalities that are more complex to measure. These costs may still be measured quantitatively but may not be possible to translate into monetary terms. Indirect costs may have to be captured qualitatively if they cannot be measured quantitatively, as the broader effects of these indirect costs on public goods, natural environments, climate change and human well-being still need to be accounted for (Arabi and Nahman, 2020; Azoulay et al., 2019; De Wit et al., 2021; Mouat et al., 2010; Viool et al., 2019).

The extensive diversity of negative impacts brought about by plastic pollution on the environment and society makes it extremely complex to accurately value the associated direct and indirect costs. However, it is increasingly accepted that **the true cost of plastic pollution is immensely higher than any cost estimates that have been quantified to date** (De Wit et al., 2021; Viool et al., 2019).

The direct and indirect costs of the linear plastic packaging model are illustrated in Table 1. Direct costs are those occurring in the market and are "paid for" by market actors, either through taxes or through direct expenditure. Indirect costs are not internalised into any market transactions because their accurate monetary value is so difficult to estimate and attribute to specific market actors. In this study, these costs are presented as global figures, which have been summarised from a range of existing and recently published studies.

Where possible, indicative country-level estimations have been made for Côte d'Ivoire (CI), Kenya (KE) and South Africa (SA). This was done by taking each country's proportional share of the global population and using global values to estimate the country-level figures. A regional estimate of the cost of plastic pollution for the African continent is currently lacking.

TABLE 1: COSTS OF THE LINEAR PLASTIC PACKAGING MODEL

Cost category	Cost description	Direct costs (market, monetary)	Indirect costs (non-market, non-monetary)	
		m = million bn = billion trn = trillion	Quantitative	Qualitative
Waste management	The cost to collect, sort, recycle and/or dispose of plastic waste by both the formal and informal sector	**Global**: $32bn **CI:** $770 000 **KE:** $2,2m **SA:** $4,2m (annually as at 2019)	**Global:** 368m tonnes (2019) **CI:** > 40 000 tonnes/year **KE:** 502 000 tonnes (2020) **SA:** 676 000 tonnes (2018)	The unidentified costs associated with landfills
	The cost to run clean-up activities	**Global:** $15bn **CI:** $600 000 **KE:** $1,2m **SA:** $1,3m (annually as at 2019)		
	Increased operational and maintenance costs of seaports, marinas, waterways and stormwater networks	**Global:** $5,6–15bn **CI:** $230 000 **KE:** $630 000 **SA:** $1,1m (annually as at 2018)		
GHG emissions	Costs of GHG emissions from plastic production	**Global:** $171bn **CI:** $600 000 **KE:** $1,2m **SA:** $1,3m (annually as at 2019)	**Global:** 1,6 Gigatonnes **CI:** 114 000 tonnes **KE:** 228 000 tonnes **SA**: 254 000 tonnes (annually as at 2019)	
	Costs of GHG emissions from waste management processes		**Global:** 161m tonnes **CI:** 116 000–550 000 tonnes **KE:** 233 000 tonnes (2020) **SA:** up to 1,25m tonnes	
Forgone economic value	Loss of revenue (GDP reductions) specific sectors (Tourism, Real estate, Fisheries and aquaculture)	**Global:** $7bn **CI:** $550 000 **KE:** $2,1m **SA:** $2,9m (annually as at 2018)		
	Forgone value of plastic material (i.e. lost opportunity for recycling, upcycling and/or reuse)	**Global:** $259bn ($370bn market cost in 2019 where 70% is turned to waste) **CI:** $908m **KE:** $1,8bn **SA:** $2bn (annually as at 2019)	**Global:** 302m tonnes of plastic become waste per year (as at 2019)	

Cost category	Cost description	Direct costs (market, monetary) m = million bn = billion trn = trillion	Indirect costs (non-market, non-monetary) Quantitative	 Qualitative
Public health	The costs associated with the threat that production, incineration and open burning of plastic polymers pose to human health through released chemical pollutants and harmful compounds such as black carbon			While monetary costs are poorly understood, health threats and impacts include cancer, neurotoxicity, hormone disruption and problems with the respiratory, cardiovascular, digestive, reproductive and immune system.
	The costs associated with the impacts of microplastics on human health		It is estimated that globally, on average, humans may ingest 0,1–5 g of microplastics weekly through various exposure pathways (Senathirajah et al., 2021).	Evidence of human exposure to microplastics is growing, but scientific understanding of the health implications is still limited.
Ecosystems and biodiversity	Reduction in marine ecosystem services including the various goods people can obtain from marine habitats, carbon sequestration, flood control, pest control, habitat, novel chemicals, genetic diversity, spiritual sites and recreation	**Global:** $3,1trn (+/-$1trn) **CI:** $350m **KE:** $700m **SA:** $779m	**Global:** > 11m tonnes of plastic waste reaching oceans per year (as at 2019) (600 million tonnes in the ocean by 2040)	Plastic in the environment will continue to damage ecosystems as it breaks down into smaller particles. The full impact of microplastics in the environment is still largely unknown.

Source: Authors' adaptation from WWF and Dalberg (2021), Hamilton and Fait (2019) and The Ocean Cleanup and Deloitte (2019)

Plastic materials and other waste burning at a landfill site in Pongola, South Africa.

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EVOLVING POLICY CONTEXT FOR A CIRCULAR PLASTICS ECONOMY

The need to move to a circular plastics economy is being recognised from the intergovernmental level to voluntary initiatives by large multinational and local companies.

This chapter reviews the evolving policy context at the international, regional and national level on plastic pollution. Policy frameworks and trade agreements are discussed in each subsection.

INTERNATIONAL POLICY AND TRADE CONTEXT

The global community has recognised that the problem of plastic pollution spans across geographical boundaries and cannot be adequately addressed by any particular country on its own. There is thus a need for countries to commit to the establishment of a balanced framework or global agreement to ensure international cooperation. This should take the following global policy discussions and negotiations about plastic pollution into account:

An area for informal sorting of waste in Kenya.

© WWF-Kenya

GLOBAL POLICY DISCUSSIONS AND NEGOTIATIONS

2014: United Nations Environment Assembly-1 (UNEA-1)

It was noted that marine litter and microplastics were emerging global environmental problems and that more research was needed.

2016: UNEA-2

The United Nations Environment Programme (UNEP) was requested to assess the effectiveness of relevant international, regional and subregional regulatory frameworks, governance strategies and approaches to combat marine plastic litter and microplastics, and identify possible gaps and options to address these gaps.

2017: UNEA-3

UNEA-3 was a turning point where a global "zero-emissions" vision aimed at eliminating plastic discharge to the oceans was adopted. The open-ended Ad Hoc Expert Group (AHEG) on marine litter and microplastics was established and its mandate extended to UNEA-4.

2019: UNEA-4

Resolution 6 on marine plastic litter and microplastics extended the mandate of the AHEG and called on UNEP to continue strengthening scientific and technological knowledge on marine plastics. It stressed the importance of coordination and collaboration. An additional resolution was also tabled on the problem of pollution from single-use plastic products.

At the third AHEG meeting in Bangkok in November 2019, the African Ministerial Conference on the Environment (AMCEN) declaration[2] provided guidance for the Africa group of negotiators' involvement in global plastics policy.

2021: UNEA-5.1

On account of circumstances brought about by the Covid-19 pandemic, UNEA-5 was split into two sessions. The first took place in **February 2021**. UNEA-5.1 was convened virtually to discuss urgent matters. It also expressed continued aspirations towards launching negotiations on a global agreement to address plastic pollution. There was also an announcement of the first ministerial conference on marine litter and microplastics.

In **June 2021**, the Ocean Day Plastic Pollution Declaration, arguably the strongest statement in support of the legally binding treaty on marine litter and plastic pollution, was endorsed by 78 UN member states and the European Union (EU) (Draft statement on the need for a plastic pollution treaty on the occasion of the Parliamentarians for Global Action (PGA) High Level Meeting on Oceans, 1 June 2021). The declaration affirmed the commitment to "work for a decision at UNEA-5.2 to establish an Intergovernmental Negotiating Committee" to start negotiations on the agreement.

In **September 2021**, the first ministerial conference on marine litter and plastic pollution was co-convened by Ecuador, Germany, Ghana and Viet Nam in a hybrid format. The goal of the conference was to build momentum and political will to advance a coherent global strategy to tackle the problem, and to build support for the start of negotiations on a new legally binding agreement (Sadan and De Kock, 2021).

Altogether 136 member states committed, through a ministerial statement, "to take the next decisive steps by working towards the timely establishment of an Intergovernmental Negotiating Committee on Marine Litter and Plastic Pollution at UNEA-5.2, with the aim of achieving a new global agreement with ambitious goals, wide participation and means of implementation". Sixty-five countries endorsed the ministerial statement, among them 10 African countries (Burkina Faso, Cameroon, Côte d'Ivoire, the Democratic Republic of the Congo (DRC), Ethiopia, Ghana, Kenya, Mauritania, Somalia and Sudan).

2 wedocs.unep.org/bitstream/handle/20.500.11822/30786/AMCEN_17L1.pdf?sequence=1&isAllowed=y

Basel Convention

The Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel Convention) was adopted in 1989 and came into force in 1992. However, plastic scrap and waste were not included in the existing provisions until May 2019, when member countries decided to significantly restrict international trade of these materials to help address the improper disposal of plastic waste and reduce its leakage into the environment.

As a result of this amendment to the Basel Convention, transboundary shipments of most plastic scrap and waste are being controlled or regulated from **1 January 2021**.

International shipments of most plastic scrap and waste are allowed only with the prior written consent of the importing country and any transit countries. Côte d'Ivoire, Kenya and South Africa are all party to the Basel Convention.

2022: UNEA-5.2

The final adoption of the UN resolution, "End plastic pollution: Towards an international legally binding instrument", was unanimously approved. This outcome attested to the ongoing commitment of all states to urgently address plastic pollution. This resolution calls for the establishment of the Intergovernmental Negotiating Committee to commence negotiations towards a global treaty over the next two years. It highlights the need for measures to support effective implementation of the treaty, which will include capacity building and financial and technical support.

Close-up of plastic bottles being collected during a beach clean-up at Lamu, Kenya.

OTHER INITIATIVES TO INFLUENCE POLICY

At a meeting on 22 October 2021, World Trade Organization (WTO) members who attended the meeting of the **Informal Dialogue on Plastics Pollution and Environmentally Sustainable Plastics Trade (IDP)** drafted a ministerial statement to support global efforts towards the reduction of plastic pollution and to strive for a more responsible transition in the trade in plastic (WTO, 2021b). The main emphasis of the draft statement included the need to build capacity in vulnerable economies (including least-developed countries and small island developing states) with much-needed technical assistance. The current WTO work includes the evolution of evidence on plastic pollution and encouraging and recording the associated international action with specific emphasis on potential trade implications (WTO, 2021b).

The need to move to a circular plastics economy has also been recognised by organisations such as the Ellen MacArthur Foundation. This organisation drives voluntary initiatives such as the **New Plastics Economy**, which "sets out a vision for a global plastics system in which plastic never becomes waste" (Ellen MacArthur Foundation, 2020). Led by the Ellen MacArthur Foundation in collaboration with UNEP, the New Plastics Economy has established a Global Commitment that has united more than 500 organisations (businesses, governments, academia and civil society) behind a common vision of a circular economy for plastics, representing 20% of the plastic packaging use worldwide (Ellen MacArthur Foundation and UNEP, 2021).

Subsequently, the Ellen MacArthur Foundation has established the **Plastics Pact Network**, a globally aligned response to plastic waste and pollution that enables vital knowledge-sharing and coordinated action. It is a network of national and regional (multi-country) initiatives that brings together key stakeholders to implement solutions towards a circular economy for plastic, tailored to each geography (Ellen MacArthur Foundation, 2021a). Each initiative is led by a local organisation and unites governments, businesses and citizens behind the common vision with a concrete set of ambitious local targets in the following areas, among others (Ellen MacArthur Foundation, 2021a):

- Eliminate unnecessary and problematic plastic packaging through redesign and innovation
- Move from single-use to reuse where relevant
- Ensure that all plastic packaging is reusable, recyclable or compostable
- Increase the reuse, collection and recycling or composting of plastic packaging
- Increase recycled content in plastic packaging.

Initiatives such as the New Plastics Economy Global Commitment (commonly referred to as the Global Commitment) and the Plastics Pact Network have catalysed **voluntary action** by **some** corporates and governments, but regulation and enforcement are urgently required to drive change across the entire system.

Voluntary initiatives will continue to be important, with frontrunners raising the levels of ambition, and pioneering rapid responses to the challenge. Although progress has been made in addressing the global plastic pollution challenge (millions of companies across the world use and discard plastic packaging), current commitments by governments and industry will reduce the annual volume of plastic flowing into the ocean by only about 7% by 2040.

Voluntary initiatives alone cannot drive the system change required. They must be strengthened by regulatory frameworks and interventions that drive robust monitoring and enforcement to ensure accountability, develop an enabling environment and level the playing field for all businesses.

Plastics Pact Network

At the time of publication, the Plastics Pact Network has been launched in 11 countries or regions:

2018 United Kingdom
2019 Chile, France, The Netherlands
2020 Poland, Portugal, South Africa, USA
2021 ANZPAC (Australia, New Zealand and the Pacific Island Nations), Canada, Kenya

ENABLING ENVIRONMENT AT THE REGIONAL LEVEL

Despite the distance between Côte d'Ivoire, Kenya and South Africa, these countries can build on regional, continental and international platforms and initiatives to support efforts towards a circular plastics economy.

Regional policy

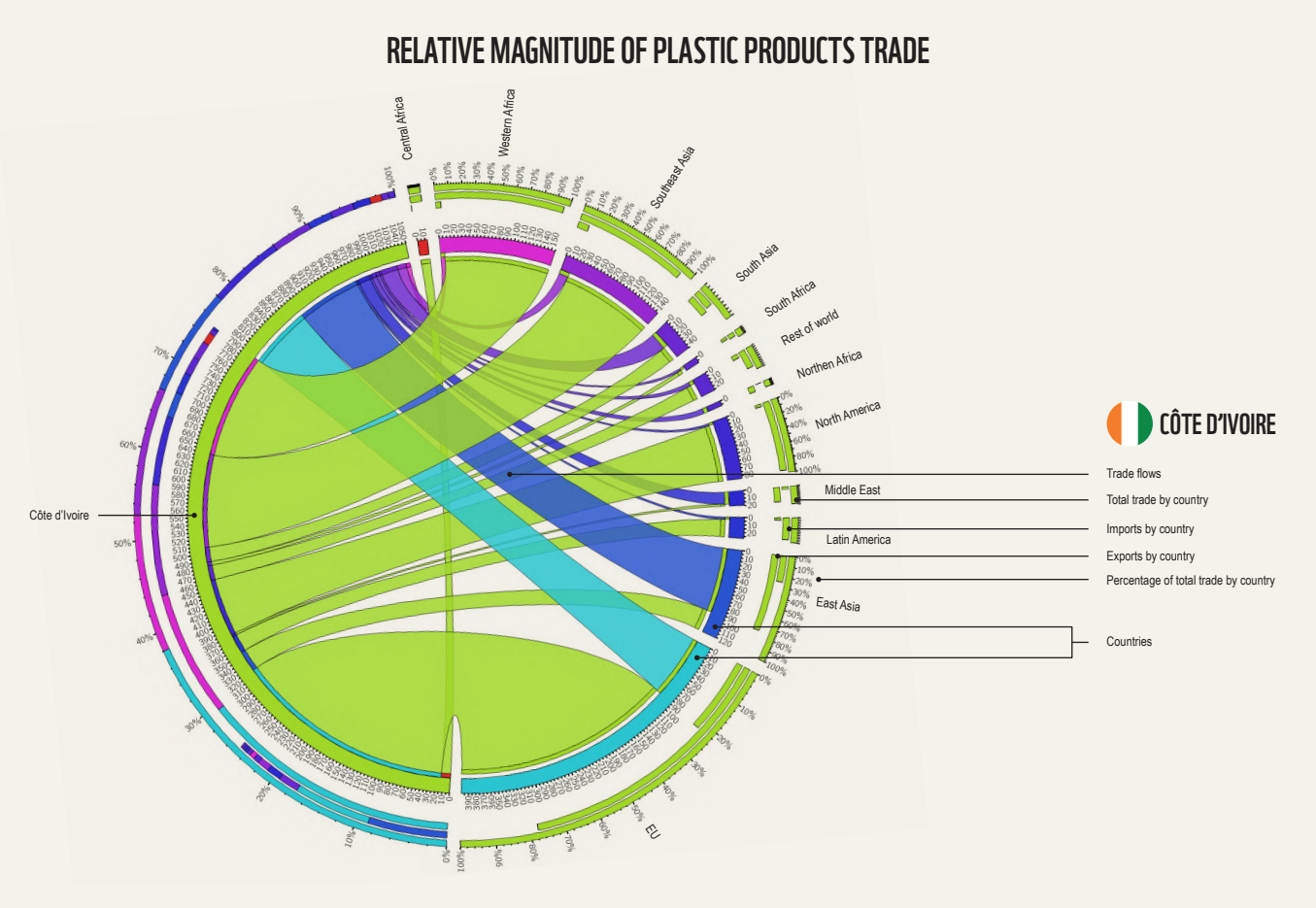
Given the importance of trade policy and agreements as a potential mechanism to help the transition to a circular plastics economy, it is crucial to understand the significance of trade in plastic products for Côte d'Ivoire, Kenya and South Africa.

