

RECOMMENDATIONS FOR ADVANCING THE CIRCULAR PLASTICS ECONOMY IN SOUTH AFRICA

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ABSTRACT

Leakage of plastics to the environment is an issue of global concern. A transition to a circular plastics economy is increasingly recognised as an important strategy for addressing plastic leakage and pollution, while potentially giving rise to a number of additional socio-economic and environmental benefits.

This paper reports on the outcomes of a study funded by the PROBLUE multi-donor trust fund through the World Bank and implemented by the CSIR, aimed at advancing the circular plastics economy in South Africa, with a focus on packaging and other single use plastic products. The objectives were to (1) provide a comprehensive overview of current circular economy initiatives and activities, (2) frame the circular plastics economy in the South African context, and (3) inform the development of a Roadmap for advancing the circular plastics economy, based on recommended short-, medium- and long-term interventions. The methodology for the study involved a combination of desktop reviews and extensive stakeholder engagement.

This paper focuses on the latter two objectives of the study, namely framing the circular plastics economy in the South African context, and providing recommendations for advancing the circular plastics economy. In line with recent global work, there is no “silver bullet” for reducing leakage of plastics to the environment. Instead, a system change is required, incorporating a suite of interventions across the value chain (including rethinking and reducing the use of plastics, redesigning plastics for circularity, reusing, and recycling; in addition to improved waste collection and controlled disposal); rather than relying solely on end-of-pipe solutions.

Specifically, a circular plastics economy in South Africa should entail (1) designing out plastic items that are either problematic or unnecessary (or both), through innovation and alternative delivery models; (2) ensuring that all plastic products are reusable, recyclable, or compostable in the South African context; (3) ensuring that plastic products or materials are circulated within the economy (at their highest value, and for as long as possible), and kept out of the natural environment; and (4) decoupling plastic production from the consumption of virgin inputs from fossil fuel sources, in favour of using recycled materials.

KEYWORDS

Circular economy, plastics, reduce, redesign, reuse, recycling



INTRODUCTION

Population growth, urbanization, and income growth have resulted in increasing levels of waste generation in South Africa, the management of which is a challenge for South African municipalities, many of whom are struggling to maintain basic service levels. A large proportion (37%) of households do not receive regular waste collection services (Statistics South Africa, 2022), while the majority of waste disposal sites are unregulated, or non-compliant with norms and standards (Von Blottnitz et al., 2017; Nahman, 2021; Plastics SA, 2022).

The lack of effective waste management systems gives rise to significant leakage of waste into the environment. Jambeck et al. (2015) ranked South Africa 11th out of 192 countries in terms of mismanaged plastic waste entering the marine environment, with 90,000-250,000 tonnes per annum (tpa) of plastic estimated to enter the oceans from land-based sources. A more recent local study (Verster and Bouwman, 2020) shows that the amount of land-based plastic reaching the ocean is somewhat lower, in the range of 15,000 – 40,000 tpa. However, it also highlights that the majority of total mismanaged plastic waste (estimated at 440,000 tpa) remains in the terrestrial and freshwater environment.

Transitioning to a circular economy (CE) is recognised globally as being fundamental to relieving pressure on waste management systems, and addressing plastic leakage to the environment. The World Bank issued a request for proposals in July 2021 for a study to map and assess existing activities around the circular economy of plastics in South Africa, and to support the South African Government in developing a Roadmap to advance the circularity of plastics. The Council for Scientific and Industrial Research (CSIR) was contracted to conduct this study in September 2021. The objectives of the study were:

1. To provide a comprehensive overview of current circular economy initiatives and activities in South Africa (focusing in particular on plastics);
2. To frame the circular economy in the South African context (with specific reference to plastics); and
3. To inform the development of a Roadmap for advancing a circular economy for plastics in South Africa, by providing a set of recommended short-, medium- and long-term interventions required to transition towards a circular economy pathway.

In so doing, the intention was to draw together the different strands of activity relating to the plastics circular economy in South Africa, and help develop an overall narrative of the status quo and the required pathway for transitioning towards a circular economy. Ultimately, the intended outcome is to enhance the circularity of plastics in South Africa, and thereby to reduce the leakage of plastics into the environment.

Given this focus on reducing leakage of plastics to the environment, a decision was made to delimit the scope of the study primarily to plastic packaging and other single use plastic items; which are particularly problematic from a leakage perspective; since they (a) tend to be used for only short periods of time, and are often disposed after a single use; (b) are often used 'on-the-go', and are therefore often disposed of improperly (e.g. directly littered); and (c) tend to be lightweight, and are therefore easily dispersed through wind and rain, even when disposed of through formal waste management systems.

However, given the significant cross-sectoral linkages between plastic packaging and other applications of plastic (e.g. in the case of open-loop recycling), and with other materials; as well as broader socio-economic and environmental challenges; it is critical to adopt a systems view of the circular economy, and to take these cross-sectoral linkages into account. Indeed, one of the key recommendations arising from the study is for an evidence-based, cross-sectoral circular economy Roadmap for South Africa (beyond only plastics) to be developed.

Given the focus on packaging and single use items, it should be noted that certain types of circular economy strategies (such as repair and remanufacturing; as well as sharing, exchange and renting models) were not addressed in detail in the study; since these are typically associated with longer-lived, durable items. However, it is critical that such strategies are considered within the broader circular economy Roadmap proposed above.



This paper summarises the recommendations identified during the study for advancing the transition towards a circular plastics economy in South Africa. More detail in terms of the current circular economy initiatives identified during the study, as well as barriers and opportunities for transitioning to a circular plastics economy, and the rationale behind each of the recommendations, can be found in the reports produced as an outcome of the study, available from the authors on request. The intention is for the recommendations to be used to inform an evidence-based Roadmap for the circular plastics economy, linking to a broader cross-sectoral circular economy Roadmap for South Africa; in conjunction with other evidence.

