

BREAKING THE PLASTIC WAVE, THE RELEVANCE FOR AFRICA AND SOUTH AFRICA AND FURTHER ACTIONS REQUIRED TO REDUCE THE LEAKAGE OF PLASTIC

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KEY FINDINGS

The results of a recent international study (Pew/Systemiq, 2020) showed that *“urgent and coordinated action combining pre- and post-consumption solutions could reverse the increasing trend of environmental plastic pollution. While no silver bullet exists, 78% of the plastic pollution problem can be solved by 2040 using current knowledge and technologies and at a lower net cost for waste management systems compared to BAU”*.

INTRODUCTION

South Africa has recently participated in a global study aimed at evaluating the interventions necessary to reduce the leakage of waste plastic to our oceans. In July 2020, US- and UK-based The Pew Charitable Trusts and SYSTEMIQ, in partnership with the University of Oxford, University of Leeds, Ellen MacArthur Foundation, Common Seas, and a panel of 17 global experts, launched a report which modelled global plastic flows and stocks. It was important to the CSIR and the Department of Science and Innovation (DSI) that South Africa and Africa be represented in this study. To ensure that the conditions facing the continent be represented in the model design and development, and that the findings of the study be used to facilitate change in how plastic and plastic waste are managed on the continent and in the region.

METHODOLOGY

Against the backdrop of a Business-as-usual (BAU) strategy, this global study first modelled four, individual intervention scenarios, commonly held as mitigation strategies to address the plastic waste problem –

- Current commitments
- Collect and dispose
- Recycling
- Reduce and substitute

Early results showed that there is no single solution to end ocean plastic pollution. Upstream and downstream solutions must be deployed together. An integrated intervention scenario was therefore added to the model –

- System change (compounded)

KEY FINDINGS

The key findings from this data-driven analysis, were –

1. Without action, the annual flow of plastic into the ocean will nearly triple by 2040.
2. Governments and industry leaders are stepping up with new policies and voluntary initiatives. However,

- these commitments are only likely to reduce annual plastic leakage to the ocean by 7% relative to BAU.
3. The informal sector plays an important role in the collection of plastic, responsible for 58% of post-consumer plastic waste collected for recycling in 2016.
4. Industry and governments have the solutions today to reduce rates of annual land-based plastic leakage into the ocean by about 80% below projected BAU levels by 2040.
5. Going beyond the System Change Scenario to tackle the remaining 5 million metric tons per year of plastic leakage demands significant innovation across the entire value chain.
6. The System Change Scenario is economically viable for governments and consumers, but a major redirection of capital investment is required.
7. Reducing approximately 80% of plastic leakage into the ocean will bring to life a new circular plastics economy with major opportunities – and risks – for industry.
8. A system change would require different implementation priorities in different geographies and for different plastic categories.
9. Addressing plastic leakage into the ocean in a systemic way has many co-benefits for climate, health, jobs, working conditions, the environment, thus contributing to many of the UN SDGs.
10. The time is now: If we want to significantly reduce plastic leakage, we have the solutions at our fingertips. An implementation delay of five years would result in an additional ~80 million metric tons of plastic going into the ocean by 2040.

“For the first time, we have information that shows just how important the informal sector is to the global plastics value chain, and to reducing the leakage of plastic to the environment. This supports activities happening in many developing countries to improve informal reclaimer livelihoods through greater integration into the waste economy.” – Linda Godfrey