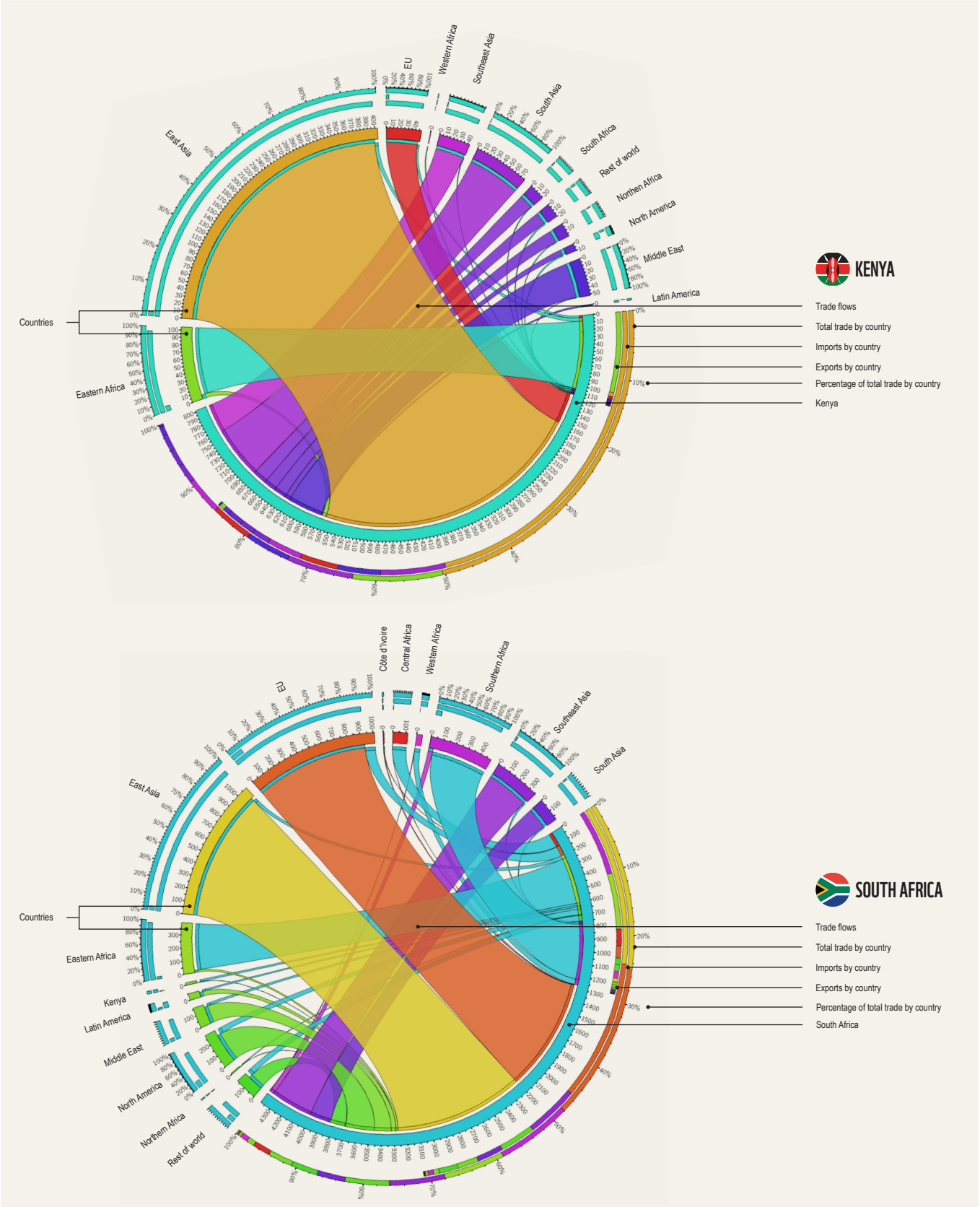
At present, all three countries are experiencing a trade deficit in their plastics industries, meaning that the cost of a country's imports exceeds the value of its exports (DTIC, 2020; as evident in Global Trade Analysis Project (GTAP-10) database documented in Aguiar et al., 2019).

From a **regional** trade perspective, there is currently a lack of effective enforcement of plastic waste trade regulations into and across Africa. There is a need for stricter control on rules of origin, anti-dumping and trade corridors (DTIC, 2020). Controlling rules of origin (i.e. the criteria by which the source and composition of imports can be identified) and implementing trade areas and corridors where these rules are consistently applied and understood between trading partners, will help to address uncertainty about the availability and quality of both recycled and recyclable plastics (OECD, 2018).

From a **policy-making** perspective, standards need to be implemented and harmonised among trading partners. This could go a long way to enable trade where some countries may need external recyclable waste feedstock or for plastic waste to be recyclable. Several agreements, amendments and initiatives are currently under way that are important to support the trade of circular plastic packaging.

Figure 3 illustrates the relative magnitude of the trade in plastic products (for 2014) between Côte d'Ivoire (top), Kenya (middle) and South Africa (bottom) and their respective trading partners. The light-blue ribbons represent exports of plastic products from South Africa and Kenya, while the green ribbons represent the exports from Côte d'Ivoire. The ribbons in other colours indicate each country's respective share of plastic product imports. For all three countries, the figures show that East Asia (which includes China), the EU and the Middle East are major origins for plastic product imports. The EU is also a significant export market for plastic products from Côte d'Ivoire. Nearby African markets represent the largest export destinations for Côte d'Ivoire, Kenya and South Africa.





Source: Pegasys calculations based on GTAP-10 database

Figure 3: Trade in plastic products between Côte d'Ivoire, Kenya and South Africa and their respective trading partners in the GTAP-10 database

BOX 1: THREE AFRICAN COUNTRIES IN THE INTERNATIONAL TRADE CONTEXT

Côte d'Ivoire, Kenya and South Africa have **international** trade relations with many countries, most notably with China as a source of imports. Global trade influences how individual countries ensure that imported products and related packaging contribute to national circular plastics economy objectives. Differences in production and recycling standards and variations in the use of on-pack labelling can lead to complications. Given the large volumes of imports from China to Africa, it is necessary to open up dialogue at an international level about increasing the recyclability of packaging as well as the recycled content of packaging.

All three countries have been signatories to the **World Trade Organization (WTO)** since 1995 (WTO, 2021a).

At the WTO some members are currently exploring the role the organisation could play in tackling plastic pollution (Zhang and Baliño, 2020). The topic has been raised in the WTO's Committee on Trade and Environment, one of the institution's regular bodies, and has also been the subject of informal discussions among interested member groups.

Trade context

The **African Continental Free Trade Area (AfCFTA)**, founded in 2018, has the overarching objective of boosting intra-African trade through the creation of a liberalised continental market for goods and services. The AfCFTA is a trade agreement under the African Union with trade commencing as of 1 January 2021, emphasising the reduction of tariffs and non-tariff barriers, the facilitation of free movement of people and labour, right of residence, right of establishment and investment (DTIC, 2020). Côte d'Ivoire and Kenya ratified the AfCFTA in 2018, while South Africa did so in 2019 (AU, 2021b). The agreement and its related protocols contain provisions for protecting environmental and human health, as well as upholding domestic restrictions on production or consumption such as product bans.

The AfCFTA may play an important role in strengthening customs processes that are required to implement international and regional regulatory frameworks covered under the Basel and Bamako Conventions. This will ensure more effective control of the hazardous waste trade, which includes plastic waste and e-waste (Van der Ven and Signé, 2021). The AfCFTA could also facilitate trade of plastic waste intended for recycling and recycled plastic intended for remanufacturing, but currently there are no plastics-specific provisions in the agreement.

In 2019, the **African Ministerial Conference on the Environment (AMCEN)** took place. In the **Durban Declaration**, ministers agreed to take action to promote environmental sustainability and prosperity in Africa. Regarding plastic pollution, they made a commitment to supporting global action that addresses plastic pollution, and to doing further work to engage more effectively on global governance issues on plastic pollution. This would be in the form of reinforcing existing agreements or through a new global agreement on plastic pollution that takes a comprehensive approach to addressing the full life cycle of plastics.

African Union

The African Union is a continental body consisting of 55 member states from the African continent. It was officially launched in 2002 as a successor to the Organisation of African Unity (OAU, 1963–1999) (AU, 2021a). **AGENDA 2063** is Africa's blueprint and master plan for transforming Africa into the global powerhouse of the future. It is the continent's strategic framework that aims to deliver on its goal for inclusive and sustainable development and is a concrete manifestation of the pan-African drive for unity, self-determination, freedom, progress and collective prosperity.

In 2020, an amendment was made to the **Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa (Bamako Convention)**. Resolution 3/8 was taken to include all forms of plastic waste under its scope, following similar amendments to the Basel Convention the year before. This decision also invites parties, who have not already done so, to implement bans on plastic bags and other single-use plastics. In response to the AMCEN Durban Declaration, the amendment adds its call for a new legally binding global agreement to combat plastic pollution. Countries such as South Africa and Nigeria have not ratified the Bamako Convention given the perceived risk that it may inhibit their recycling economies, which involve transboundary trade of goods such as e-waste and plastic waste (Parliamentary Monitoring Group, 2008, 2014). To date, 29 countries are signatories and 25 countries are parties to the Bamako Convention.

Building on the developments at AMCEN and the Bamako Convention, in 2021, at the 18th session of AMCEN, African ministers for the environment strengthened their commitment.

> "We will work towards having a new global legally binding agreement on marine litter and plastic pollution that takes a comprehensive approach to address the full life cycle of plastics, from production and design to waste prevention and management, while ensuring coherence and coordination of activities undertaken by existing regional and international instruments, and create a supporting structure for implementation in developing countries …"
>
> – AMCEN 2021, Appendix I, paragraph 10

AMCEN further undertook to support the draft resolution on marine litter and plastic pollution, co-drafted by Rwanda and Peru and co-sponsored by over 40 UN member states, including Guinea, Kenya, Madagascar, Senegal and Uganda, as of December 2021. The draft resolution suggested elements to define the mandate on the agreement of the Intergovernmental Negotiation Committee, for negotiation at UNEA-5.2. Lastly, African ministers for the environment agreed to develop a common regional approach for Africa on engagement on the proposed draft resolution (AMCEN 2021, Appendix I, paragraph 10(f)). These commitments and intentions from African ministers were significant and support the unified approach that is needed to stem the tide of plastic pollution in Africa. In collaboration with AMCEN, the African Union will be drafting a **Circular Economy Action Plan for Africa**. This will contribute to the united approach that the continent needs to facilitate the actions required for a transition to a circular plastics economy from a unified perspective.

Platforms for alignment and policy coherence

Alignment between national plastics initiatives, as well as a unified approach across regions and the continent, is urgently needed to support the transition to circular plastics economies in Africa. At the regional level, the Bamako Convention and AMCEN's Durban Declaration have aligned around the call for a legally binding global agreement on plastic pollution. While the Basel Convention further supports more sustainable control of plastic waste trade and pollution, a coherent and unified position on plastic pollution is yet to be achieved. Several international and continental platforms and initiatives that involve Côte d'Ivoire, Kenya and South Africa in circular economy activities are supporting greater alignment and policy coherence for managing plastic packaging. These platforms and initiatives are also creating a strong foundation and impetus towards the engagement of African governments with the global discourse on a legally binding agreement.

The **Platform for Accelerating the Circular Economy (PACE)** was launched in 2017 by the World Economic Forum as a platform for public and private-sector leaders to make commitments and accelerate collective action towards the circular economy (WEF, 2021a).

The PACE community consists of 80 public, private, international and civil society executive leaders and over 200 members championing 18 projects across the globe. Since early 2019, the PACE secretariat has been hosted by the World Resources Institute in The Hague with the continued leadership and collaboration of the World Economic Forum. PACE consists of regional circular economy alliances around the world. It hosts several international circular plastics initiatives such as the Global Plastic Action Partnership (GPAP), a public-private collaboration platform launched in 2018 to help translate commitment into tangible strategies and investible action plans. Another initiative under PACE is the trade and circular economy initiative, which seeks to assess the role and function of trade in facilitating a positive transition to a circular economy.

Also conceived by the World Economic Forum and the Government of Rwanda in 2016, the **African Circular Economy Alliance (ACEA)** is a country-led platform that aims to lead advocacy projects, undertake policy research and support high-impact circular economy projects. In 2017, ACEA was launched with three founding member countries: Rwanda, South Africa and Nigeria. In 2019, Ghana and Côte d'Ivoire joined the alliance and in 2021 Benin, Burkina Faso and Sudan also became members (ACEA, 2021). Kenya is not yet a member of ACEA.

Co-chaired by the ministers for the environment of Rwanda, Nigeria and South Africa, with 10 member countries from across the African continent, ACEA has given rise to a multi-donor trust fund with initial capital of €4 million. The **Africa Circular Economy Support Programme (ACESP)** will fund circular economy entrepreneurs and circular economy activities in countries that have joined the alliance. It is supported by a number of strategic partners including the World Economic Forum, the African Development Bank, the Global Environment Facility (GEF), UNEP, the Government of Finland and PACE, with financial support from the Danish and Finnish governments and the Nordic Council (ACEA, 2021).

One of ACEA's projects is a collaboration with the World Economic Forum's Regional Action Group on Africa and the Africa Plastics Recycling Alliance, a coalition that includes Diageo, Unilever, The Coca-Cola Company and Nestlé (WEF, 2020). It is thought that this collaboration will, in turn, spark collaboration between companies and policymakers working on building a PET bottle-to-bottle recycling industry on the continent to reduce waste and create jobs.

In one of its reports, ACEA identifies five sectors that have the most potential to drive the circular economy, namely food systems, the built environment, fashion and textiles, electronics, and packaging (AfDB Group, 2021). The support of the African Development Bank and other partners in driving the work of ACEA has been crucial. The report argues that greater regional policy harmonisation, resource mobilisation and international collaboration are critical to accelerate the transition to a circular economy.

The **African Circular Economy Network (ACEN)** was established in 2016. It was officially registered as a non-profit organisation in 2018 and as a non-profit company in 2020. ACEN has official and non-official partnerships with most of the large organisations involved in the circular economy, including the World Economic Forum, ICLEI Africa, UNEP Africa, the EU, the European Environmental Bureau, the Ellen MacArthur Foundation, Accenture, Holland HotSpot and the African Development Bank.

ACEN has built its reputation as being able to convey the message of developing a uniquely African circular economy agenda when advising public and private organisations. It has a network of 30 active countries with 100 identified experts in their own field, all of whom have signed the ACEN Ethics Charter. Most importantly, while ACEN's headquarters are in South Africa, many of the executive team members are located in other African countries, which enables them to add their extensive knowledge and locally existing networks in circular economy applications to the envisaged South African project outcomes. For the past five years, ACEN has endeavoured to increase the visibility of an African-centred circular economy concept with social justice and well-being at its core.

The initiatives outlined above hold the potential to drive greater alignment and momentum for African countries' participation in the transition to a circular plastics economy. With a growing global urgency to put measures in place to curb plastic pollution, including from plastic packaging, the time is ripe for African governments to participate in shaping global ambition, strengthen regional coordination and boost national action.

Research conducted by WWF has identified seven potential opportunities that African countries can explore, as shown in Figure 4 (Sadan and De Kock, 2021).

BOX 2: REGIONAL POLICY GAPS TO OVERCOME

The current enabling environment still faces the challenges of several policy gaps at regional level:

- A lack of a continent-wide vision and targets to address plastic pollution and prioritise and outline common standards for action.
- A lack of regional coordination of existing policy frameworks and interventions across Africa, as well as a general lack of an inventory of existing, successful policies and interventions on the continent.
- A lack of Pan-African research and knowledge-sharing to inform policy development for a circular plastics economy to address plastic pollution systemically.
- A lack of effective enforcement of plastic waste trade regulations into and across Africa.
- Competing developmental priorities, which delay progress on policy and legislation to address plastic pollution, particularly immediate priorities such as the Covid-19 pandemic relief and stimulus measures that are also influencing resource availability and flows.