METHODS

The approach adopted in framing the vision for the circular plastics economy was as follows:

- A desktop review of
 - Key local sources, including relevant reports and initiatives from the Department of Forestry, Fisheries and the Environment (DFFE); Plastics SA; the SA Initiative to End Plastic Waste; the SA Plastics Pact and the World Wide Fund for Nature (WWF-SA); as well as the draft Plastics Industry Master Plan for Growth (Pretorius, 2020).
 - Relevant international sources, such as the Ellen MacArthur Foundation (EMF), the World Economic Forum (WEF), the Breaking the Plastic Wave report (PEW and SYSTEMIQ, 2020); as well as discussions relating to the development of a legally binding global treaty for addressing plastic pollution under the United Nations Environment Assembly (UNEA).
- A focused workshop with a group of key experts and stakeholders representing a broad range of relevant role-players, including national government (DFFE; the Department of Science and Innovation (DSI); The Department of Trade, Industry and Competition (the dtic) and National Treasury); industry (Plastics SA, producer responsibility organisations (PROs) and the SA Plastics Recycling Organisation (SAPRO)); civil society (SA Plastics Pact and WWF-SA); and academia.

Following the workshop with key experts and stakeholder representatives, a draft vision was formulated, which was then shared with this group for further input. There was general agreement on the draft, which was subsequently further refined and adopted as the vision presented in the following section of this paper.

This vision was then used as a framework to guide the final phase of the study; which aimed at informing a Roadmap for advancing the circular plastics economy, by providing a set of recommendations for transitioning toward a circular economy. During this phase, the focus was on identifying:

- Barriers, obstacles, gaps, challenges etc. for advancing the circular plastics economy in South Africa. These included:
 - Legislative and regulatory barriers
 - Economic and financial barriers, including issues related to markets, incentives/disincentives, access to financing, etc.
 - Technical and infrastructural issues, including issues around service delivery, logistics, and access to materials
 - Social, political and behavioural issues
 - Regional and global issues.
- Opportunities for advancing the circular plastics economy in South Africa.
- Recommended short-, medium- and long-term interventions required for overcoming the barriers, leveraging the opportunities, and advancing the circular plastics economy.

The following approach was applied in identifying barriers and opportunities, and for developing recommendations:

- A comprehensive desktop review, drawing on a wide range of relevant literature, reports, policies, legislation, etc.
- Extensive stakeholder engagement, including one-on-one meetings with key experts and stakeholders, and a virtual workshop session held on 7 April 2022 with the broader stakeholder group. All stakeholders were also provided with opportunities to provide written inputs, and to comment on the draft report.



The findings from the desktop review and the inputs received through the stakeholder engagement process were then integrated, analyzed (using qualitative data analysis approaches such as thematic analysis); and critically assessed (for example, a distinction was made between 'real' and 'perceived' barriers). The resulting barriers, opportunities and recommendations were structured according to the key circular economy strategies (rethink and reduce, redesign, reuse and recycle); as well as cross-cutting issues. The recommendations were then synthesized across the different strategies, to give rise to an over-arching set of key recommendations. These key recommendations are presented in this paper, categorised into a number of themes.

FRAMING THE CIRCULAR PLASTICS ECONOMY IN THE SOUTH AFRICAN CONTEXT

The prevailing economic development paradigm, both locally and globally, can be described as a linear 'take-make-dispose' or 'take-make-waste' economic model. Resources are extracted from the natural environment and used to make products, which are often used for only a short period of time, before being discarded back into the environment (EMF, 2020; UNIDO, 2017). Throughout this process, vast amounts of material and energy are used; while significant emissions and waste are generated.

South Africa is characterized by a particularly linear economy. Material cycling in South Africa is estimated at 7% (Von Blottnitz et al., 2021); of which 5% is the result of ecological cycling of biomass and organic waste. The socio-economic cycling rate (recycling and reuse of materials within the economy) is only 2%.

In contrast to the linear economic model, a circular economy "entails keeping materials and products in circulation for as long as possible through practices such as reuse of products, sharing of underused assets, repairing, recycling and remanufacturing" (Schröder, 2020). It is based on three principles: Design out waste and pollution; keep products and materials in use; and regenerate natural systems (EMF, 2017).

Contrary to how the concept is often perceived in South Africa, a circular economy is about far more than simply improved waste management and recycling. It instead involves a systemic shift away from the traditional linear economy; and encompasses a radical transformation of the ways in which resources are used and products are designed, and of the relationship between producers and consumers. In the case of plastics, recycling is "only one of a suite of interventions required across the plastics life cycle. Others include elimination of unnecessary and problematic plastic items, product design for reuse and new product delivery models such as own-container dispensing schemes" (Sadan and De Kock, 2020).

The resolution adopted at UNEA5.2 regarding the development of a legally binding global treaty (by 2024) for addressing plastic pollution, will provide a strong driver for the transition to a circular plastics economy. The treaty will be aimed at developing a less fragmented approach to addressing the challenge, at identifying approaches to make the plastics economy more circular; and at addressing the full life cycle of plastics. Specifically, it will be aimed at promoting sustainable consumption and production throughout the full life cycle; starting with product design (specifically to ensure that products are as reusable as possible; or, at least, as recyclable as possible); and, for the plastic that cannot be reused or recycled, ensuring that there is environmentally sound management of waste (Gross, 2022).

Given the complexity of the problem, there is no "silver bullet" for reducing the leakage of plastics to the environment. Instead, as highlighted by the global Breaking the Plastics Wave study (PEW and SystemIQ, 2020), a system change is required, incorporating a suite of interventions across the value chain, rather than relying solely on end-of-pipe solutions. In particular, the circular economy concept places an emphasis on rethinking and redesigning products and packaging, in such a way as to reduce the amount of waste generated in the first place, and to ensure that products and materials are reusable or recyclable at end of life. Specifically, the emphasis is on ensuring that all plastic items and materials have an economic value, increasing the likelihood that they will be recovered and circulated within the economy, and kept out of the natural environment.