RECOMMENDATIONS

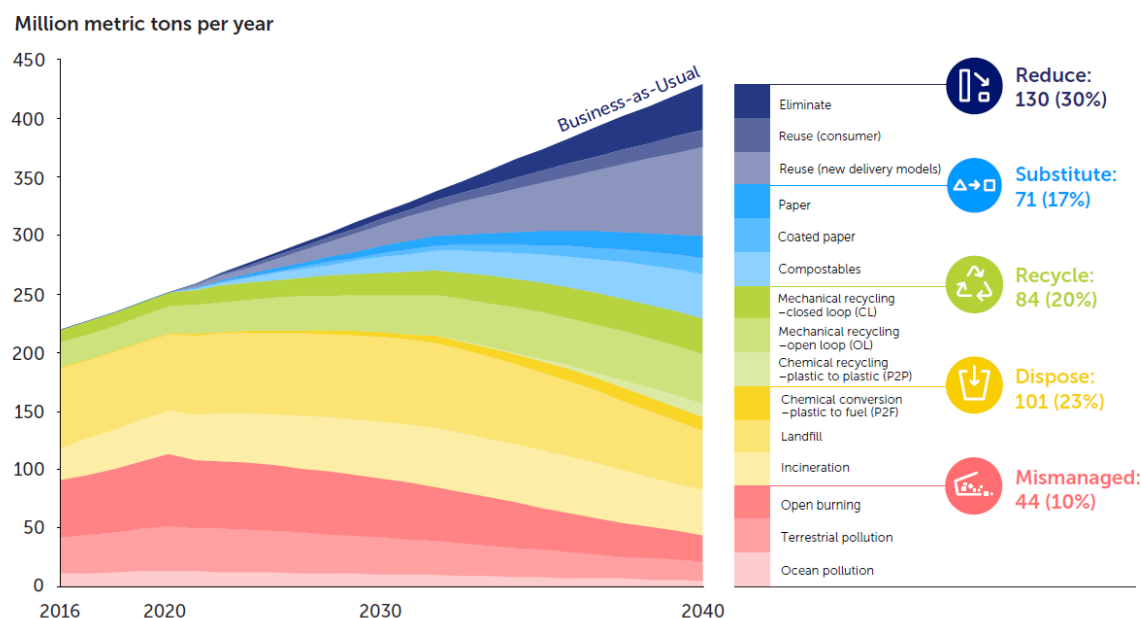
The recommendations made by the Pew/Systemiq report provide clear guidance on (i) where immediate intervention is required in South Africa, and (ii) where our national system of innovation (NSI) must support further action –

1. Reduce growth in plastic production and consumption to avoid nearly one-third of projected plastic waste generation through elimination, reuse, and new delivery models.
2. Substitute plastic with paper and compostable materials (for specific problematic products), switching one-sixth of projected plastic waste generation.
3. Design products and packaging for recycling to expand the share of economically recyclable plastic from an estimated 21% to 54%.

4. Expand waste collection rates in the middle-/low-income countries to 90% in all urban areas and 50% in rural areas and support the informal collection sector.
5. Double mechanical recycling capacity globally to 86 million metric tons per year.
6. Develop plastic-to-plastic conversion, potentially to a global capacity of up to 13 million metric tons per year.
7. Build facilities to dispose of the 23% of plastic that cannot be recycled economically, as a transitional measure.
8. Reduce plastic waste exports by 90% to countries with low collection and high leakage rates.

Figure 1: Plastic fate in the System Change Scenario: a 'wedges' analysis

There is a credible path to significantly reduce plastic leakage to the ocean but only if all solutions are implemented concurrently, ambitiously, and starting immediately



RELEVANCE FOR SOUTH AFRICA AND AFRICA

The findings of the Pew/Systemiq (2020) report are highly relevant for Africa, which is facing a growing waste – and waste plastic – problem. As noted in the Africa Waste Management Outlook (UN, 2018), population growth, rapid urbanization, a growing middle class, changing consumption habits and production patterns, and global waste trade will inevitably mean an increased waste burden on African cities and on already strained waste infrastructure. Five of the top 20 countries ranked by Jambeck *et al.* (2015) by mass of mismanaged plastic waste are in Africa.

“African countries are facing increasing plastic consumption, and because of constraints in waste management, increasing plastic pollution. This report provides the evidence countries urgently need to develop intervention strategies. Strategies, which the system model shows, can be more cost-effective and provide greater social, environmental and economic benefit, than a business as usual approach.” – Linda Godfrey

Areas of action

Given the findings of this global study, there are immediate areas of action for the South African government and industry. These include –

1. Re-evaluation of plastic production in South Africa given suggested reduction and substitution as a major intervention strategy for reducing leakage of plastic to the environment. Warnings have already been raised internationally, that plastic could become the next stranded asset (*manufacturing*).
2. Identify which polymers and products (particularly single-use products) are problematic in South Africa and identify interventions (together with brand owners) for their rapid replacement and/or substitution (*manufacturing*).
3. Fast-track development of an enabling environment that will support the growth of South Africa’s plastic recycling industry. While South Africa has grown its local plastic recycling sector, a large percentage of waste plastic still continues to be disposed of to land and leak to the environment (*policy*).