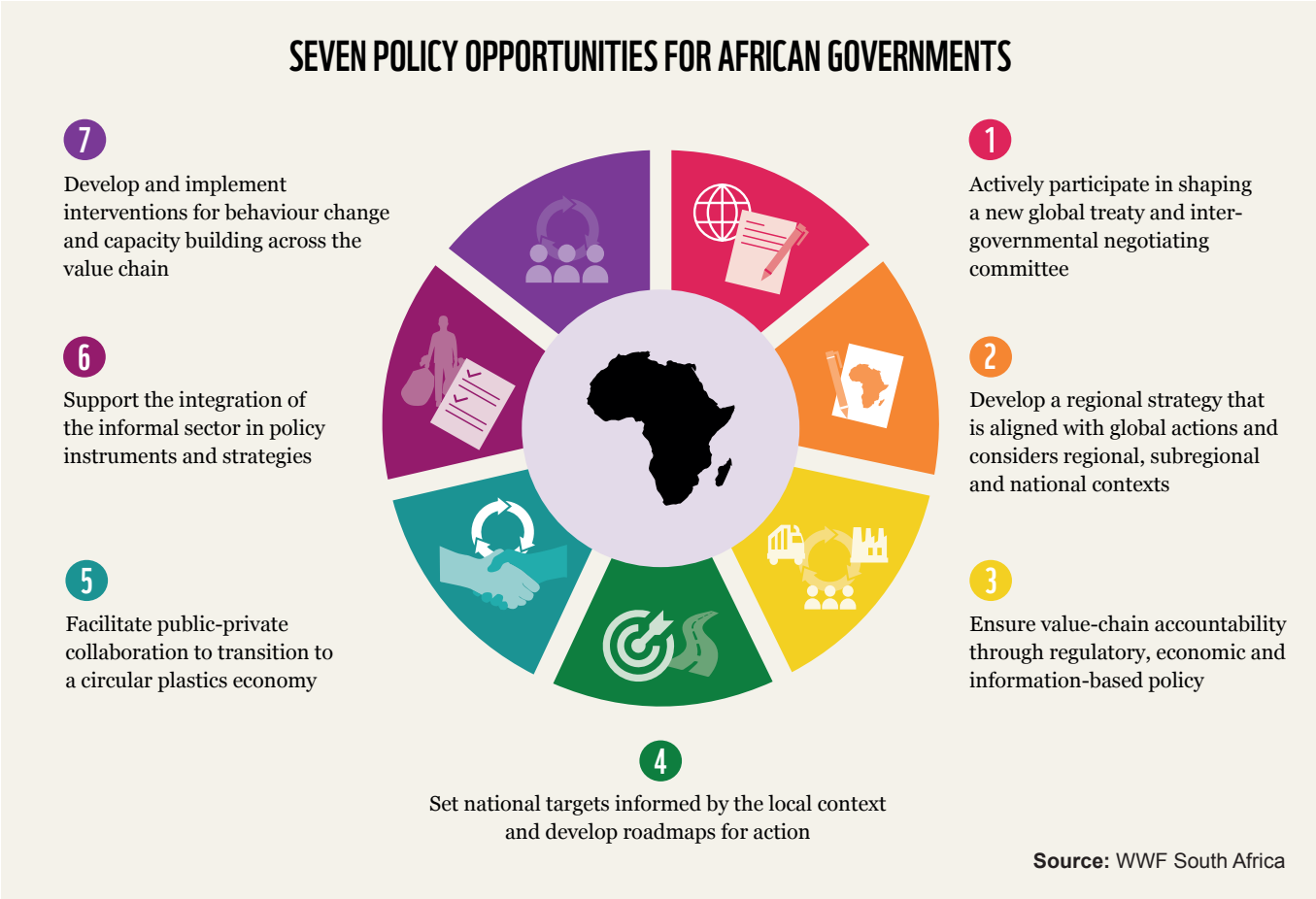


Figure 4: Seven policy opportunities for African governments

ENABLING ENVIRONMENT AT THE NATIONAL LEVEL

An enabling environment that would support any sustainable development transition is characterised by an effective policy and institutional landscape, knowledge and understanding, and the capacity to enforce and execute implementation. The same is true for effective and sustainable implementation of circular plastics interventions, as demonstrated in Figure 5.

- The **enabling conditions** related to the policy and institutional environment need to be conducive to promote, enable and mobilise investment into and support for the circular plastics economy. This may require the adoption of novel institutional mechanisms to overcome potential barriers.
- **Knowledge and understanding** must support the motivation for implementation through rigorous, scientific assessment, targeted monitoring and effective information dissemination to the key stakeholders supporting the interventions.
- **Enforcement and execution** must respond to the enabling conditions and local context by ensuring that (1) any policy instruments and regulations have the necessary enforcement capacity to encourage compliance, and (2) the planned interventions are demonstrably effective at addressing the issues of linear economic processes, have the appropriate institutional and financing mechanisms to sustain the circular plastics activities, and enjoy the support of the relevant stakeholders.

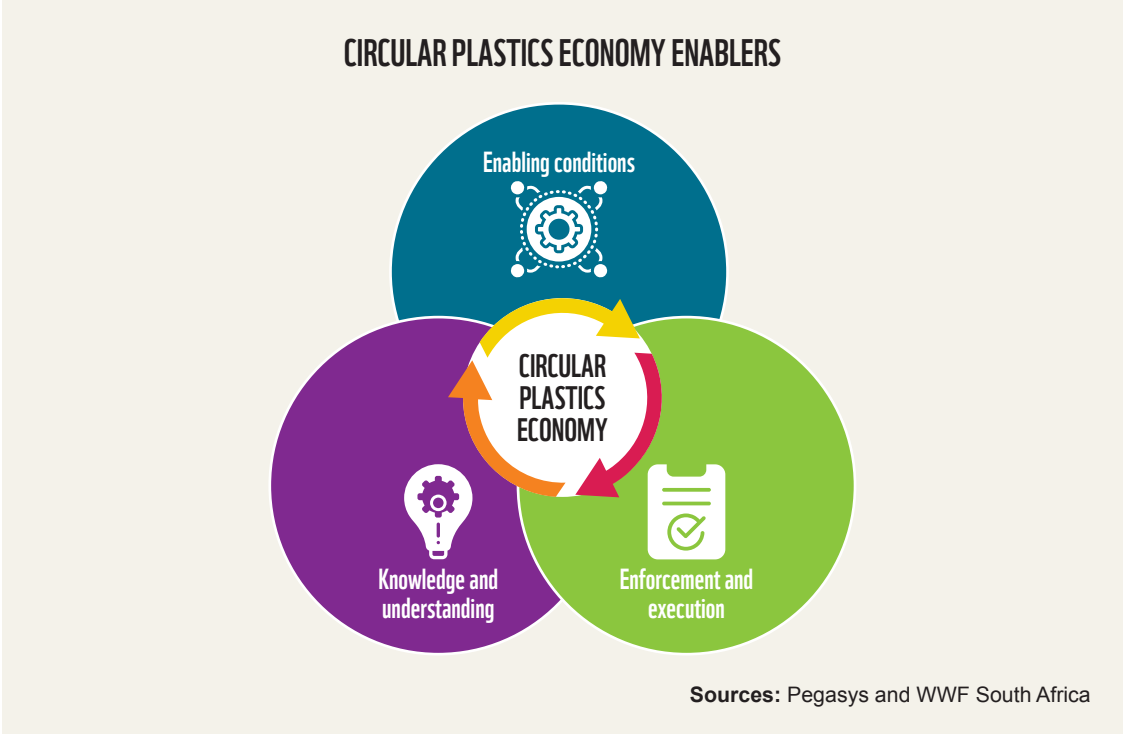


Figure 5: Three dimensions of the enabling environment for a transition to a circular plastics economy

Côte d'Ivoire

Enabling conditions

The policy and legislative landscape in Côte d'Ivoire is the least comprehensive of the three countries in this study. Côte d'Ivoire has banned the use of plastic sachets for alcohol, as well as the use of non-biodegradable plastics (Ministère de l'Environnement et du Développement Durable, 1996; Adam et al., 2020). The legislation (Framework Law 96-766 under the Environment Code (1996)) enforcing these bans also seeks to strengthen and create infrastructure for the management of waste (including plastics). The country is in the process of developing a National Circular Economy Strategy (which will include provisions for plastic and e-waste), as well as an urban-focused Circular Economy Strategy for the City of Abidjan to guide circular initiatives in Côte d'Ivoire's economic centre. Côte d'Ivoire has also updated its waste sector strategy as part of the country's Nationally Determined Contribution (NDC) towards the Paris Agreement.

Currently, the legislative framework is weak. Where regulation has been enacted, it is not enforced. Through stakeholder engagement, it appears that there is a lack of coordination between the different government departments and, as the legislation relating to waste management or bans on plastic packaging is housed within the Ministry of the Environment and Sustainable Development, it seems not to hold much weight. Therefore, transitioning to a more circular approach will be difficult without coordination and enforceable mandates.

Legislation in Côte d'Ivoire

The relevant legislation and policy for Côte d'Ivoire's circular plastics economy include the following:

1996	Framework Act 96-766 under the Environment Code
2013	Extended producer responsibility regarding plastic bags (Decree No. 2013-327 on the ban of the use of plastic bags and non-biodegradable plastic, 2013)
2016	Ban on plastic sachets for alcohol
2021	Nationally Determined Contribution

Knowledge and understanding
A knowledge base is being built with support from donor-funded projects and multilateral development partners, but these remain high level and strategic in nature. Stakeholders in Côte d'Ivoire confirmed that the Abidjan district of the city of Abidjan is conducting a formal baseline study with World Bank funding to understand the industrial, public and household levels of plastic material flow and how complementary networks can be set up. This study is linked to the recently established Abidjan Circular Economy Institute, which brings together public and private stakeholders on circular economy issues.

Other initiatives being spearheaded by the Ministry of the Environment and Sustainable Development and the United Nations Industrial Development Organisation (UNIDO) are developing a waste-stream-specific circular economy roadmap and improving educational programmes that integrate the circular economy into curricula at primary to tertiary levels.

Understanding the waste baseline is a good place to start as it can indicate where the quick wins may lie based on empirical findings. This information can then also be used to develop educational and awareness-raising materials that can be shared widely. These materials should consider both the economic and the environmental narrative when communicating to the public and private sectors, as well as the community at large.

Enforcement and execution
There is weak enforcement of existing waste policy and legislation, with dumping and burning of waste (including plastics) ubiquitous, especially in urban areas.

Circular economy activities in the plastics sector are nascent and largely driven by voluntary activities. Public and private-sector companies have recently come together in an association, the Association Ivoirienne de Valorisation des déchets Plastiques (AIVP). This public-private partnership aims to find a sustainable solution to the plastic waste management problem in Côte d'Ivoire.

The presence of large French supermarket chains has also influenced the execution of more circular practices in retail, such as substituting plastic carrier bags with reusable ones (Bassompierre and Hoije, 2019). There is a need to support a similar transition in the equally strong informal market economy to alternative reuse models. At present, informal markets use single-use packaging to package their goods. Execution on the ground is being driven by social enterprises such as Coliba, which engage in the informal plastics economy. Other initiatives include Project Plastic, which creates urban collection points for plastic recycling.

The lack of enforcement of the existing legislative framework is problematic and voluntary initiatives alone will not solve the plastic mismanagement crisis. The government must start implementing the regulations that have been put in place in order to establish trust and accountability.

Plastic pollution in the ocean.

Kenya

Enabling conditions

From a policy and institutional perspective, the transition to a circular economy is driven by the Ministry of Environment and Forestry. However, circular economy principles and their importance are not horizontally prioritised across the different parts of the Kenyan national government. There is also a lack of standardised waste management laws at county (subnational) level, which impedes market actors from contributing effectively to plastics management. During the last decade, Kenya has implemented several relevant pieces of legislation that promote the transition to a more circular economy, as summarised in the box below.

Although the policy framework may appear fairly robust, many of the regulations are still in draft format and strategic documents or implementation plans are poorly enforced. The enabling environment is lacking and, without coordination and enforceable mandates, transitioning to a more circular approach will be difficult.

Legislation in Kenya

Relevant legislation and policy for Kenya's circular plastics economy includes the following:

2014	National Solid Waste Management Strategy
2016	Nationally Appropriate Mitigation Action (NAMA) on Circular Economy Municipal Solid Waste Management Approach for Urban Areas (2016)
2016–2030	Green Economy Strategy and Implementation Plan
2017	National Plastic Bag Ban
2019	Solid Waste Management Bill
2020	Single-use Plastic Ban
	The Sustainable Waste Management Bill
2021	Draft EPR Regulations

Knowledge and understanding

Following the plastics bans actioned by the Kenyan government, the private sector, through the Kenya Association of Manufacturers (KAM), produced the Kenya Plastic Action Plan. This plan provides for in-depth research into the Kenyan plastics sector and outlines the entire plastics value chain, spanning from imports of raw material to manufacturing processes, to uses and the subsequent recycling of different plastic fractions (KAM, 2021). The plan was written to foster concepts of the circular economy in the plastics sector and proposes the creation of a model for extended producer responsibility (EPR).

Understanding of the current status quo for plastic in Kenya is still emerging. The Kenya Plastics Pact, which was launched in 2021, will also help to demystify plastic and the circular economy.

The knowledge base needs to be underpinned or supported by the enabling environment, i.e. the policy landscape.

Enforcement and execution

The monitoring and enforcement of key legislation has proven to be an enormous challenge. This is particularly true of the national plastic bag ban (2017). It is not uncommon to see some roadside traders in urban and rural areas still selling plastic carrier bags and plastic flat bags (Oguge et al., 2021).

Voluntary activities in the private sector, including social enterprises and the informal economy, are leading the implementation of circular plastics activities in Kenya.

The Kenya Private Sector Alliance (KEPSA) is supporting the Kenya Association of Manufacturers to set up a business model for EPR for other streams of plastics apart from PET.

The Kenya Plastics Pact was launched in 2021 in parallel with the development of EPR regulations; however, the process and contradictory decisions from the government are causing confusion among participating businesses.

Social enterprises that engage in the informal plastics economy, such as Mr Green and EcoPost, are leading the execution of plastic waste management practices on the ground by facilitating recycling, upcycling and reusing.

Private and voluntary initiatives are not sufficient to move the country towards a circular plastics economy. There is a need for an enabling environment coupled with knowledge-sharing and understanding of the problem.

South Africa

Enabling conditions

Of the three countries, South Africa has the most robust policy framework. It also has the strongest stakeholder and institutional landscape for a circular plastics economy, but major misalignment remains between the policies of different government departments. The Department of Forestry, Fisheries and the Environment (DFFE), the Department of Science and Innovation (DSI) and the Department of Trade, Industry and Competition (DTIC) all have policies or strategies related to plastics, but they are not coherent between the departments.

Misaligned strategies, a lack of coordination and challenges in mandates are not conducive to achieving common goals. Clear leadership is required, which could be led by the economic or industrial development ministries rather than the environmental departments as the latter often do not carry the same weight or lack the mandate to implement circular economy initiatives.

Legislation in South Africa

Relevant legislation and policy for South Africa's circular plastics economy include the following:

2003	Environment Conservation Act: Regulations: Plastic Bags
2008	National Environmental Management: Waste Act 59 of 2008
2018	National Waste Management Strategy
	Regulations regarding the exclusion of a waste stream or a portion of a waste stream from the definition of "waste" (as defined in the National Environmental Management: Waste Amendment Act 26 of 2014)
2020	Circular Economy Guidelines for the Waste Sector
2021	Extended producer responsibility regulations for the paper and packaging, e-waste and lighting sectors
2021	Plastics bag directives under the Amendment Regulations regarding Plastic Carrier Bags and Plastic Flat Bags, 2021

Knowledge and understanding

A phenomenal amount of work is being done to build greater knowledge and understanding for a circular plastics economy in South Africa. Table 2 provides a snapshot of a range of current research and development initiatives that is being carried out by government, civil society and private-sector role-players.

The challenge with all the research mentioned in Table 2 is that it is being undertaken by many different institutions from the public and private sectors, resulting in a lack of coordination. To ensure that knowledge and research can be used effectively for planning and implementation purposes, an overarching coordinating structure is needed to bring all the studies together so that the information can be accessed by all and be utilised in the most effective manner.

Baled plastic packaging at a storage site in Pongola, South Africa.

© Dimpho Lephaila/WWF South Africa

TABLE 2: INITIATIVES AND RESEARCH TO BUILD KNOWLEDGE AND UNDERSTANDING FOR SOUTH AFRICA'S CIRCULAR PLASTICS ECONOMY (2015-2021)

Name of initiative	Key role-players
The Biorefinery Industry Development Facility	CSIR
Council for Scientific and Industrial Research (CSIR) Advanced Polymer Composites research group • Compostable/biodegradable bioplastics R&D programme • Biodegradation Testing Facility • Development of technologies to enhance the properties of recycled plastics	CSIR, UNIDO, industry partners
CSIR's Sustainability, Economics and Waste research group **Research and development (R&D) projects include:** • Science, Technology and Innovation for a Circular Economy • Mainstreaming coherent product policies, including through the circular economy (UNEP) • Building an inclusive circular economy: The case for informal waste sector inclusion (WWF South Africa) • Impacts of marine plastic debris on ecosystem services and the economy (Waste RDI) • Testing and applying the PEW Breaking the Plastic Wave Model for South Africa • Life Cycle Sustainability Assessment of Plastic Bags (Waste RDI Roadmap) • Support for Transitioning from Conventional Plastics to More Environmentally Sustainable Alternatives (Japan/UNIDO)	CSIR
SARChI Research Chairs in Waste and Climate Change and Waste and Society	UKZN, UWC, DSI, NRF, CSIR
University of Cape Town's Environmental and Process Systems Engineering research group **Projects include:** • Material Flow Analyses (MFA) of plastics in South Africa • Assessing economy-wide prospects for a more sustainable circular economy in South Africa (MFA) • Various life-cycle assessments related to plastics	UCT
GreenCape Circular Economy Programme **Projects include:** • Circular Economy RDI needs assessment (for DSI, 2019) • Plastics circular economy market study (World Bank)	GreenCape
Science review of marine plastic pollution in South Africa (Waste RDI Roadmap)	DSI, CSIR, NWU, UCT, UWC
DFFE-funded projects • Survey of the extent of single-use plastic waste and possible policy options • Appointment of a consultant to develop a Waste Economy Master Plan • Assessment to determine waste streams with high potential for circularity • Refuse-derived fuel feasibility study	DFFE
WWF-led or -funded projects • Plastics: Facts and Futures – Moving beyond pollution management towards a circular plastics economy in South Africa • Urban lockdown lessons for South Africa: Essential considerations for a resilient and equitable waste sector • Plastics: From recycling to post-consumer recyclate – Industry views on barriers and opportunities in South Africa • Extended producer responsibility for plastic packaging in South Africa: A synthesis report on policy recommendations • Building an inclusive circular economy: The case for informal waste sector inclusion in Africa (CSIR) • Economic case for a circular plastics economy in Africa: Findings and recommendations for Côte d'Ivoire, Kenya and South Africa (this study) • Plastic pollution in Africa: Identifying policy gaps and opportunities	WWF South Africa
Circular Economy in Africa-EU Cooperation; Country Report for South Africa	Trinomics
Green Building Council of South Africa (GBCSA) – Survey of retailers on plastics and circular economy	GBCSA

Enforcement and execution

Similar to most African countries, even in larger and more industrialised countries like South Africa the capacity to enforce plastics-related policies and legislation is limited. There are also issues of inconsistency in enforcement where public-sector operations are not held to the same regulatory penalties as the private sector. This is due to procedural requirements that need to be followed in terms of the Intergovernmental Relations Framework Act 13 of 2005 when bringing a municipality or government department to book.