For the purposes of this study, a vision for a circular plastics economy in South Africa was developed, as follows:

“South Africa has a thriving, equitable and inclusive circular plastics economy, which is driven by innovation, and generates well-being for society and the environment. The circular plastics economy is characterised by the following principles:

- *Designing out plastic items that are either problematic¹ or unnecessary² (or both)*
- *All plastic products are reusable, recyclable, or compostable³ in the South African context*
- *Plastics⁴ are circulated within the economy (at their highest value⁵, and for as long as possible), and kept out of the natural environment*
- *Decoupling⁶ plastic production from the consumption of finite resources, in favour of using recycled materials*
- *There is collaboration across the value chain. All role-players are engaged and active in keeping plastic in the economy and out of the environment*
- *There is a just transition⁷ to the circular economy; the health, safety and livelihoods of all role-players across the value chain are respected.*

This broad vision can in turn be translated into more specific strategies for driving a circular plastics economy. Table 1 illustrates how the first four principles in the vision outlined above can be translated into four key circular plastics economy strategies (rethink and reduce, redesign, reuse and recycle⁸). In addition, improved collection is critical for ensuring recovery of materials for recycling, while controlled disposal to engineered landfills will still be required for any residual waste that cannot be reduced, designed out, reused or recycled. The final two principles of the vision, relating to collaboration and inclusivity, are cross-cutting.

As discussed in the introductory section, certain types of circular economy strategies (such as sharing, repairing and remanufacturing) do not form part of the scope of this study. However, it is critical that such strategies are considered in a broader, cross-sectoral circular economy Roadmap.

¹ Problematic plastic items are items which are not reusable, recyclable (technically and/or economically) or compostable; which contain, or their manufacturing requires, hazardous chemicals that pose a significant risk to human health or the environment; which hinder or disrupt the recyclability or compostability of other items; and/or which have a high likelihood of being littered (EMF, cited in SA Plastics Pact, 2021).

² Unnecessary plastic items are items which can be avoided (or replaced by a reuse model), while maintaining utility. They have limited social utility, for which no alternative is required, and can be phased out without significant behavioural or infrastructural change (EMF, cited in SA Plastics Pact, 2021).

³ Compostable plastics are only suitable for specific targeted applications (EMF, 2021); and in closed loop and controlled systems, where there is no risk of mixing with the recycling stream, and where the requisite collection and composting infrastructure is in place. Such materials must be proven to be compostable in the South African context; and to match or exceed conventional plastics in terms of functionality, socio-economic outcomes and environmental performance across the life cycle.

⁴ Circulating plastics within the economy includes both reuse of plastic products, as well as effective collection and recycling of plastic materials through multiple life cycles.

⁵ Highest value means (a) maintaining the integrity of plastic products for reuse for as long as possible; and, when reuse is no longer possible; (b) maximising the utility of plastic materials, in terms of the range of applications for which the material can be used in its next life, and the potential for further recovery and recycling.

⁶ Decoupling in the context of plastics means gradually reducing inputs of finite resources (such as virgin materials from fossil fuels sources) per unit of plastic produced; first and foremost through the use of recycled inputs; and over time through switching to renewable feedstocks, where proven to be environmentally beneficial and to come from responsibly managed sources (EMF, 2021).

⁷ The concept of a Just Transition still needs to be contextualised for the case of the circular plastics economy; rather than simply transferring the existing definitions used in the context of coal mining and climate change (personal communication, 5 August 2022).



Table 1: Strategies for driving a circular plastics economy arising from the vision

CE strategies	Linkages to the circular plastics economy vision
1. Rethink and reduce	<ul style="list-style-type: none"> • Designing out unnecessary plastic items • Innovation and alternative delivery models
2. Redesign	<ul style="list-style-type: none"> • Designing out problematic plastic items • All plastic products are reusable, recyclable or compostable in the SA context
3. Reuse	<ul style="list-style-type: none"> • Innovation and alternative delivery models • Circulating materials at their highest value and for as long as possible • Keeping plastic out of the natural environment
4. Recycle	<ul style="list-style-type: none"> • Circulating materials at their highest value and for as long as possible • Decoupling - using recycled materials • Keeping plastic out of the natural environment
5. Controlled disposal	<ul style="list-style-type: none"> • Keeping plastic out of the natural environment

The circular economy vision and principles, and the translation of this vision into a framework of broad circular economy strategies, is illustrated in Figure 1.