4. Fast-track waste collection services in both urban and rural areas in South Africa. Illegal dumping and littering of waste are a major sources of plastic leakage in South Africa (*service delivery*).
5. Fast-track closure of waste dumpsites (areas of high leakage) and shift to fewer, larger, regional, engineered landfills. Dumpsites are a major source of plastic leakage in South Africa (*service delivery*).

“This systems model clearly shows us just how important it is for low- and middle-income countries to urgently address their current waste management systems. The cost of inaction will be significant.” – Linda Godfrey

It is recommended that the global Plastics-to-Ocean (P2O) data-driven coupled ordinary differential equation (ODE) model be applied to South Africa, to determine how the eight interventions can be applied at the country level, and in an integrated way. This will establish South Africa’s response to minimising the leakage of plastic to the environment, but at the same time, assist in quantifying the broader social (e.g. jobs), environmental (e.g. CO₂ mitigation) and economic (e.g. cost savings) benefits.

STI RESPONSE FOR SOUTH AFRICA AND AFRICA

Current activities

The DSI recognised in early 2014 during the development of the Waste Research, Development and Innovation (RDI) Roadmap, that an integrated approach to addressing waste plastic pollution was necessary. To date, the Department has initiated, or partnered on, a number of studies in each of the four main intervention areas identified in the global study. To date, the response by DSI has been limited only by the available funding for the Waste RDI Roadmap –

Reduce:

- Informing decisions on single-use plastic carrier bags in South Africa: Evidence from a LCSA (*building local capability to inform further products*) (CSIR)

Due to funding limitations, South Africa may need to rely on brand owners to find reduction solutions within their international markets and to “drop” these innovations into their South African market.

Substitute:

- Support for transitioning from conventional plastics to more environmentally sustainable alternatives (*in partnership with the Government of Japan and UNIDO*) (CSIR)
- End-of-life options of biobased plastic materials and its biocomposites in landfill, compost and marine water conditions (CSIR)

There is significant RDI opportunity in product design, alternative materials, and alternative delivery methods appropriate in a developing country context.

Recycling:

Finding new, high-value end-use markets for plastic –

- The use of plastic waste in road construction (CSIR)
- Extraction of value from solid waste by pyrolysis conversion: Pilot scale optimisation (SUN)
- Techno-economic feasibility assessment on the viability of using waste PET to produce MOFs (CSIR)

There is significant RDI opportunity in developing new, high-value end-use markets for waste plastics.

Collect and dispose:

- Evidence based guidelines to integrate waste pickers into municipal waste management systems (Wits)
- Clean cities and towns: Understanding societal behaviour in order to reduce and divert waste going to landfills (UWC)
- Incentives for municipalities to divert waste from landfill in South Africa (CSIR)

There is significant opportunity to strengthen capability at local government level to respond to the current waste management challenges facing municipalities, and to build community awareness regarding responsible waste management.

To place the impact of waste plastic in context in South Africa, the DSI recently completed a marine plastic pollution science review, published as five peer reviewed papers in the SA Journal of Science. The aim of the science review was to understand the magnitude of the sources, pathways and sinks of marine plastic debris, and the associated ecological, societal and economic impacts of marine plastic pollution. The study identified a number of evidence gaps which the DSI has taken forward into a targeted research call in 2020.

Future activities

There is immediate opportunity for the NSI to support government and industry in modelling the eight interventions, to determine our country-specific intervention strategy. Once, known, this country strategy can be used to map out further, immediate actions (which may require policy support) and areas of innovation (where current technology solutions are not available). As noted by the Systemiq report, significant innovation will be required to address the remaining 5 million metric tons per year of plastic that will continue to leak to the environment, and for which technologies are not currently available.

Notes: South Africa was represented in the global study by Prof Linda Godfrey, Manager of the Waste RDI Roadmap Implementation Unit, an initiative of the Department of Science and Innovation, hosted by the CSIR, and principal scientist in Waste and the Circular Economy at the CSIR.

Further information:

Report <https://www.systemiq.earth/breakingtheplasticwave/>
Peer reviewed Science paper <https://doi.org/10.1126/science.aba9475>