Although there are several initiatives taking place throughout the plastics value chain, they are disjointed among stakeholders due to a lack of sector-wide collaboration and trust among industry, civil society and government bodies (Sadan and De Kock, 2020). Circular plastics activity is being driven by the **government**, the **private sector** and **civil society**. Multi-stakeholder initiatives include the commitments of and the work being done by the South African Plastics Pact, the momentum moving towards standardisation starting with the on-pack recycling labelling (OPRL) initiative, and the plastic packaging industry's active producer responsibility organisation (PRO) network.

Voluntary initiatives add value to the existing enabling environment and create a pre-competitive space for industry role-players to build trust to develop potentially different and more circular business models. This is being tested by the South African Plastics Pact and seems to be successful, especially in the open discussions of the many action groups who are setting mutual goals to reach ambitious targets.

In order to transition to more circular approaches, consistent application of the existing legal framework is required. A clear and coordinated vision is lacking between the different (and at times the same) government departments at national level. A collaborative approach is needed to bring circular interventions together in terms of policy, enforcement and implementation.

A receptable to collect post-use material at a beach in Kenya.

© WWF-Kenya

ECONOMIC RATIONALE FOR MOVING TOWARDS A CIRCULAR PLASTICS ECONOMY

In order to ascertain whether there is an economic rationale to transition to a circular plastics economy, macroeconomic modelling is the preferred framework to evaluate the wide range of attributes and potential outcomes in each of the three countries up to 2050.

MACROECONOMIC MODELLING

Modelling a transition to a circular plastics economy requires a flexible methodology and framework that can be adjusted to accommodate the unique attributes of such a system (Ellen MacArthur Foundation, 2015). A computational general equilibrium (CGE) model provides this framework and has been used in this study. The model makes use of the Global Trade Analysis Project-10 (GTAP-10) database (Aguiar et al., 2019), which underlies most global CGE models that examine environmental and economic issues at an international level. It relies on input-output tables and various international datasets that describe the sale and purchase relationships between producers and consumers in an economy.

BOX 3: LIMITATIONS OF CGE MODELLING

The "hybrid" computational general equilibrium (CGE) modelling methodology and approach used in this report has limitations that must be considered when analysing the modelling results. Some of these include:

- The model's ability to capture granular detail, such as specific informal activity and related jobs, new trades or businesses in a circular plastics economy; skills and training programmes needed; the quantum of financing for specific new infrastructure; and fully capturing all externalities in production and utility functions.
- CGE modelling still relies on traditional metrics, such as GDP, for economic analysis. GDP is not an ideal measure for economic sustainability or circularity because it excludes non-market transactions. It does not account for or represent the degree of income inequality in society, it fails to account for the costs imposed on human health and the environment of negative externalities arising from the production or consumption of the nation's output, and it ultimately fails to indicate whether the nation's rate of growth is sustainable or not.

The modelling of this transition also requires an explicit representation of the country-specific primary and secondary production activities for plastics. For this study, recycling and the production and use of primary and secondary plastics were disaggregated for the analysis:

- **Primary plastic products:** Plastic products produced from virgin plastic
- **Secondary plastic products:** Plastic products produced from secondary plastic (non-virgin materials/recycled plastic); the "secondary" activity uses plastic waste collected (and in some cases pre-treated) by the "recycling" activity to produce recycled plastic products
- **Recycling**: An activity that collects plastic waste or that uses plastic products for further recycling; it does not produce any plastic products per se but provides all the collected waste as an input to the "secondary" activity.

A summary of the modelling approach used in this study is provided in Figure 6.

Business-as-usual scenario

The business-as-usual (BAU) baseline scenario, which represents the development path for each country or region's economy with no changes to the status quo, was run up to 2050. While the nature of any long-term projection is fundamentally speculative, the most important output for a meaningful interpretation of results and associated recommendations is found in the deviations from the baseline under the various circular plastics economy scenarios and not in the actual forecast. The baseline provides the most accurate view of projected growth in each country or region without any policy intervention or exogenous change. For this reason, the deviations from the baseline provide better answers to policy questions such as the impact of transitioning to a circular plastics economy. The baseline data on select economic and plastic indicators for all three countries used in the CGE modelling is provided in Appendix A.

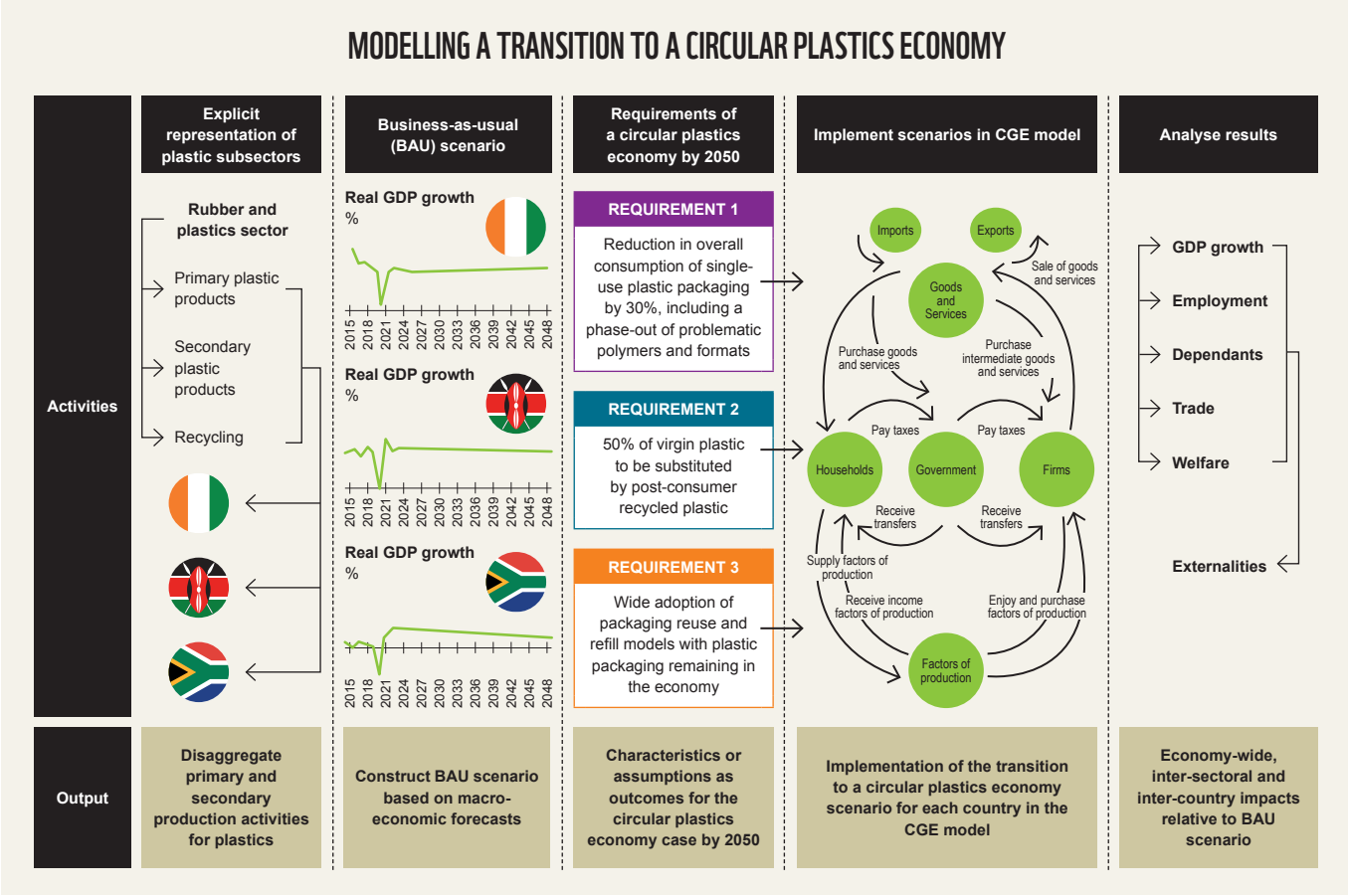


Figure 6: Macroeconomic modelling approach for transition to a circular plastics economy

Circular plastics economy scenario

Using insights drawn from the literature and key stakeholder engagements, the impact on various macroeconomic variables of a transition to a circular plastics economy for Côte d'Ivoire, Kenya and South Africa was estimated. The analysis used **stylised**[3] **economic instruments** (taxes, subsidies and direct demand reductions) to show cost-reflective policy options to achieve a transition to a circular plastics economy.

The circular plastics economy scenario has three core requirements, as shown in Figure 7.

The structural changes ("shocks") implemented in the CGE model do not affect the circular plastics economy outcome characteristics or assumptions for 2050 in isolation. Instead, all structural changes ("shocks") are interrelated and interdependent in affecting plastics industry outcomes.

BOX 4: THREE CORE REQUIREMENTS OF THE CIRCULAR PLASTICS ECONOMY SCENARIO

1 A reduction in overall consumption of single-use plastic packaging by 30%, including a phase-out of problematic polymers and formats

This was implemented in the model as an output tax, resulting in a 15,6% reduction in aggregate demand for the primary plastic products sector. Thus, a 30% reduction in single-use plastics packaging equates to a ~15,6% reduction in aggregate plastics demand (i.e. plastic packaging represents around 52% of plastics products, thus a ~15,6% reduction in aggregate primary demand, rather than the full 30% as primary demand shock to represent packaging).

Plastic packaging represents 52% of plastic raw material produced and imported into South Africa (DTIC, 2020), which has also been extrapolated for Kenya as reported in Elliot et al. (2018). Due to a lack of data on the share of plastic packaging in total plastics production, this 52% has also been assumed for Kenya and Côte d'Ivoire, which is higher than the global average of 35% of the volume of all plastic products produced worldwide, to represent plastic packaging (Barrowclough et al., 2020).

2 50% of virgin plastic to be substituted by post-consumer recycled plastic

This was implemented in the model as a tax-subsidy combination – the tax to achieve a 50% reduction in demand for primary plastic products, and the subsidy to boost production in the secondary plastic products sector of ~43,6% and the "recycling" activity of 6,4% (based on the current output share of "Secondary plastic products" and "Recycling" in the model) (Figure 6).

Taxation was implemented to achieve a 34,4% reduction in primary plastic demand due to the 15,6% reduction to aggregate demand of packaging made from primary plastic products under Requirement 1. This resulted in reducing overall aggregate demand for primary plastic products by 50%.

3 Wide adoption of packaging reuse and refill models with plastic packaging remaining in the economy

This was implemented in the model as a decrease in demand in plastic products overall, along with positive demand shocks for services (repairs, refill, logistics), assuming that the lifetime of goods will be longer and such goods will take longer to become waste (this also has an impact on the amount of input to recycled plastics).

The decrease in demand for overall plastic products is achieved by applying an additional structural change to the secondary plastics sector, given the reduction in overall demand in Requirement 1 and 2 for primary plastic products. Put simply, we further reduced demand for secondary plastic products and shifted this demand to the services industries that would see an increase in activity following an increase in reuse and refill.

3 Other mechanisms are available to implement the specific options but are not considered in this report, such as using bans and then using the model to identify investment shocks to specific sectors and industrial activities or where rents will take place. There is not much current information available to take these costs into account effectively.

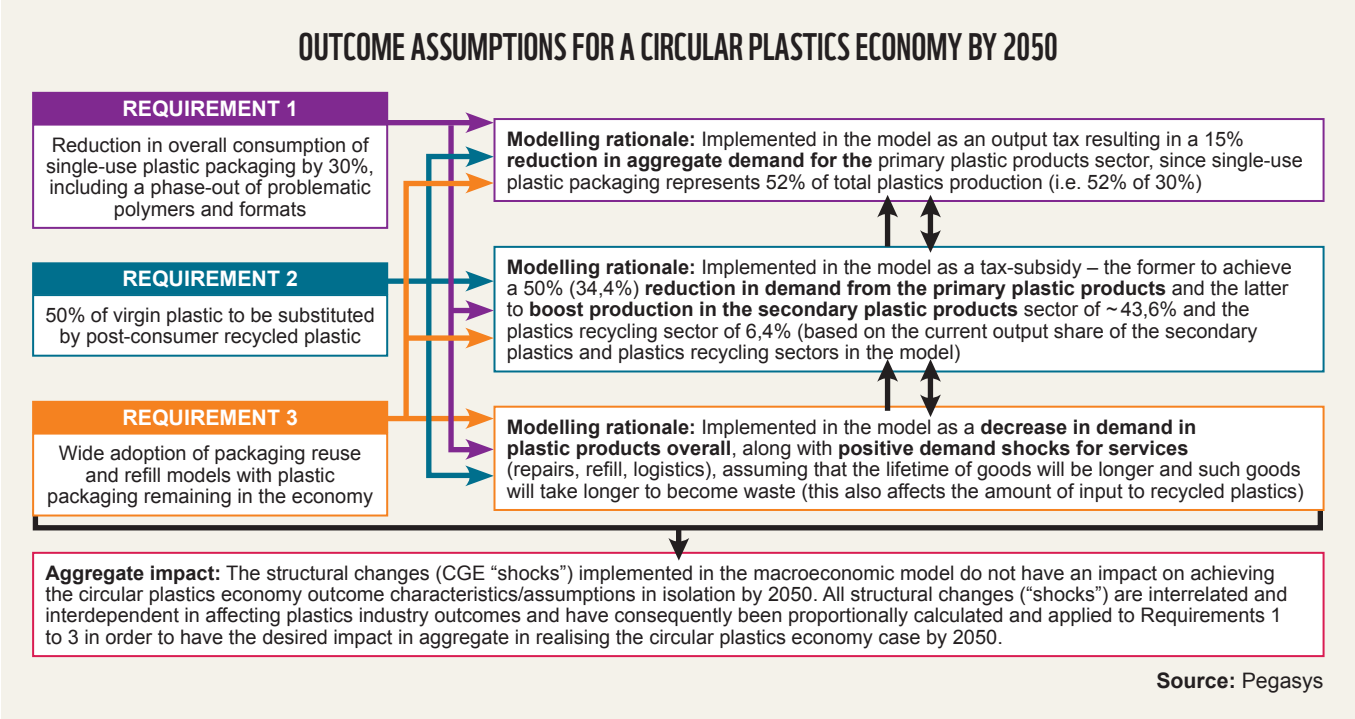


Figure 7: Characteristics or assumptions as outcomes for the circular plastics economy case by 2050

The transition to a circular plastics economy presented in Figure 7 is implemented for all three countries at three alternative rates of structural change in the plastics value chain to achieve the set targets by the end of 2050. These three implementation options inform specific policy recommendations about how the transition to a circular plastics economy should happen, and what the implications of these structural changes wo uld be in each country. The three options for implementation are shown in Box 5 and Figure 8.

BOX 5: THREE OPTIONS FOR IMPLEMENTATION

1 Immediate implementation (i.e. ambitious implementation of structural changes with maximum environmental gain)

Under this option, the set targets are achieved more rapidly in the first half of the period due to large-scale buy-in and investments to transition to a circular plastics economy. The latter part of the period (i.e. from about 2036 to 2050) sees the rate of change to achieve the set targets by 2050 slowing down. This implementation option would also ensure the greatest environmental gains from moving away from the linear plastics model as soon as possible.

2 Incremental shift (i.e. gradual shifting of economic models with steady environmental gains)

Under this option, the set targets are achieved at a steady or equal rate of change over the entire period to transition to a circular plastics economy. The annual rate of change is 3,4% over the entire period, with each economy achieving the same set targets by 2050.