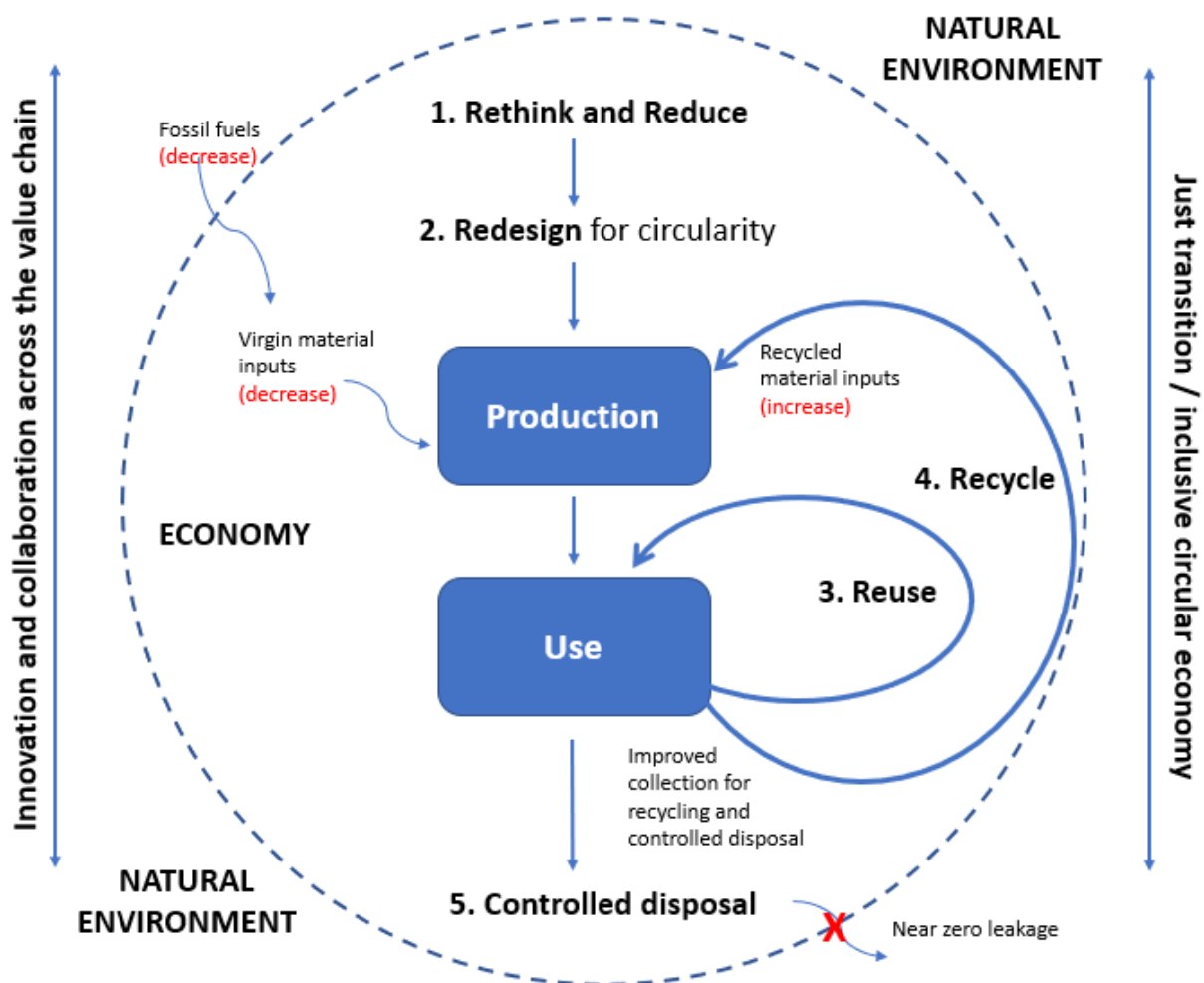


Figure 1: Conceptual framework for a circular plastics economy

The numbering of the circular economy strategies (1 – 5) reflects the prioritisation of interventions; with greater emphasis being placed on upstream interventions (rethinking, reducing and redesigning) over downstream interventions (recycling and controlled disposal). In order to drive a circular economy



and reduce leakage of plastic to the environment, it is crucial to focus on upstream measures such as reducing and redesigning, rather than relying on end-of-pipe interventions such as recycling and disposal. For example, the global Breaking the Plastic Wave study found that reducing plastic production and consumption is the least cost and most effective single strategy for reducing global plastic pollution (PEW and SystemIQ, 2020). This is particularly relevant to the South African context, where the poor state of waste collection and disposal services suggest that an over-reliance on end-of-pipe waste management will not be effective. Instead, reducing the amount of waste being generated in the first place, through upstream interventions, is crucial to alleviate pressure on municipal waste management systems and reduce leakage of plastics to the environment.

The following section provides a synthesis of the recommendations arising from this study for advancing a circular plastics economy. The focus was on identifying recommended actions and interventions for driving (1) rethinking/reducing, (2) redesigning, (3) reusing, and (4) recycling. In turn, each of these broad strategies can be broken down further into more specific intervention 'levers' (see the last column of Table 1). Recommendations relating to the 'cross-cutting' elements of the circular economy vision (i.e. those relating to innovation, collaboration, inclusivity and the need for a just transition) are also provided. The study does not specifically focus on recommendations relating to (5) improved collection and controlled disposal, since strictly speaking disposal falls outside the scope of the circular economy. Suffice it to say, however, that there is an urgent need for improved waste collection and disposal in South Africa; to ensure that any remaining waste that cannot be reduced, designed out, reused or recycled is at least collected and safely disposed in an engineered landfill site, in order to prevent any leakage of waste to the environment.

RECOMMENDATIONS FOR ADVANCING A CIRCULAR PLASTICS ECONOMY

Table 2 provides a summary of the preliminary recommendations arising from this study for advancing a circular plastics economy, with a specific focus on plastic packaging and other single use plastic products. For more detail on how these recommendations were derived, including an in-depth analysis of barriers and opportunities, please refer to the final report arising from this study. The recommendations are structured according to ten themes, as follows:

- a) Adopting a common vision and roadmap for the circular economy
- b) Creating an effective enabling environment
- c) Improved waste collection and management to ensure recovery of recyclables and elimination of leakage
- d) Designing out unnecessary and problematic plastic items
- e) Driving design for circularity
- f) Scaling up reuse models
- g) Further development of recycling capacity where required
- h) Driving demand for post-consumer recycle
- i) Improved communication, education and behavioural change
- j) Promoting inclusivity and a just transition

The column titled "CE strategy" provides an indication of which specific circular economy strategies (reduce, redesign, reuse or recycle) each recommendation relates to, which highlights the cross-cutting nature of many of the required actions.

In the full report, preliminary suggestions are also made regarding timeframes for the required actions, as well as specific entities that should be responsible for each of the interventions; although these are subject to discussion as part of the development of the circular plastics economy Roadmap. Included among the recommendations are some immediate next steps required to translate the proposed interventions into a Roadmap for a circular plastics economy; linking to a broader cross-sectoral circular economy Roadmap for South Africa.