3 Late implementation (i.e. conservative implementation of structural changes with the greatest environmental cost)

This option is inverse to the "Immediate implementation" option. Under this option, the rate of change is slow at the beginning of the period but picks up in the second half leading up to 2050. Here the assumption is that a slow pick-up rate takes significant time and effort to start the transition to a circular plastics economy. Efforts only start bearing fruit near the end of the period but still achieve the set targets by 2050. It is important to note that the later the circular economy transition is implemented, the greater the cost of the environmental impacts of the status quo.

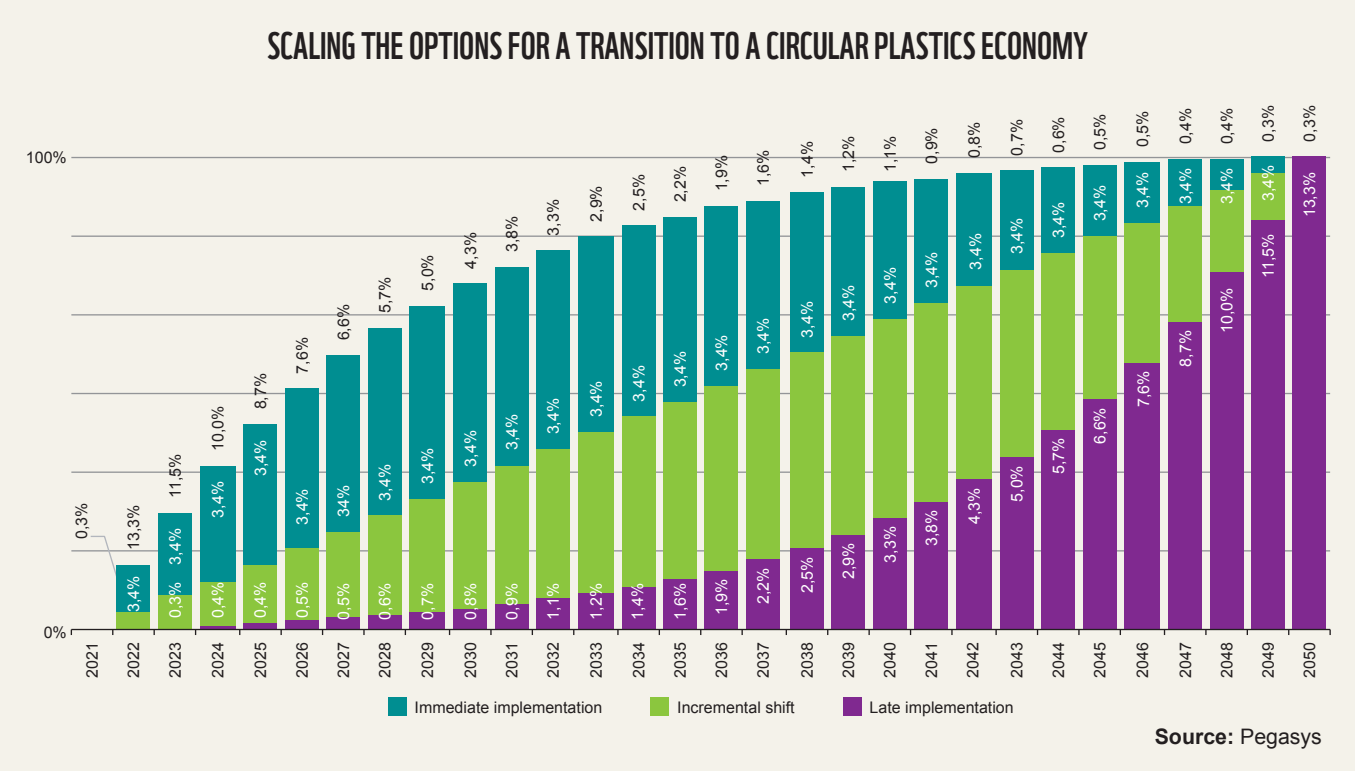


Figure 8: Weights used to scale the options for a transition to a circular plastics economy

ECONOMIC RATIONALE FOR A CIRCULAR PLASTICS ECONOMY

The economic case for the transition to a circular plastics economy is demonstrated using key metrics, including:

- The impact of the transition on GDP growth
- The demand for skilled and unskilled labour
- Informal employment dynamics and the impact on dependants (calculated using the World Bank's age-dependency ratio for each country per 100 working-age population)[4]
- Welfare and household income experienced by consumers in each country

The equivalent variation (EV) welfare measure quantifies the welfare effect. EV is a money-metric measure of the value to the consumer of the price changes due to a shock (Burfisher, 2016). The EV measures the welfare impact of a policy change in monetary terms and is defined as the amount of income that would have to be given to (or taken away from) the economy before the policy change, so that the economy is as well off as it would have been after the policy change (Andriamananjara et al., 2003). If the EV for a policy simulation is positive, it implies that the policy change would improve economic welfare.

All three implementation options have positive cumulative effects at the end of the period (2050) for all three countries. However, the results also show that the **rate of implementation** of these structural changes is an important economic consideration that must be judged not only against a country's specific macroeconomic structure and starting point, but also against the wider social and environmental cost of inaction.

GDP growth

A transition to a circular plastics economy results in more economic activity than the business-as-usual scenario, which means that consumers receive more income in the form of higher labour and capital income, leading to increased spending on goods and services. Aggregate consumption in the country therefore increases by 2050. In addition, higher aggregate consumption, investment and improvement in net exports lead to a higher GDP.

4 data.worldbank.org/indicator/SP.POP.DPND?locations=CI-KE-ZA.

For **Côte d'Ivoire**, Figure 9 illustrates the cumulative real GDP changes relative to the baseline for the various transition rates to a circular plastics economy. All three options have positive cumulative effects by the end of the period (2050), with the "Late implementation" option having the largest positive impact across all metrics. It achieves cumulative GDP growth of 2,55% by 2050, compared to 2,54% for the "Immediate implementation" option and 2,42% for the "Incremental shift" option. **These changes are equal to between $1,1 billion and $1,2 billion in additional GDP growth, or roughly a $100 million difference between the "Late implementation" and "Immediate implementation" options.**

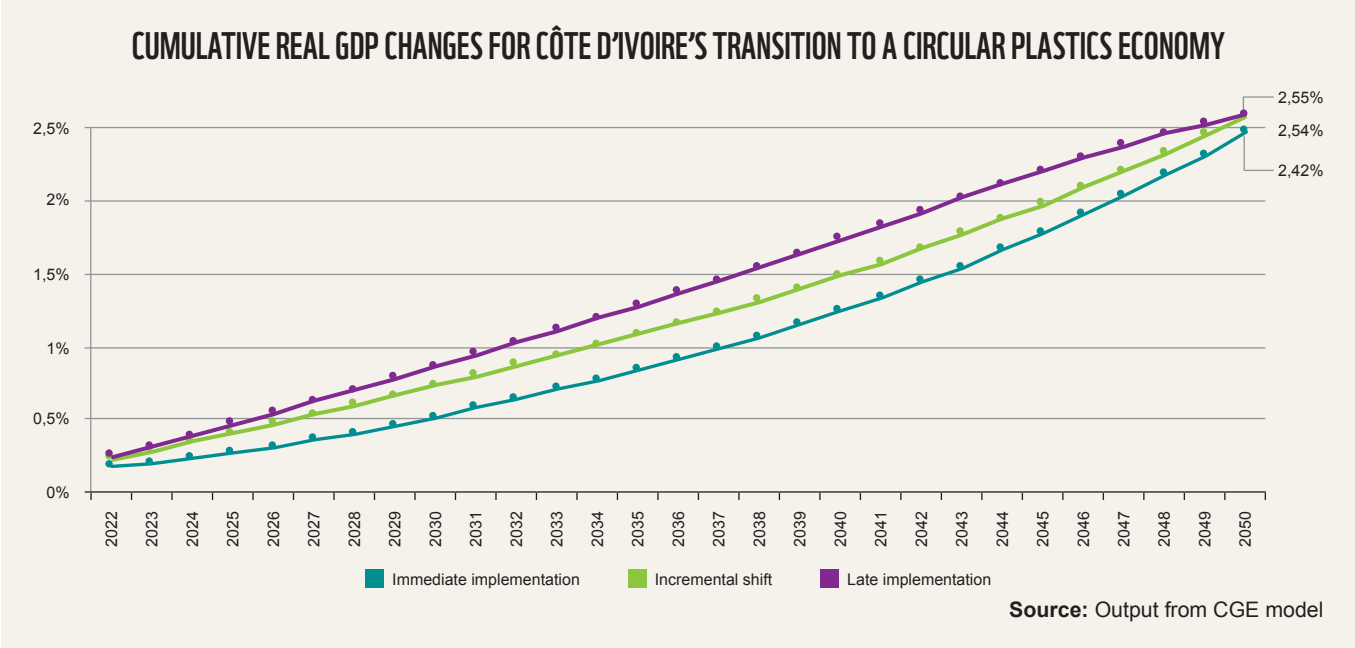


Figure 9: Cumulative percentage change in real GDP for Côte d'Ivoire relative to the baseline (%)

In **Kenya**, the transition to a circular plastics economy supports real GDP growth that is 3,6% higher than the business-as-usual scenario, as shown in Figure 10. This is equal to about $2,53 billion in additional GDP growth. Owing to the small size of the plastics industry in Kenya, there is no discernible difference in impact between the speed at which the transition to a circular plastics economy happens.

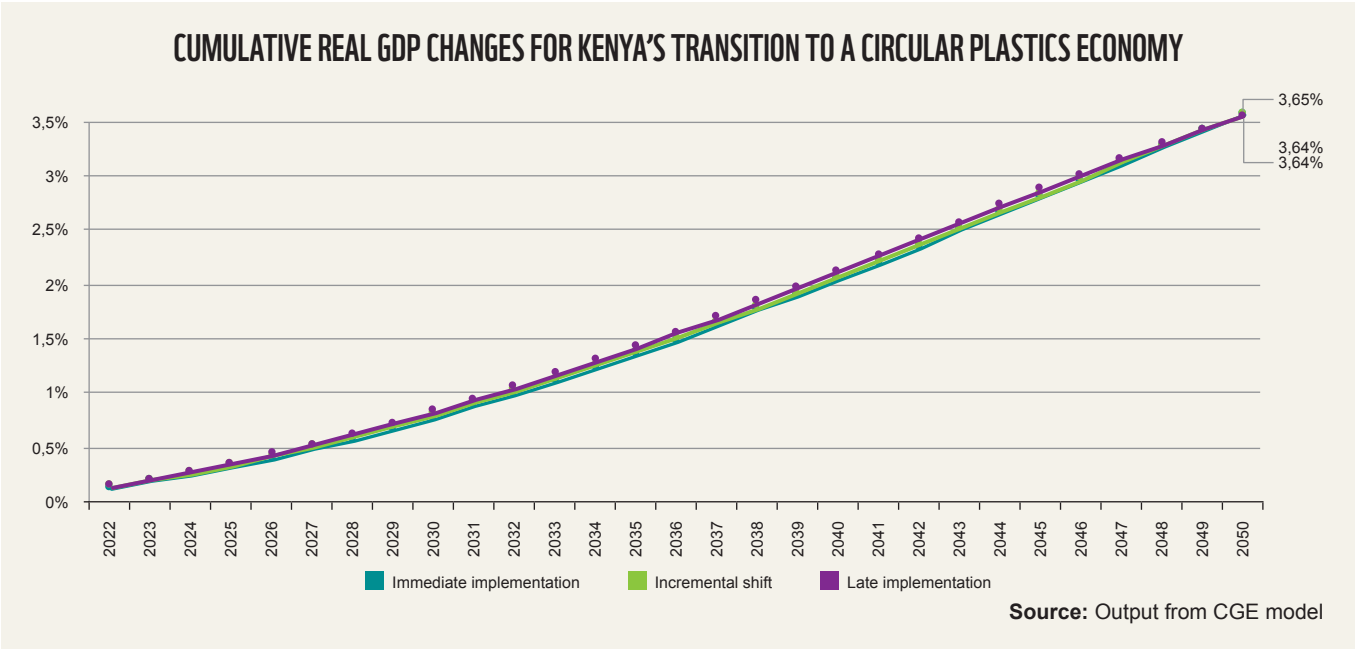


Figure 10: Cumulative percentage change in real GDP for Kenya relative to the baseline (%)

A bottled water filling plant.

© Unsplash

For **South Africa**, Figure 11 illustrates the cumulative real GDP changes relative to the baseline for the various transition rates to a circular plastics economy. All three implementation options have positive cumulative effects for South Africa by the end of the period (2050), with the "Late implementation" option having the largest positive impact overall. Cumulative GDP growth of 2,12% is achieved by 2050, compared to 2,11% for the "Immediate implementation" option and 2,01% for the "Incremental shift" option. **This equals between $7,8 billion and $8,2 billion in additional GDP growth outcomes, or roughly a difference of $400 million between the "Late implementation" and the "Incremental shift" options.** However, the results also show that the "Immediate implementation" option would have a negative effect on GDP growth during the first few years of the transition due to the structural changes taking place in South Africa's more established plastics sector.

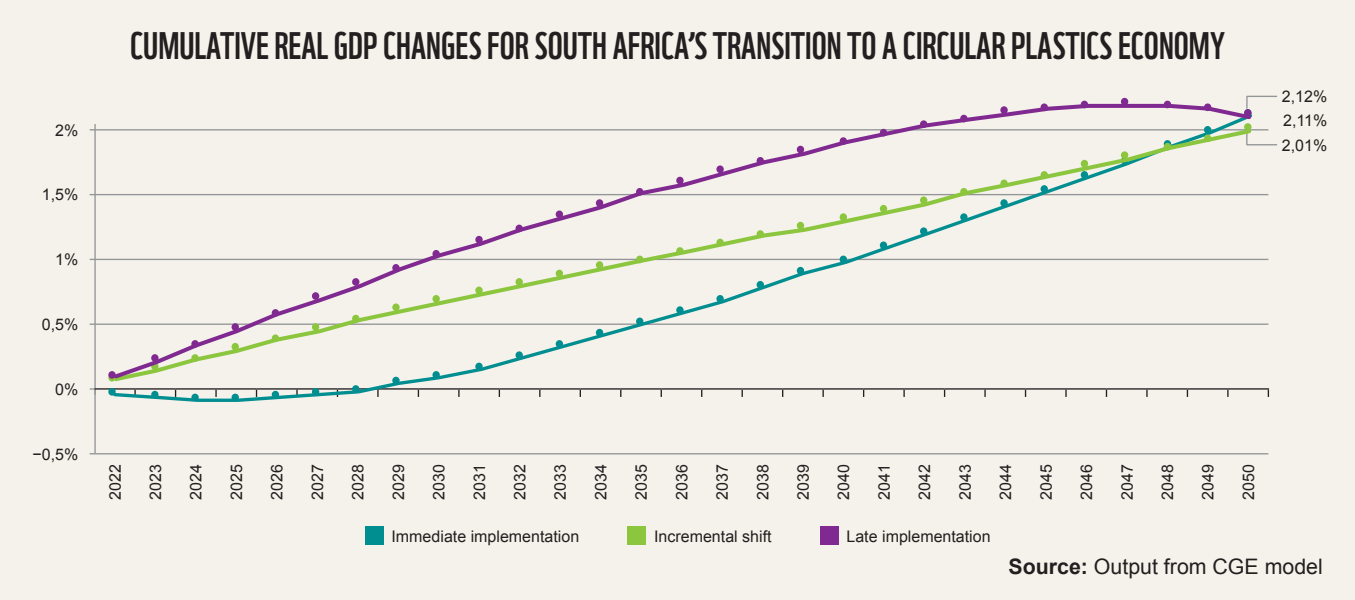


Figure 11: Cumulative percentage change in real GDP for South Africa relative to the baseline (%)

Formal employment: skilled and unskilled

The plastics industries in all three countries already support a range of skilled and unskilled employment opportunities. In all three countries, the circular plastics economy leads to an overall increase in the demand for both skilled and unskilled labour. This suggests that there is strong potential for an inclusive circular plastics transition.

In **Côte d'Ivoire**, the circular plastics transition results in a net-positive impact on sector value added and employment, with negative impacts concentrated in the (upstream) chemical products sector and the (downstream) transport and communications sector. Sector-level employment impacts are shown in Figure 12.

Figure 12: Skilled (formal) and unskilled (formal) employment by sector (cumulative % deviation) in Côte d'Ivoire by 2050

In **Kenya**, given that the labour-to-output ratio is similar for the primary and the secondary plastics industry, a shift from primary to secondary plastic products will mostly have a neutral effect. That implies that the positive economy-wide employment effects observed are due to employment gains across the secondary plastics value chain and in those sectors positively affected by an increase in demand for repair/reuse services. The increased uptake in reuse and refill models for plastic packaging is visible in the positive impacts on "Other manufacturing", which includes repair, maintenance and collection/return services. In addition, positive growth in value added for recycling is also visible given the increased demand for secondary plastics production. These sectoral shifts result in a net-positive impact on formal skilled and unskilled employment in Kenya, as shown in Figure 13.