Table 2a: Adopting a common vision and roadmap for the circular plastics economy

Required action / intervention	CE strategy			
	Reduce	Redesign	Reuse	Recycle
A1: Identify an appropriate custodian for a circular plastics economy roadmap , within the context of the Plastics Industry 2020 Master Plan for Growth. Potential custodians include DSI (during the initial research and development (R&D) stages), and thereafter to be taken over by the dtic, the Presidency, or an inter-ministerial grouping.	x	x	x	x
A2: All role-players to adopt an agreed, common vision for the circular plastics economy ; to guide collective action and ensure alignment and collaboration. The vision framed in this report could be used as a starting point for further discussion.	x	x	x	x
A3: Conduct further research required to inform the CE roadmap , including evidence on: <ul style="list-style-type: none"> • The overall net benefit/cost of transitioning to a circular economy across all sectors (beyond only plastics), taking into account socio-economic and environmental outcomes. • The (cost-)effectiveness of each intervention strategy (reducing, redesigning, reusing and recycling) in reducing plastic leakage; as well as their economic and social impacts; to inform specific targets (desired material flows); building on existing research. • While not part of the long-term circular economy vision (and while the emphasis must be on reducing and redesigning); there is also a need for research to assess the suitability of Refuse Derived Fuel (RDF) and other Waste to Energy (WtE) technologies in the SA context (as compared to landfilling); at least as an interim measure; and under what conditions; to deal with residual waste that cannot be designed out, reused or recycled. 	x	x	x	x
A4: Develop a circular plastics economy roadmap ; linking to a cross-sectoral circular economy roadmap for South Africa, based on sound scientific evidence (see # A3); and a systems thinking approach, taking into account cross-sectoral linkages. The roadmap should draw on the recommendations provided in this report, as well as other required evidence; and specify metrics/indicators to measure progress; as well as targets, timelines and roles and responsibilities. It must put in place measures to ensure accountability, and for monitoring, evaluation and reporting on progress in a transparent manner.	x	x	x	x
A5: Invest in capacity and infrastructure to conduct further required R&D and testing to provide the evidence-base for the circular plastics economy; including: <ul style="list-style-type: none"> • Development of an accredited testing facility to test barrier properties of new materials, and their ability to maintain shelf life. • Development of guidelines, capabilities and datasets for conducting Life Cycle Assessment (LCA) / Life Cycle Sustainability Assessment (LCSA) studies in the SA context; including the potential development of a national LCA database. 	x	x	x	x

Table 2b: Creating an effective enabling environment

Required action / intervention	CE strategy			
	Reduce	Redesign	Reuse	Recycle
B1: Government to provide a clear policy direction and create a leaner, more effective enabling environment to support the circular economy vision and roadmap. In particular: <ul style="list-style-type: none"> • Policy alignment is required between the key government departments; as is consistency in definitions and interpretation of laws, regulations, classifications etc. between departments, spheres of government and pieces of legislation. • Policies and regulations must be evidence-based, streamlined and coherent; aimed at sending clear policy signals, easing regulatory burdens, stimulating private sector investment, and unlocking innovation. 	x	x	x	x
B2: Review and update the definition of waste, waste classification regulations, and municipal by-laws, as well as Environmental Impact Assessment (EIA) and licensing requirements for certain types of facilities; to be more supportive of a circular economy; specifically: <ul style="list-style-type: none"> • Updating the definition of waste so that source-separated waste for recycling is no longer viewed as waste that needs to be collected by the municipality. • Updating municipal by-laws (following the updated model by-law on the Integrated Waste Management Planning Portal) to remove the assignment of ownership of waste to municipalities. • Developing an end-of-life protocol to clarify at what point during recycling or composting does waste cease to be 'waste'. • Consider putting in place a system allowing for General Technical Assessments instead of full EIAs for certain types of activities / technologies. • Relaxation of licensing requirements for recycling facilities and/or replacement with general norms and 				x



standards, so as to ease the regulatory burden for development of recycling infrastructure.				
B3: Improved regulation and quality control of imported products and materials , with strict monitoring and enforcement (e.g. through declarations by importers to PROs); to assess conformance with stated Harmonised Shipping (HS)/tariff codes, and compliance with relevant standards and specifications; so as to ensure imports are held to the same standards expected of local manufacturers (e.g. in terms of inclusion of post-consumer recyclate (PCR) content, design for circularity, avoiding problematic materials, etc.).		x		x
B4: Develop evidence-based standards relating to reusability, recyclate quality, and the use of recycled content in products and packaging; as well as for new types of materials that may arise.		x	x	x
B5: Independent, standardized testing, verification and certification for all products claimed as recyclable, compostable or biodegradable; as well as clear, standardized labelling (see also # I1); to provide assurance of verified recyclability/compostability in SA conditions, inform end-of-life management, and reduce the risk of compostable materials entering the recycling stream.		x		x

Table 2c: Improved waste collection and management to ensure recovery of recyclables and elimination of leakage

Required action / intervention	CE strategy			
	Reduce	Redesign	Reuse	Recycle
C1: Drastically improve the state of waste collection services and ensure proper disposal in fully compliant landfill sites ; to ensure that all recyclable materials are collected and that any remaining waste that can no longer be reduced, reused or recycled is at least collected and safely disposed in an engineered landfill site, in order to prevent any leakage of waste to the environment.				x
C2: Conduct research regarding the feasibility of alternative systems for the collection, recovery and aggregation of source-separated waste (e.g. separate collection, drop-offs, aggregation centres, beneficiation centres, product take-back or buy-back systems, deposit-refund systems, reverse vending machines; etc.); taking into account differing local and socio-economic contexts across South Africa, cost-effectiveness, impacts on employment and on informal waste pickers, etc.				x
C3: Implement separation at source, as well as appropriate, inclusive systems for the collection, recovery and aggregation of source-separated recyclables of sufficient volumes and quality for recycling ; taking into account the feasibility of different systems in different contexts, impacts on employment and on informal waste pickers; etc. (see # C2). This will require, among others: <ul style="list-style-type: none"> • Investment in the required infrastructure for collection and recovery (e.g. conveniently located drop-off sites, Material Recovery Facilities (MRFs), buy-back centres / mobile buy-back centres). • Funding or subsidization of sorting and baling activities. • Ensuring inclusive system design (see # J1). • Education and awareness raising (see # I2), as well as incentives/behavioural change interventions (see # I3), to encourage participation. 				x
C4: Ensure close collaboration between municipalities, waste collectors (formal and informal), and producers/PROs to enable collection of recyclables as per the 2020 National Waste Management Strategy (NWMS), and to meet the Extended Producer Responsibility (EPR) targets for collection and recycling. For example, a platform/roundtable discussion session could be created for industry and municipalities to unpack the NWMS and the EPR regulations to determine linkages and alignment; how implementation should be supported; and to clearly delineate roles and responsibilities, particularly around the collection of recyclables.				x
C5: Facilitate the establishment of longer-term contracts between municipalities and private enterprises ; so as to encourage investment in MRFs and other infrastructure, and/or to ensure surety of supply and sufficient volumes to enable economies of scale; e.g. by: <ul style="list-style-type: none"> • Lobbying for special dispensation from Treasury to allow municipalities to sign long-term agreements with private sector operators. • Training and guidelines for municipal officials to navigate the Municipal Finance Management Act (MFMA) to enable entering into longer term contracts and public-private partnerships (PPPs). • Sharing of experiences between municipalities, and with potential private sector partners. 				x
C6: Measures to improve landfilling standards and increase disposal costs; so as to incentivize diversion of waste towards alternatives, while reducing leakage . For example: <ul style="list-style-type: none"> • Licensing of landfill sites, and improved monitoring and enforcement of compliance with license conditions and with the Norms and Standards for Disposal of Waste to Landfill. • Training/capacity development for municipal solid waste departments in the application of full cost accounting and cost-reflective tariff setting, and enforcement of implementation. • Awareness raising regarding the benefits of diversion of waste from landfill; supported through changing key performance indicators (KPIs) to incentivize diversion of waste from landfill toward 				x