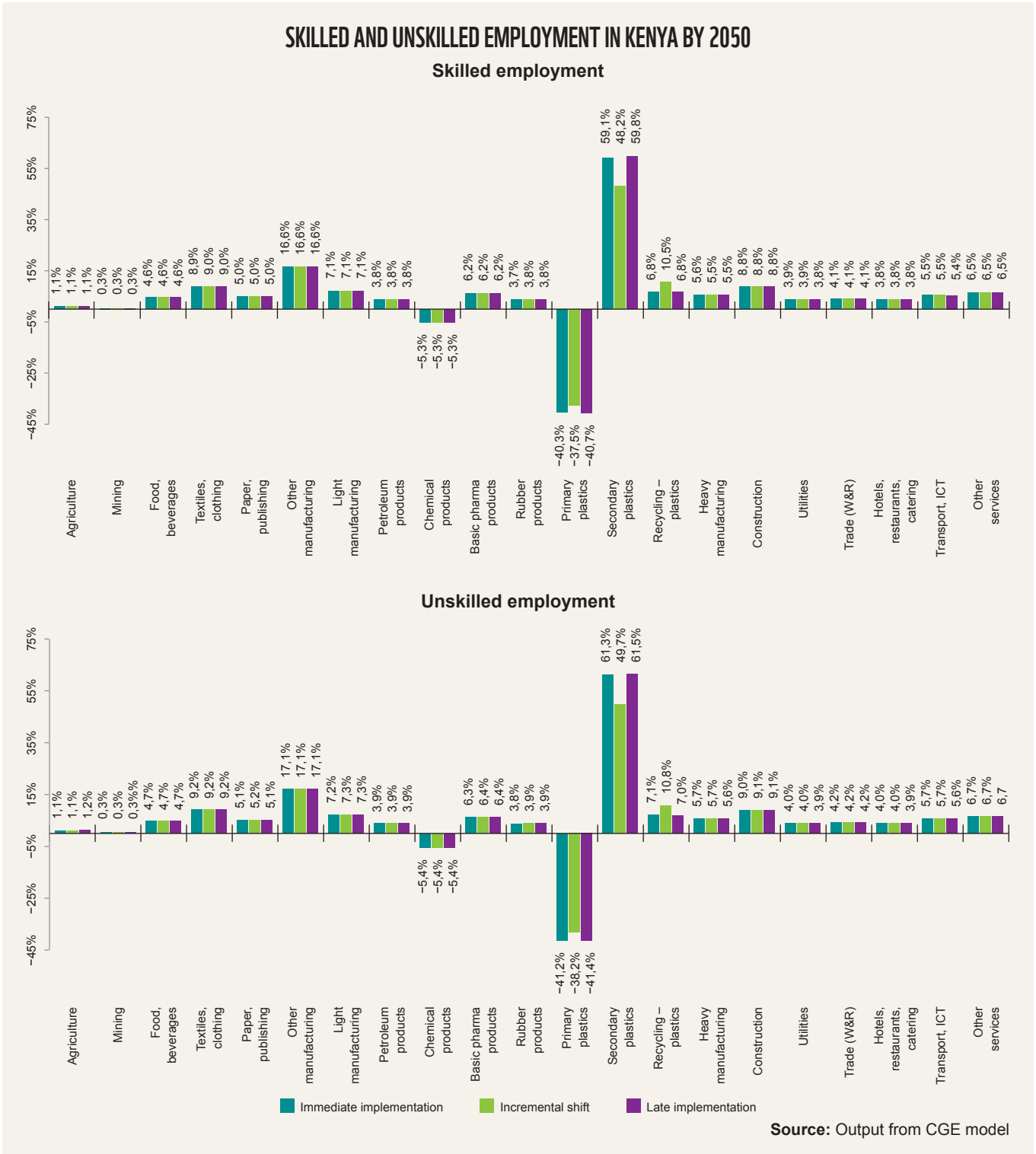


Figure 13: Skilled (formal) and unskilled (formal) employment by sector (cumulative % deviation) in Kenya by 2050

In **South Africa**, the "Late implementation" option holds the most significant benefit for both skilled and unskilled employment. This result is driven by the intensity of skilled and unskilled labour per sector and the fact that the primary plastics sector is already well established. Therefore, employment during the transition to a circular plastics economy in South Africa is expected to decline in the primary plastics sector and its value chain.

However, these sector-specific employment losses will be absorbed through growth in the secondary plastics and services sectors (which has implications for the need to design and ensure an inclusive transition in the plastics industry). The impact on formal skilled and unskilled unemployment by sector is illustrated in Figure 14, which highlights that these sectoral shifts result in a net-positive impact on formal skilled and unskilled employment in South Africa.

Figure 14: Skilled (formal) and unskilled (formal) employment by sector (cumulative % deviation) in South Africa by 2050

Informal employment and dependants

The International Labour Organization (ILO) estimates that about 1% of the urban workforce in the developing world, or 15 to 20 million people, are engaged in recycling (WIEGO, 2020). Known as waste pickers or informal waste reclaimers, they collect, wash, sort and process materials that are discarded after use from streets, waterways and landfills. Waste pickers are generally not compensated for collecting this material but earn a meagre income through selling it to buy-back centres and recyclers, where the price paid fluctuates due to volatile commodity markets.

Several studies and organisations have attempted to determine the number of waste pickers, from local to global scales (Buch et al., 2021). Although some data is available for cities, country-level and global data are scarce. According to Awad et al. (2013), waste pickers comprise an estimated 0,1–0,4% of workers in seven West African cities, and 0,7% of workers in southern Africa. Accordingly, it is vital to understand the quantum of informal employment and dependants that may be affected by the transition to a circular plastics economy for each of the three African countries.

Figure 15 highlights two critical metrics for **Côte d'Ivoire**: (1) An estimate of the number of informal waste reclaimers, and (2) the number of dependants in 2020. These figures indicate that there are 30 043 informal waste reclaimers (other sources estimate more than 23 198 waste pickers in Côte d'Ivoire at present[5]) and 23 948 dependants.

Figure 15 shows that there are 71 097 informal waste reclaimers in **Kenya** (other sources estimate that Kenya currently has more than 51 536 waste pickers[6]) and 39 101 dependants.

Figure 15 shows that there are 108 564 informal waste reclaimers in **South Africa** (other sources estimate that South Africa currently has more than 60 000 informal waste reclaimers[7]) and 31 339 dependants. These figures represent a large number of workers and livelihoods on which a transition to a circular plastics economy may have a positive impact.

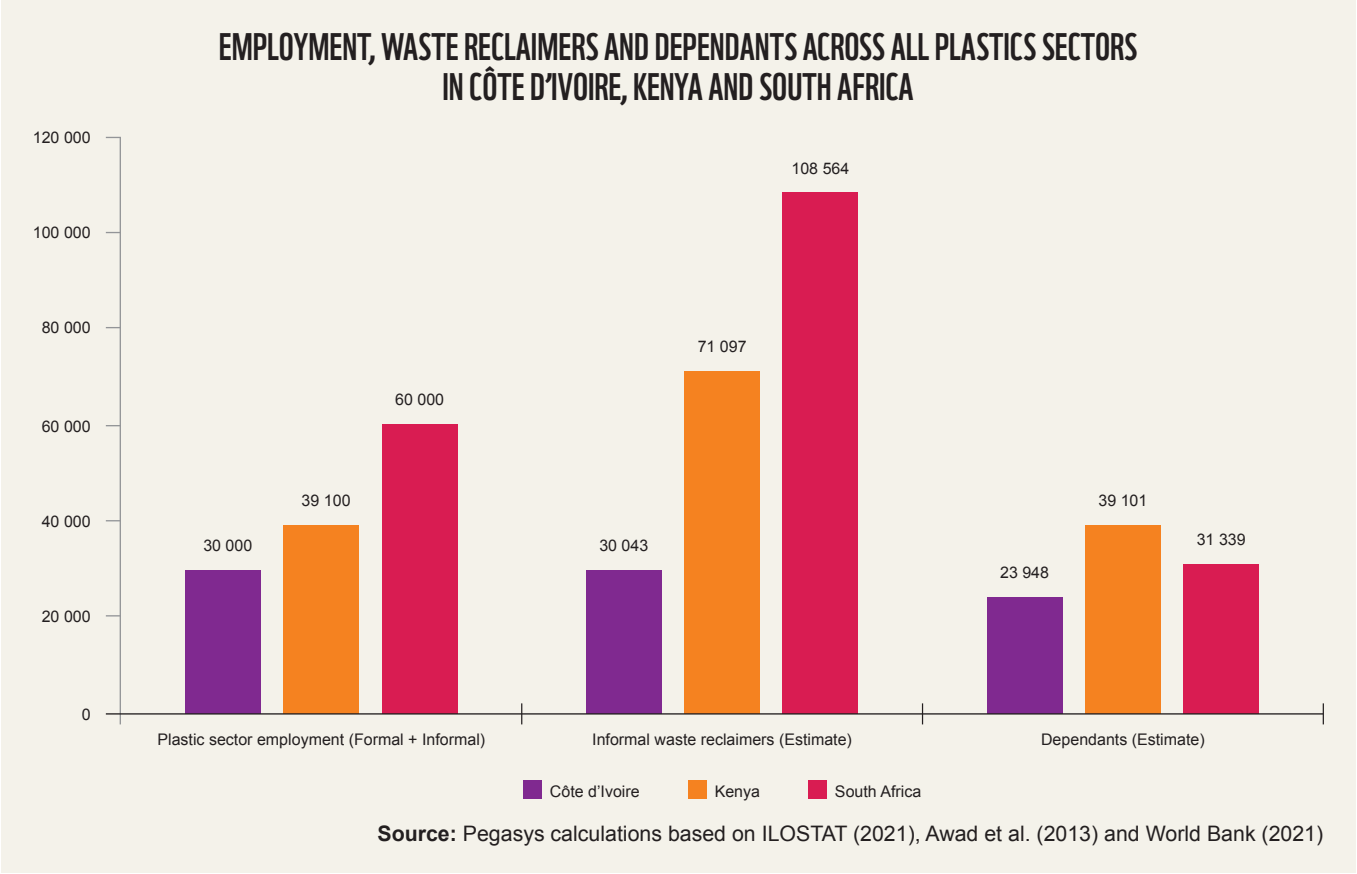


Figure 15: Total formal and informal employment across all plastics sectors, informal waste reclaimers and dependants in Côte d'Ivoire, Kenya and South Africa in 2020

5 ilo.org/wcmsp5/groups/public/---dgreports/---stat/ documents/publication/wcms_234413.pdf
6 ilo.org/wcmsp5/groups/public/---dgreports/---stat/ documents/publication/wcms_234413.pdf
7 unido.org/stories/helping-south-africas-waste-pickers-face-covid-19-crisis-and-beyond

Welfare and household income

Welfare and household income measures show the impact of a circular plastics transition on consumers.

Figure 16 shows the projected change in welfare and household income for **Côte d'Ivoire**, in each of the three options modelled. Both metrics show positive gains for households in Côte d'Ivoire from a transition to a circular plastics economy.

Figure 16: Cumulative change in consumer welfare and household income in Côte d'Ivoire relative to the baseline

Figure 17 shows the projected change in welfare and household income for **Kenya** in each of the three implementation options modelled. Both metrics show positive gains for households in Kenya.

Figure 17: Cumulative change in consumer welfare and household income in Kenya relative to the baseline

For **South Africa**, Figure 18 shows the projected change in welfare and household income in each of the three options modelled. The "Late implementation" option leads to the greatest overall change in the welfare of consumers, while the "Immediate implementation" option leads to the greatest change in household income (after a negative impact on household income in the short term).

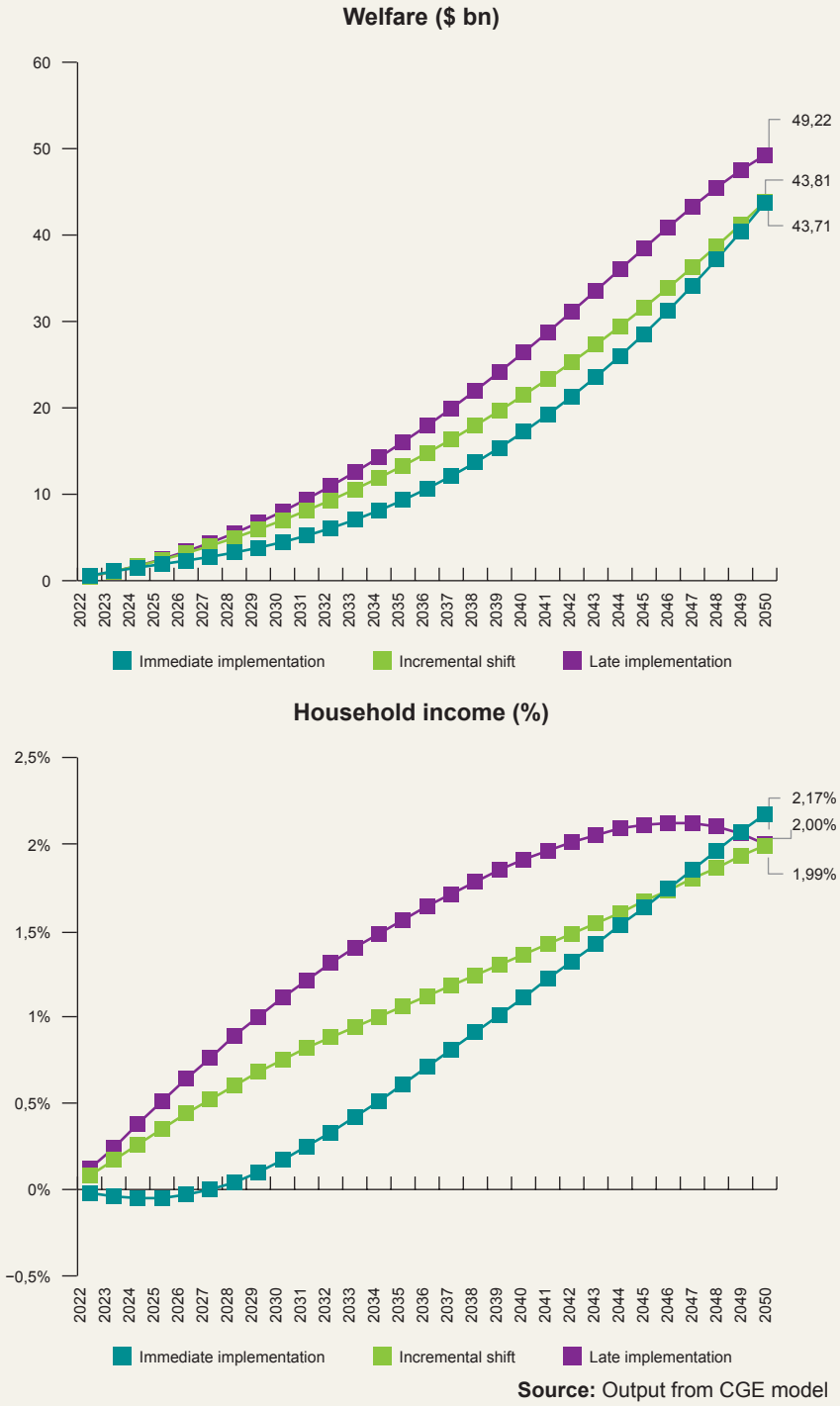


Figure 18: Cumulative change in consumer welfare and household income in South Africa relative to the baseline

Cost of externalities

The direct and indirect costs of the linear plastics model will accumulate in a business-as-usual scenario, driving unnecessary expenditure by governments and imposing social and environmental costs on the public.

Although the CGE modelling approach cannot directly quantify the cost of externalities alongside the analysis of economic impact of the circular plastics transition, some of the changes in these costs can be estimated. The changes in the costs of the listed externalities are based on changes in output (used as a proxy) of the primary plastic products sector. The difference in output between the business-as-usual scenario and the "Immediate implementation" option of the circular plastics economy scenario is used to calculate the cost savings and volume reductions shown in Table 3. The "Immediate implementation" option is used in the comparison because from the outset it generates the greatest environmental and societal "gains" from addressing the externalities associated with a linear plastics model.

The figures in Table 3 are based on the global and national figures outlined in Table 1 showing the costs of the linear plastic packaging model. The potential costs that could be avoided with the immediate implementation of circular plastics economy measures are shown in Table 3.