<p>appropriate alternatives.</p> <ul style="list-style-type: none"> • Conditional grant funding to upgrade landfills (e.g. through a dedicated Waste Infrastructure Development Fund); with the provision of funding conditional on sites being fully compliant with license conditions and Norms and Standards, the application of full cost accounting, and the degree to which waste collection and disposal tariffs are cost-reflective. 				
<p>C7: Put systems in place to enable tracking, recovery and sustained circulation of materials through all sectors of the economy. In particular:</p> <ul style="list-style-type: none"> • Put effective systems in place to ensure tracking and recovery of plastic materials at end of life in applications not currently covered by EPR. • In the medium to long term, EPR schemes for other applications of plastic could be considered, where appropriate. 				X

Table 2d: Designing out unnecessary and problematic plastic items

Required action / intervention	CE strategy			
	Reduce	Redesign	Reuse	Recycle
<p>D1: Multi-stakeholder dialogue to agree on the criteria for identifying unnecessary and problematic plastic items, building on the work of the SA Plastics Pact; and to develop a preliminary list of items to be considered for designing out (pending the outcomes of research to assess the impacts of doing so).</p>	X	X	X	X
<p>D2: Scientific research to assess the impacts of designing out unnecessary and problematic items. Specifically, evidence is required regarding:</p> <ul style="list-style-type: none"> • The socio-economic and environmental impacts of phasing out unnecessary items; including net impacts on employment and GDP. • The relationship and trade-offs between packaging and food waste for different food items; in terms of socio-economic and environmental impacts and preserving shelf life. • The potential for alternative delivery models (including reuse models); in terms of socio-economic and environmental impacts; while maintaining functionality and shelf life. • The social, economic and environmental impacts of different materials across their life cycles; and the ability of alternatives to maintain functionality and shelf life; as well as assessment of the reusability, recyclability or compostability of potential alternative materials in the SA context, and the existence of effective waste collection and treatment infrastructure (see also # B5). 	X	X	X	X
<p>D3: Based on the evidence provided under # D2; finalize an agreed list of unnecessary and problematic items to be designed out; and develop an evidence-based policy approach and guidelines for addressing them (e.g. through phasing out unnecessary items, alternative delivery models, redesign, or material substitution). This should include:</p> <ul style="list-style-type: none"> • Guidance on the amount of packaging required for different classes of products ('right-weighting'); taking into account the packaging required to maintain integrity of the product and preserve shelf life. • Guidance on the criteria against which potential alternative materials should be assessed (including socio-economic and environmental impacts; functionality (including ability to maintain shelf life); reusability, recyclability or compostability; the existence of effective waste collection and treatment infrastructure; etc.). • Clear, agreed definitions for terms such as recyclable, biodegradable and compostable. • Guidance for brand owners to easily assess whether materials/packaging are recyclable / compostable, and under what conditions. • Guidance on the requirements regarding verification, certification and labelling of alternative materials claimed as being recyclable, biodegradable or compostable. • Guidance on the specific applications for which compostable plastic materials are suitable; and the conditions under which they could be considered. 	X	X	X	X

Table 2e: Driving design for circularity

Required action / intervention	CE strategy			
	Reduce	Redesign	Reuse	Recycle
<p>E1: Internal and collective commitments among brand owners and retailers to drive redesign for circularity (including designing out problematic materials, design for reuse, design for recycling, and design for inclusion of PCR content); supported through engagement with PROs, guidance from converters, education and awareness within organisations, the development of a stronger value proposition for investment in redesign, and the development of relevant KPIs.</p>		X	X	X



E2: Standardize the materials used for specific applications ; so as to simplify communication and eliminate confusion, and to allow for a more streamlined and efficient recycling system, with improved economies of scale.		x		x
E3: Expand the existing Design for Recycling (DfR) guidelines into evidence-based Design for Circularity guidelines ; providing guidance relating to: <ul style="list-style-type: none"> • Design for reuse (e.g. design containers for easy emptying, cleaning and filling; to retain their integrity after multiple uses; and to be safe for reuse). • Design for recycling; with an emphasis on designing for multiple lives (e.g. designing products and packaging so as to maximize their recovery potential and opportunities for further recycling at end of life; and avoiding design choices that limit recovery potential and further recycling applications). • Designing for the inclusion of PCR content. 		x	x	x
E4: Application of eco-modulated EPR fees based on the application of Design for Circularity principles ; including: <ul style="list-style-type: none"> • Design for reuse • Design for Recycling, including recyclability of the material (specifically avoiding the use of problematic, difficult to recycle and non-recyclable materials), and other DfR principles • Design for multiple life cycles • The % of PCR content, where applicable (e.g. for non-food contact applications). 		x	x	x
E5: Private sector organisations to specify requirements for the incorporation of Design for Circularity principles in their procurement policies.		x	x	x
E6: Public procurement regulations to be updated to specify requirements for the incorporation of Design for Circularity principles. A platform could be developed to share examples of green procurement practices (e.g. among municipalities).		x	x	x

Table 2f: Scaling up reuse models

Required action / intervention	CE strategy			
	Reduce	Redesign	Reuse	Recycle
F1: Conduct research relating to reuse and refill models (building on existing research); aimed at: <ul style="list-style-type: none"> • Understanding consumer attitudes, perceptions and behaviour towards the reuse of packaging, and regarding the uptake of reusable packaging options and reuse/refill systems. • Providing information on the socio-economic and environmental benefits of reuse as compared to recycling in the SA context; e.g. through the inclusion of reuse options in LCA/LCSA studies. • Identifying specific types of products or packaging that are amenable to reuse models or reusable alternatives; taking into account functionality, environmental and socio-economic impacts (see # D2), health and safety issues (e.g. contamination risks), etc. • Exploring the various types of reuse and refill models, and evaluating their appropriateness to the SA context; specifically focused on <ul style="list-style-type: none"> ○ Practicality in the SA context; taking into account constraints relating to the costs and logistics of setting up return schemes, the wide reliance on public transport, lack of access to water for washing, etc. ○ Ensuring inclusive design; taking into account affordability, impacts on informal waste pickers, etc. ○ Ensuring that current recycling efforts are not hampered. 			x	
F2: Provide support for the development and implementation of reuse and refill initiatives ; e.g.: <ul style="list-style-type: none"> • Dedicated funding or support programmes for reuse initiatives • Awareness and support for brand owners and retailers to identify and adopt suitable reuse and refill models; and to put in place systems enabling return (or repair) where appropriate. 			x	
F3: Multi-stakeholder engagement to drive awareness around reuse models and achieve scaling. In particular: <ul style="list-style-type: none"> • The designers of reuse/refill models should engage with suppliers, producers, brand-owners and retailers to raise awareness, drive change, put the required systems in place, and achieve scaling. • Brand-owners and retailers should engage with consumers to make them aware of available reuse/refill models and reusable packaging options; and encourage them to make use of such systems, and to request reusable options at point-of-sale. • Brand-owners and retailers should create awareness among consumers that many types of plastic packaging and other items typically discarded after a single use can in fact be reused; and encourage them to reuse such items as many times as possible, before recycling. 			x	
F4: Add reuse targets for certain classes of plastic packaging (where feasible) within the EPR Regulations ; informed by dialogue with relevant role-players to assess feasibility.			x	



Table 2g: Further development of recycling capacity where required

Required action / intervention	CE strategy			
	Reduce	Redesign	Reuse	Recycle
G1: Funding / incentives for the development of processing technologies, infrastructure and additional recycling capacity where required (e.g. through public sector funding, the creation of an enabling environment to incentivize private sector investment, or through EPR). Funding should preferably be on a cost-sharing basis; and could take the form of grant funding (particularly for SMMEs), incentives (e.g. tax credits), or the application of conventional commercial financing models (e.g. loans) with preferential rates.				x
G2: Investment in innovative solutions to enable improved quality and grading of recycled polymers; e.g. tracking and tracing of recyclate supply chains; sorting and washing technologies to deal with mixed / contaminated waste; as well as improved processing technology and quality management systems; to ensure a consistent supply of good quality PCR.				x
G3: Conduct research to assess the feasibility and suitability of developing processing technology for more difficult to recycle waste streams and more advanced forms of recycling in the SA context; e.g. food-grade recycling (including the feasibility of setting up closed-loop collection and recycling systems for food-grade polyolefins); chemical recycling; etc.				x
G4: Investment (e.g. through EPR) in the development of processing technologies for more difficult to recycle waste streams and more advanced forms of recycling, where found to be feasible and suitable in the SA context (see # G3).				x

Table 2h: Driving demand for post-consumer recyclate

Required action / intervention	CE strategy			
	Reduce	Redesign	Reuse	Recycle
H1: Invest in the development of further capacity for independent verification of PCR content, to enable simple and cost-effective verification for a wider range of products; and an associated labelling system to provide assurance of verified PCR content.				x
H2: Develop a brief (1-2 page) evidence-based guideline identifying suitable end-markets for PCR. Criteria for the identification of such end-markets could include, among others: <ul style="list-style-type: none"> • Legal, technical and economic feasibility of including or increasing PCR content in the product. • Impact in terms of the quantity of PCR that could be absorbed / virgin inputs that can be replaced. • Avoiding the development of new unnecessary or problematic products (see # D3). • Likelihood that the material will be recovered and recycled again at end of life in the new application; e.g. based on: <ul style="list-style-type: none"> ○ The range of further applications in which the material can be used once it reaches end of life; i.e. keeping material at its highest possible value (in terms of utility for further recycling applications), and avoiding applications with limited further recovery and recycling potential. ○ Whether systems are in place enabling recovery at end of life in the new application. ○ Technical and economic feasibility of recovery, separation and recycling of materials at end of life. 				x
H3: PROs, brand-owners/retailers, converters, recyclers and virgin polymer producers to collaborate to drive demand for PCR as a substitute for virgin inputs; e.g. by developing, trialing and implementing products containing PCR, and developing end use markets.				x
H4: Brand-owners and retailers to specify requirements for PCR content in their products and packaging; particularly for non-food contact applications.				x
H5: Where feasible, add mandatory phased targets for the inclusion of PCR in products and packaging within the EPR Regulations, with an initial focus on non-food contact applications. Feasibility to be assessed in consultation with PROs; taking into account legal/technical/economic constraints for PCR inclusion, and the existence of capacity for independent verification of PCR content (see # H1).				x
H6: Private sector organisations to specify requirements for the inclusion of PCR content in their procurement policies, based on the guidelines proposed in # H2.				x
H7: Public procurement regulations to be updated to specify requirements for the inclusion of PCR content, based on the guidelines proposed in # H2. For example, identified products purchased using public funds could be required to include a minimum % of PCR; alternatively, the actual % of PCR content in the product could be factored into the procurement score. A platform could be developed to share examples of green procurement practices (e.g. among municipalities).				x