TABLE 3: ABSOLUTE CHANGES IN COSTS OF THE LINEAR PLASTIC PACKAGING MODEL FOLLOWING THE TRANSITION TO A CIRCULAR PLASTICS ECONOMY

Cost category	Cost description	Direct costs (market, monetary) m = million bn = billion trn = trillion	Indirect costs (non-market) Quantitative
Waste management	The cost to collect, sort, recycle or dispose of plastic waste by both the formal and informal sectors	**Global:** $0,4bn **CI:** $15 400 **KE:** $60 000 **SA:** $80 000 (Annual cost saving)	**Global:** 155m tonnes **CI:** 721 000 tonnes **KE:** 302 000 tonnes **SA:** 406 000 tonnes (reduction by 2050)
	The cost to run clean-up activities	**Global:** $200m **CI:** $12 000 **KE:** $20 000 **SA:** $30 000 (Annual cost saving)	
	Increased operational and maintenance costs of seaports, marinas, waterways and stormwater networks	**Global:** $0,08bn **CI:** $4 600 **KE:** $12 600 **SA:** $22 000 (Annual cost saving)	
GHG emissions	Costs of GHG emissions from plastic production	**Global:** $5,5bn **CI:** $11 000 **KE:** $24 000 **SA:** $26 000 (Annual cost saving)	**Global:** 0,1 Gigatonnes **CI:** 100 tonnes **KE:** 100 tonnes **SA**: 1 200 tonnes (Annual reduction in emissions)
	Costs of GHG emissions from waste management processes		**Global:** 5,2m tonnes **CI:** 2 300–11 000 tonnes **KE:** 4 700 tonnes **SA:** Up to 30 000 tonnes (Annual reduction in emissions)
Forgone economic value	Loss of revenue (GDP reductions) in specific sectors (Tourism, Real estate, Fisheries and aquaculture)	**Global:** $0,1bn **CI:** $11 000 **KE:** $42 000 **SA:** $58 000 (Annual cost saving)	

Cost category	Cost description	Direct costs (market, monetary) m = million bn = billion trn = trillion	Indirect costs (non-market) Quantitative
Forgone economic value	Forgone value of plastic material (i.e. lost opportunity for recycling, upcycling and/or reuse)	**Global:** $3,6bn ($370bn market cost in 2019 where 70% is turned to waste) **CI:** $18 200 **KE:** $36 100 **SA:** $40 100 (Potential annual value of plastic material)	
Ecosystems and biodiversity	Reduction in marine ecosystem services including the various goods people can obtain from marine habitats, carbon sequestration, flood control, pest control, habitat, novel chemicals, genetic diversity, spiritual sites and recreation	**Global:** $0,04trn **CI:** $7,0m **KE:** $14,0m **SA:** $15,6m (Potential annual value of ecosystem services retained)	

Source: Authors' calculations using costs in Table 1

Over the full period to 2050, the subset of quantifiable externalities accumulates to significant sums. An indicative **total cost of continuing with the linear plastics packaging model in a business-as-usual scenario** can be summarised as follows for each country:

- **Côte d'Ivoire: $211 836 000**
- **Kenya: $425 841 000**
- **South Africa: $475 683 000**

Regional opportunities

Given the economic linkages across borders, consumption of goods in one region has an impact on the production of goods, and material extraction, in other regions. It is, therefore, essential to consider these critical channels of influence and potential spill-over impacts across trade links and regional/global value chains.

International trade policy and agreements are also potential mechanisms to help the transition to a circular plastics economy. It is thus crucial to understand the significance of trade in plastics for Côte d'Ivoire, Kenya and South Africa and the potential for spill-over effects across these trade channels to other countries. The results of this study show that eastern and western Africa will benefit from a shift to a circular plastics economy by 2050. This is evident from the volume of total imports and exports of primary and secondary plastic goods, and of recycling by region, which show the benefit of **localising the regional value chain** for a circular plastics economy on the African continent.

Figure 19 summarises the volume of imports and exports in primary plastic products between the various countries and regions in the CGE model with a transition to a circular plastics economy by 2050. The results across the three scenarios show some trade diversion away from the three countries in this study to other supplying regions. The most significant impacts are concentrated in their largest trading partners, i.e. in eastern, central and western Africa, flowing from changes in Kenya and Côte d'Ivoire's trade in primary plastic products. For South Africa, the largest spill-over impact is observed in southern Africa. The impact is also concentrated mainly in Africa, with little effect on the rest of the world.

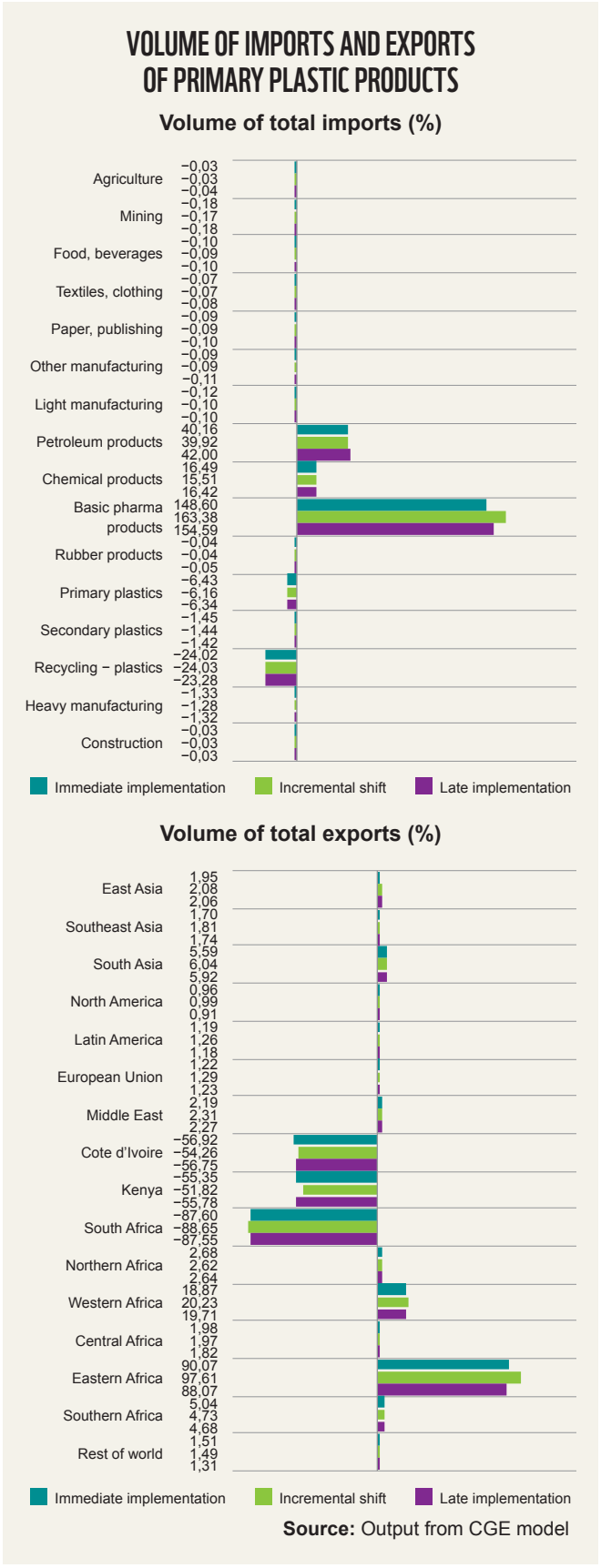


Figure 19: Volume of imports and exports of primary plastic products between the various countries and regions (cumulative %) by 2050

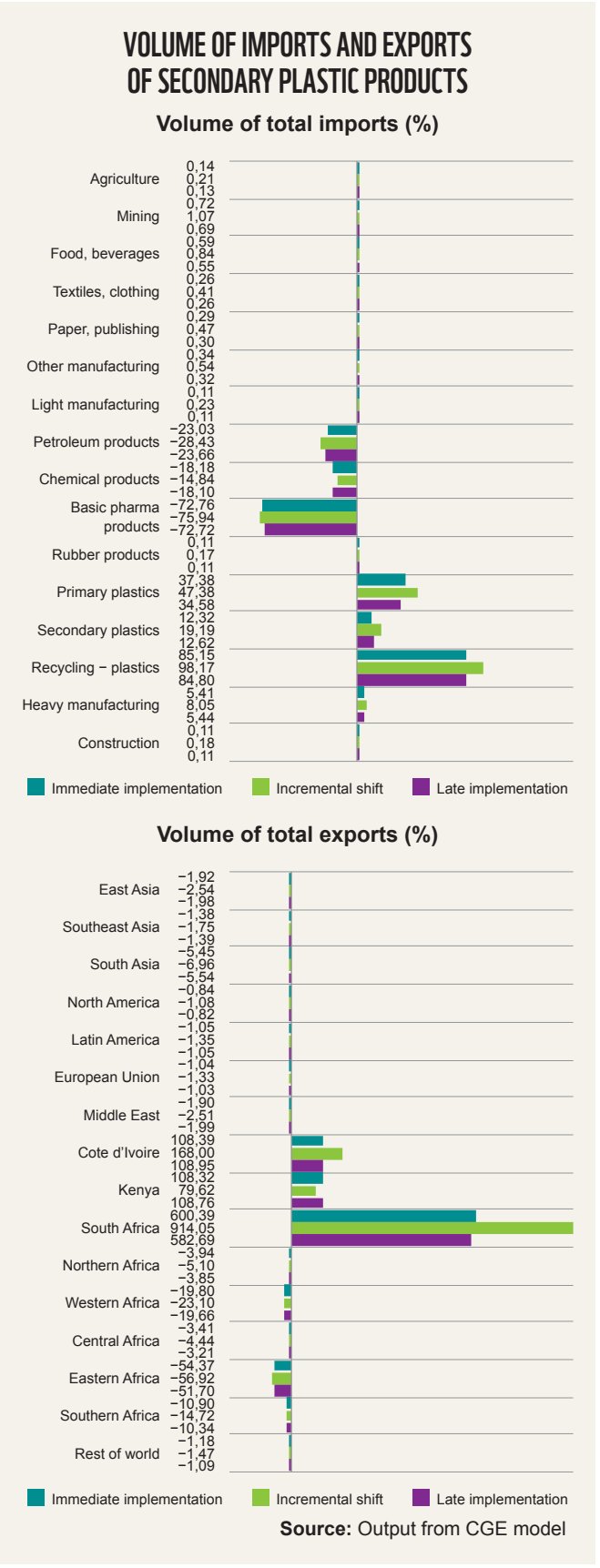


Figure 20: Volume of imports and exports of secondary plastic products between the various countries and regions (cumulative %) by 2050

Figure 20 summarises the volume of imports and exports in secondary plastic products between the various countries and regions in the CGE model. The results across the three scenarios show some import substitution in the three countries in this study to higher domestic demand for these products. The most significant impacts are concentrated in the largest trading partners of these countries, i.e. in eastern, central and western Africa, flowing from changes in Kenya and Côte d'Ivoire's trade in primary plastic products. For South Africa, the largest spill-over impact is observed in southern Africa. The impact is also concentrated mainly in Africa, with little spill-over to the rest of the world. More significant inter-country trade is also observed between Côte d'Ivoire, Kenya and South Africa.

Figure 21 summarises the volume of imports and exports in plastic recycling between the various countries and regions in the CGE model. The results across the three scenarios show import substitution in the three countries in the study to higher domestic demand for these products. The most significant impacts are concentrated in the largest trading partners of these countries, i.e. in eastern, central and western Africa, flowing from changes in Kenya and Côte d'Ivoire's trade in primary plastic products. For South Africa, the largest spill-over impact is observed in southern Africa. The overall impact is also concentrated mainly in Africa, with little spill-over to the rest of the world. More significant inter-country trade is also observed between Côte d'Ivoire, Kenya and South Africa.

Figures 18 to 21 illustrate that a transition to a circular plastics economy enables a shift away from virgin/primary plastic products in such a way that they are ultimately replaced by secondary plastic products and other materials. This minimises the shock of reduced trade in primary plastics and also has a minimal impact on the overall volume of global trade.

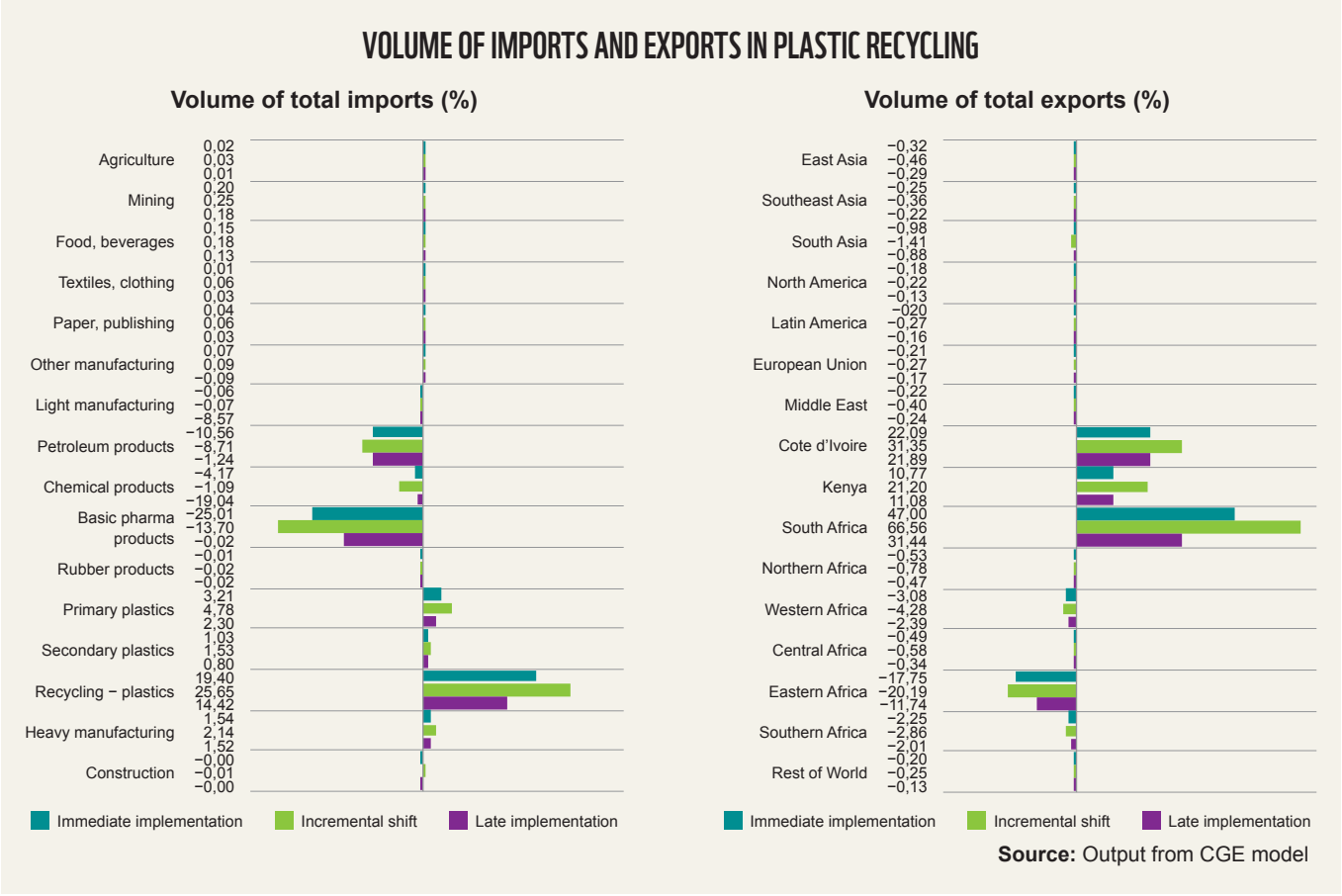


Figure 21: Volume of imports and exports of recycling between the various countries and regions (cumulative %) by 2050

OBSERVATIONS AND CONCLUSIONS

A transition to a circular plastics economy holds net-positive effects for the economies of all three countries in this study by delivering gains in GDP growth, employment, welfare and household income above what is expected under a business-as-usual scenario.

A circular plastics economy also mitigates the future cost of externalities produced by the linear plastic packaging model. A transition to a circular plastics economy that enables market building for reuse models, recycling and secondary plastics effectively absorbs economic activities from primary plastics and reduces the negative impact of the transition. However, the speed of the transition (i.e. the rate of implementation of measures that bring about structural economic changes) was identified as an important consideration for each country based on the specific structure of the domestic economy and its plastics sector. The speed at which structural measures are implemented must also be weighed against the rising costs of the externalities, particularly plastic pollution, associated with the linear plastic packaging model.

Côte d'Ivoire

Côte d'Ivoire imports all its plastic virgin material meaning that, during the transition to a circular plastics economy, the knock-on effects to upstream industries are expected to be minor, with more significant impacts expected in the country's trading dynamics. With some local midstream production (i.e. the processing, storing, transporting and marketing of primary and secondary plastic products), the direct impacts (such as those originating from the primary and secondary plastic products and the plastic recycling sectors themselves) will be more significant than the indirect effects (i.e. the effects on other sectors). There is a large informal economy operating in the absence of effective formal waste management; therefore, a clear understanding of the country's baseline material flows for plastics is lacking. There is also a need to establish a better understanding of the informal market dynamics so that circular plastics measures do not undermine livelihood activities.

In Côte d'Ivoire, both the "Incremental shift" and "Late implementation" options for a circular plastics economy show the greatest positive macroeconomic effects for the country, generating approximately $100 million in value above the "Immediate implementation" option. However, given that the plastics sector is small and has yet to develop, there is a strong opportunity to implement a more circular sector at the outset. The costs of the linear plastic packaging model that would accumulate during the "Late implementation" option are also a key consideration.

An "Immediate implementation" option enables Côte d'Ivoire to save over $200 million by 2050 by avoiding the costs arising from the externalities of a business-as-usual approach. Given that there are no short-term negative impacts from an "Immediate implementation" option, and this option allows the country to avoid sunk costs associated with investment in a traditional plastics economy, the "**Immediate implementation**" option is recommended for Côte d'Ivoire.