Table 2i: Improved communication, education and behavioural change

Required action / intervention	CE strategy			
	Reduce	Redesign	Reuse	Recycle
I1: Mandatory application of a harmonized On-Pack Recycling Label (OPRL) system across all products and packaging (including compostable plastics, as well as non-plastic products and packaging); based on clear, agreed definitions of key terms (recyclable, recycled, compostable etc.). This system should build on the existing OPRL initiative underway through WWF-SA and the SA Plastics Pact, and be linked to the awareness and education campaign discussed under # I2.				x
I2: Develop an evidence-based, credible, and ongoing awareness and education campaign; with a clear and consistent message for all role-players, based on the research proposed under # A3, D2, etc. Include information on: <ul style="list-style-type: none"> • What is meant by a circular economy (in general, and with specific reference to plastics). • Clear, unambiguous definitions for terms such as single use, reduce, reuse/reusable, recycle/recyclable, biodegradable/compostable, etc., to ensure agreement and alignment on definitions. • An understanding of the benefits of plastic; and a mindset change away from seeing material substitution or recycling as silver bullets; towards understanding that all materials have value, but need to be designed and used in a more circular way, with an emphasis on reduction and reuse. • The impacts of different material choices; so as to simplify comparison and facilitate more sustainable choices for producers and consumers. • The benefits of using PCR content in products; and of purchasing products with a higher PCR content. <p>This message should inform communication at all levels (although different role players would be involved in dissemination, depending on the target audience); to ensure that consistent information is being shared, and to avoid confusion and misinformation. For example, brand owners and retailers should educate consumers around:</p> <ul style="list-style-type: none"> • Differences between reducing/reusing/repurposing/recycling; and the benefits of reducing/reusing over recycling. • The differences between biodegradable, compostable and recyclable; emphasizing that products claiming biodegradability/compostability will only do so under certain conditions, and can contaminate the recycling stream. • What can and can't be recycled (linked to the OPRL system proposed in # I1); how to separate their recyclables, where to take them, the importance of supporting informal collectors, etc. 	x	x	x	x
I3: Incentives and behavioural change interventions (e.g. behavioural 'nudges'), aimed at: <ul style="list-style-type: none"> • Addressing unsustainable consumption patterns and lifestyles. • Reducing the consumption of unnecessary items (e.g. avoiding the provision of 'free' plastic cutlery, straws, bags etc. as the default option; and likewise for non-plastic products). • Promoting Design for Circularity and the use of PCR content in production; and incentivizing consumers to choose products that have been designed for circularity and have higher PCR content. • Promoting reuse of plastic packaging and other items (e.g. discounts for reusing containers/bags, own-container dispensing systems with lower prices relative to packaged products, visible messaging outside the store reminding consumers to bring their reusable containers/bags, etc.). • Incentivizing return of items for reuse or recycling (e.g. through product take-back / buy-back systems, deposit-refund systems, reverse vending machines, etc.). • Encouraging participation in separation at source, or bringing recyclables to drop off facilities. 	x	x	x	x

Table 2j: Promoting inclusivity and a just transition

Required action / intervention	CE strategy			
	Reduce	Redesign	Reuse	Recycle
J1: Ensure integration of informal collectors within collection and recovery systems (including separation at source, see # C3); through implementation of the Waste Picker Integration Guidelines; and as per the requirements of the EPR Regulations, including payment of a collection service fee.				x
J2: Ensure inclusion of the informal sector within the circular economy more broadly; e.g. by <ul style="list-style-type: none"> • Including the informal sector in decision making and policy making processes. • Expanding the Waste Picker Integration Guidelines to cover other circular economy activities undertaken by the informal sector. 	x	x	x	x
J3: Develop decentralized, local solutions appropriate for areas located far from recycling markets (especially rural areas); e.g. development of local value adding/recycling capacity and local markets; to enable local economic development.				x



J4: Safeguarding of livelihoods and employment, e.g. through retraining and reskilling of workers to transition toward new and emerging activities, and the development of transferable skills.	x	x	x	x
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CONCLUSIONS

South Africa has been plagued by stagnant GDP growth, significant unemployment, and persistent poverty and inequality for a number of years. The COVID-19 pandemic has led to a further deepening of South Africa’s economic crisis; and highlights the urgency for a new model of economic development to drive the post-pandemic economic recovery. In line with global trends, the President has called for a recovery that is transformative, inclusive, digital, green and sustainable (The Presidency, 2020a). A circular economy transition is core to the South African development pathway; with the President affirming that “we cannot afford to be out of step with international moves towards green growth and green development” (The Presidency, 2020b).

The benefits of transitioning to a circular plastics economy are clear. In addition to relieving pressure on municipal waste management systems and on landfills, and addressing plastic leakage to the environment; the circular economy is recognized globally as an opportunity to reframe economic development and unlock new opportunities for growth and employment; while achieving global commitments relating to climate change and sustainable development. It also provides opportunities for more sustainable resource management and reduced environmental impacts; by keeping products and materials in use for as long as possible, while designing out pollution and waste. Finally, it provides opportunities for managing risks to economic development, by creating resilience in the face of volatile international markets and future resource scarcities.

A circular plastics economy is about much more than increased recycling. A circular economy requires a mindset change and interventions across the full value chain. The use of unnecessary plastics must be reduced, and problematic materials must be designed out. Products and materials must be designed not only for recycling, but for circularity – i.e. ensuring that materials are kept at their highest value through multiple life cycles, increasing the likelihood that they will be recovered at the end of their next life; and ensuring that they are kept in the economy and out of the environment for as long as possible. Products should also be designed for reuse, and innovative reuse/refill models should be encouraged; while a comprehensive consumer education and awareness drive is required to encourage the reuse of plastic products and packaging. Products must be designed for the inclusion of post-consumer recycled content, while targets and procurement policies requiring the inclusion of PCR content must be put in place; to create a sustained demand. Collection systems must also be improved, to ensure that materials can be recovered and retained within the economy; while improved waste disposal practices will also be required for any materials that cannot be reduced, designed out, reused or recycled.

There are a plethora of circular plastics economy activities already underway in South Africa. However, many of these are end-of-pipe, downstream initiatives aimed at treating the symptoms (leakage of plastics to the environment), rather than holistic solutions aimed at addressing the root causes. There is also a lack of collaboration and coordination towards meeting a joint vision, resulting in a lack of impact. There is a need for a clear policy direction and an effective enabling environment to be created, and for all role-players to work towards a common agenda; with an appropriate custodian providing direction and coordination towards meeting the vision; in order for a truly circular plastics economy to be realised.

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