Kenya

For Kenya, given the small size of the local plastics industry, there is no discernible difference in impact if the transition to a circular plastics economy is implemented at different speeds. Therefore, Kenya could implement structural changes towards a circular plastics economy **immediately**, without being concerned about any negative economic impacts. This would also enable the country to save over $425 million by 2050 through avoiding the costs of externalities that would accumulate in the business-as-usual scenario. To capitalise on this opportunity, Kenya's extended producer responsibility scheme as well as the Kenya Plastics Pact must come into force in such a way that the targets and commitments of each are aligned and mutually reinforcing.

A storage area for collected materials in South Africa.

South Africa

South Africa has the largest and most established plastics industry of the three countries in this study, spanning all phases of the value chain. There is a large reliance on primary plastics, both through local production and the import of virgin material for further manufacturing. The South African plastics industry plans to focus on several key areas that support a transition to a circular economy (DTIC, 2020), including:

- Value-chain localisation
- Standardisation of plastic packaging
- Tailor-made industrial incentive packages
- Beneficiation and export of problematic formats
- Greater regulation of the trade environment: local (optimise growth potential of legally compliant manufacturers) and international (control rules of origin, anti-dumping and trade corridors).

In addition, South Africa needs to put several measures in place to minimise negative impacts to its already well-established plastics sector. These include, but are not limited to:

- Reskilling of primary plastics workers to meet the requirements for effective secondary plastics production
- Upskilling of the informal sector and waste reclaimers to effectively participate in the transition to a circular plastics economy
- Securing supply of quality recyclate through redesigning and reimagining packaging that is made to be reusable, recycled or composted at the outset
- Improving waste collection and management systems
- Ensuring that all actors in the value chain are on board, with a common vision.

The impact of the transition to a circular plastics economy in South Africa is driven by the size of the total plastics sector and the relative size of the plastics subsectors. The **immediate** implementation of structural changes may lead to a negative impact on the country's economy in the short term. It might therefore not be favoured by industry, which could argue that it will affect its economic performance. However, when factoring in the savings associated with the avoided cost of externalities with the business-as-usual approach (over $475 million by 2050), **late** implementation of the circular plastics economy becomes far less favourable.

In order to capture the gains which a circular plastics economy can deliver and to avoid the costs of the business-as-usual scenario, implementing structural changes **immediately** alongside the necessary measures to minimise any negative impacts on the current value chain is preferred. This is possible in South Africa by following an "**Incremental shift**" option in the short term, and scaling up over time.

RECOMMENDATIONS

It needs to be acknowledged that the transition to a circular plastics economy, even with a focus on plastic packaging, is complex. Therefore, a combination of national, regional and global policy interventions is needed.

Plastic packaging is linked to the production of oil (i.e. virgin raw material) on the supply side, as well as the food and consumer goods systems (i.e. the way we produce and package the food and goods we consume) on the demand side. Decoupling from these systems is required in order to drive a transition to a circular plastics economy. This can be achieved first and foremost by drastically reducing the need for virgin plastics through replacing problem plastics, allowing for reuse and using recycled content in plastic packaging (Ellen MacArthur Foundation and UNEP, 2021).

Over time, with the requisite technological and production capacity building, any remaining virgin inputs must be switched to responsible and environmentally beneficial renewable feedstock (Ellen MacArthur Foundation and UNEP, 2021). Biodegradable and compostable plastic innovation is also encouraged, but such streams require separate collection systems and industrial-scale composters. These requirements make the viability of biodegradable and compostable plastics challenging in developing countries and complicate already complex plastic and waste management systems.

This study has demonstrated that economic instruments can assist with the transition to a circular plastics economy. In reality, these instruments must be supported by strong political will and commitment for the full industry to be brought on board at a regional level. Furthermore, these economic instruments should be associated with appropriate policy, regulatory and behaviour change (awareness) instruments (Sadan and De Kock, 2021).

Replace, retain, reuse, refill, repurpose, repair, recycle

Unnecessary and problematic plastics must be replaced (eliminated) from value chains and material flows, and all remaining plastic must be retained in the economy through product delivery and business model innovation using packaging reuse and refill. For these reasons, plastic packaging needs to be redesigned to allow for reuse, repurposing, repair and (as a last resort) recycling.

A retail store where customers can use reusable packaging to refill with required products.

A shopper using a refillable container at a dry-goods refilling station.

NATIONAL ACTION

This report investigated the plastics industries of Côte d'Ivoire, Kenya and South Africa to understand how different African countries might transition to a circular plastics economy. Although further study is required to understand the nature, effectiveness and cost of specific economic instruments at the national level, this analysis has provided indicative learnings that could inform country-specific transitions across the continent.

- For countries with largely **undeveloped and unregulated plastics sectors** that are reliant on international imports for inputs (e.g. Côte d'Ivoire), there is a strong opportunity to design their plastics sectors for circularity from the outset. There are opportunities to build a multi-stakeholder network around circularity that supports such countries so that they can avoid elements of the linear plastic packaging model that are difficult to transition away from (such as establishing recycling sectors that are predominantly active in downcycling). For these countries, a large informal economy is most like present in the plastic waste sector. In these cases, an understanding of the informal market dynamics is essential so that circular plastics measures do not undermine livelihood activities. Market-based instruments such as deposit return schemes, or foundational policy instruments such as extended producer responsibility schemes, are two examples of policy instruments that can be introduced to further progress towards a circular plastics economy (see Box 6).
- For countries with **small plastics sectors** but an active and broad stakeholder base at the outset of planning national priorities and targets (e.g. Kenya), there is an immediate opportunity to implement measures that encourage greater circularity. This will enable these countries to avoid both the sunk costs that would accumulate through the externalities of the linear plastic packaging model, and the cost of financial and institutional resources to update policy frameworks and legislation down the line. Establishing product and packaging standards and certifications to mandate circular design could provide invaluable guidance from the outset (see Box 6).
- For countries with **larger plastics sectors** that span the full value chain from primary production to recycling (e.g. South Africa), it is essential that economic instruments (see Box 6) are implemented to minimise the negative impact on employment and productivity, while simultaneously encouraging innovation towards the circular transition.

BOX 6: POLICY INSTRUMENTS TO GUIDE PROGRESS TOWARDS A CIRCULAR PLASTICS ECONOMY

1 Deposit return schemes

Deposit return schemes (DRS) can play an important role in supporting collection-and-sorting policies and resource management objectives, and formalising and expanding the culture of reuse in countries such as Côte d'Ivoire. DRS are a market-based instrument that creates a financial incentive to ensure the return (and therefore the proper collection) of goods. In this instance, the incentive is given to the customer through a deposit on the item that is paid up front and returned upon collection of the empty packaging (Ellen MacArthur Foundation, 2021b). DRS for plastic bottles that have been established in the EU have seen up to a 96% return rate (Statista, 2019), suggesting strong potential to apply these systems in African countries, especially where DRS for glass bottles are still in use in cities and towns in South Africa, Kenya, Uganda and Mozambique (Rowcroft and Black, 2017).

2 Extended producer responsibility schemes

Extended producer responsibility (EPR) schemes should also be put in place as a foundational policy instrument. These schemes place financial liability on producers to ensure the collection and end-of-life management of the goods they put on the market (Ellen MacArthur Foundation, 2021b). Initiatives of this nature are widely considered to be an effective tool to secure financing for collection, sorting and recycling. EPR schemes are also an (economic) incentive to design packaging for circularity (reuse and recycling) to reduce the costs of end-of-life management.

There is now broad support for EPR from businesses across the value chain, with many brands and retailers contributing to efforts, in particular where the Plastics Pact networks are active (Ellen MacArthur Foundation and UNEP, 2021). However, EPR needs to be mandatory to create the required change at scale.

3 Product standards and certifications

Product standards and certifications play two important roles:

1. They mandate circular design for reuse, repair, increased durability (reduced obsolescence), recyclability and minimum levels of post-consumer recycled content (including, where possible, standards for biodegradable and compostable plastics).
2. They give the industry coherent guidance and clarity on production so that alignment and shared understanding of targets can be achieved. The creation of standards is inherently collaborative, bringing together technical committees of experts from industry, academia and civil society organisations, as well as policymakers (Ellen MacArthur Foundation, 2021b). A starting point is to consult the recently created standards for circular economy by the International Organization for Standardization ISO/TC 32.

4 Economic instruments

Economic instruments need to incentivise (or disincentivise) in ways that make smart use of government resources and capacity, and encourage participation of all industry players. Rather than just capping the use of virgin plastic, measures to support the transition to a circular plastics economy should incentivise the use of recyclate through tax and subsidies.

The **combination of production tax (on primary plastic products) and subsidy (on secondary plastic products, as well as recycling and reuse activities)** used in the options modelled result in a net-positive impact on the economies of the three countries in this study. Importantly, instruments such as taxes should be accompanied by other measures that support the transition to greater circularity.

5 Classifications and definitions of materials and waste

Waste collection and diversion from landfill are necessary but insufficient steps to ensure that the plastics material flow can be made more circular. The introduction of multiple-stream collection systems allowing separated collection of recyclables is essential (OECD, 2018). In Côte d'Ivoire, Kenya and South Africa there is already a vibrant network of social enterprises and informal waste reclaimers that could support constrained municipal efforts through public-private partnerships.

To lower the chances of plastic packaging ending up as waste, circular plastic packaging design should be mandated, together with the implementation of increasingly stringent landfill and incineration fees, to better reflect the full social costs of these activities. The introduction of more ambitious recycling rate targets and harmonisation of the methods used to calculate these rates and activities are also needed (OECD, 2018).

6 Research and development

Recycling remains an important (albeit last resort) step for encouraging more circularity in plastics sectors in countries such as South Africa, where recycling infrastructure and value chains are already established. A key barrier to the effective recycling of plastic packaging waste is poor design, and the lack of information and infrastructure to keep plastic packaging separate from other materials after use. This affects the availability and quality of recyclable plastic packaging.

There is a need to support research and development and initiatives such as the South African and Kenya Plastics Pacts. These initiatives are driving change through concrete activities to ensure that the industry designs plastic packaging that can be recycled economically and at scale.

REGIONAL COORDINATION

African ministers for the environment have been strengthening their commitment to work actively towards a new global legally binding agreement on marine litter and plastic pollution at the 18th session of AMCEN in 2021, and further undertook to support the draft resolution "End Plastic Pollution: Towards an international legally binding instrument". This resolution was adopted at UNEA-5.2, resulting in the establishment of a mandate to start negotiations for a global treaty. These actions provide strong coordination and a proactive point of departure for the African continent in tackling plastic pollution.

The next steps for the continent are to participate in shaping global action, strengthen regional coordination and boost policy ambition and implementation efforts in African countries.

From a regional economic policy perspective, **definitions, regulations and standards need to be harmonised** and implemented among all stakeholders, in particular to enhance the trade in circular plastics. A clear and detailed classification for circular plastics goods and practices will create a common language for all actors in the system, with useful examples including the EU taxonomy (EU Technical Expert Group on Sustainable Finance, 2020).

Leveraging trade agreements (in this case the African Continental Free Trade Area agreement) is necessary to **restrict import and export of problematic or undesirable plastics formats and products** (and waste), as well as offering **zero-tariff incentives for circular plastics** to promote the trade of specific goods and services and stimulate the localisation of circular plastics value chains

GLOBAL AMBITION

A new legally binding global treaty to combat plastic pollution will create the opportunity to harmonise, coordinate and provide regulatory measures to holistically and comprehensively address plastic pollution (Sadan and De Kock, 2021). As of January 2022, over 160 countries and 70 multinational businesses are supportive of and calling for the establishment of an Intergovernmental Negotiating Committee towards a global agreement on plastic pollution, recognising that voluntary initiatives alone will not be enough (Ellen MacArthur Foundation and UNEP, 2021). The final adoption of the resolution, "End plastic pollution: Towards an international legally binding instrument", was unanimously approved at UNEA-5.2, highlighting the need for measures to support effective implementation of the treaty.

A combination of voluntary initiatives, regulatory measures and trade agreements is required for a transition to a circular plastics economy. There is a strong need for consistency to be provided by means of policy alignment, both regarding the overarching direction through which targets and measures lead stakeholders and the type of enforcement required across different stakeholders.

A United Nations treaty on plastic pollution could catalyse a comprehensive global effort to address the problem at scale and help put the world on a path towards a circular economy for plastics (WWF et al., 2020). In terms of this treaty, governments will commit to a new legally binding global agreement that will eventually provide an avenue for realising a coordinated set of policies and actions. African governments should actively participate in negotiations towards this treaty in order to offer perspectives and priorities from the African context.

A legally binding international treaty

On 2 March 2022, at UNEA-5.2, UN member states unanimously agreed to develop a legally binding treaty to end plastic pollution.

The resolution, titled "End plastic pollution: Towards an international legally binding instrument", was unanimously approved. This UN resolution calls for the establishment of the Intergovernmental Negotiating Committee to commence negotiations towards the global treaty over the next two years. The resolution highlights the need for measures to support effective implementation of the treaty, which includes capacity building and financial and technical support.

APPENDIX A
KEY PLASTICS AND MACROECONOMIC MEASURES

TABLE A1: SELECT ECONOMIC AND PLASTICS INDICATORS FOR CÔTE D'IVOIRE, KENYA AND SOUTH AFRICA

Indicator	Subindicator	Côte d'Ivoire	Kenya	South Africa	Global
Economic					
Gross domestic product (GDP)	$million (nominal)	58 539 (2019)	95 503 (2019)	351 432 (2019)	87 607 919 (2019)
	Ave growth (% y/y 2015–2019)	7%	6%	1%	3%
	$ per capita	2 276 (2019)	1 817 (2019)	6 001 (2019)	11 417 (2019)
Population	Million	25,7 (2019)	52,5 (2019)	58,5 (2019)	7 673,3 (2019)
	Ave growth (% y/y)	2,5%	2,4%	1,4%	1,1%
Labour	Employment (million)	7,7 (2019)	23,1 (2019)	16,7 (2019)	3 303,1 (2019)
	Indicative informal share (%)	~ 87% (2017)	~ 65% (2019)	~35% (2019)	~58% (2017)
	Official unemployment rate	3,2% (2019)	2,6% (2019)	28,5% (2019)	5,4% (2019)
Plastics					
Production	% of GDP	1,4%	0,01% (2018)	2,1% (2018)	0,7% (2019)
	Employment	30 000[1] (2019)	39 100 (2018)	60 000 (2018)	4 391 886 (2020)
	Tonnes (virgin plastic)	105 000	517 000 (2018)	1 841 745 (2019)	359 000 000 (2018)
	Per capita (kg)	4 (2019)	10 (2018)	30 (2018)	40 (2018)
Exports (net)[2]	Tonnes	154 279 (2019)	57 863 (2019)	2 821 240 (2019)	198 865 614 (2019)
	$ value (million)	268 (2019)	110 (2019)	5 561 (2019)	593 478 (2019)
Imports (net)	Tonnes	737 095 (2019)	456 811 (2019)	4 998 033 (2019)	222 199 873 (2019)
	$ value (million)	939 (2019)	734 (2019)	9 961 (2019)	609 062 (2019)
Consumption (Use)	Tonnes (million)	0,05 (2019)	0,56 (2018)	1,8 (2018)	341,24 (2017)
	Per capita (kg)	2 (2019)	10 (2018)	36 (2018)	44,9 (2017)
Plastic waste	Tonnes generated	766 988 (2010)	506 000 (2018)	2 633 333	343 000 000
	Per capita (kg)	37 (2010)	11 (2018)	41(2018)	29 (2018)
	% of all waste types	–	18,7% (2016)	7,1% (2016)	12% (2016)
	Tonnes in rivers/oceans	–	37 000 (2018)	79 000 (2018)	12 000 000 (2016)
	% total generated	–	7% (2018)	3% (2018)	4% (2018)
Plastic recycling	Recycling rate[3] (%)	5% (2018)	8% (2018)	46,3% (2018)	31,1% (Europe, 2018)
	% recyclate[4] weight in packaging	–	15% (2018)	13% (2018)	6,2% (2018)

Sources: DFFE (2021), DTIC (2018, 2020), ILOSTAT (2021), Koumi (2020), Parliamentary Monitoring Group (2016), Ritchie and Roser (2018), Statista (2021), UN Comtrade (2021), UNEP and IUCN (2020), WEF (2021b), World Bank (2020, 2021), World Bank What a Waste Global Database (2018)

1 Includes 10 000 formal jobs and 20 000 informal jobs.

2 Plastics and articles thereof as per HS 39 classification codes HS 3901 to HS 3926 (UN Comtrade, 2021; Babayemi et al., 2019).

3 Input recycling rate: The ratio of plastics collected for recycling against the total plastic entering the waste stream (Sadan and De Kock, 2020 – Aligned with the EU recycling rate calculation methodology, as well as Paper, Glass and Metal packaging). The calculation point is where plastics in the waste stream are collected.

4 The term "recyclate" represents post-consumer effectively recycled content in plastic packaging as a means to reduce or displace the amount of virgin plastic raw material in such packaging and thereby improve recycling rates (Van Os and De Kock, 2021).

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1st Floor, Bridge House, Boundary Terraces, Mariendahl Lane, Newlands, Cape Town.
PO Box 23273, Claremont 7735

T: +27 21 657 6600 E: info@wwf.org.za W: wwf.org.za