

South Africa beats Europe at plastics recycling, but also is a top 20 ocean polluter. Really?

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Recently released industry figures claim that South Africa recovers 43,7% of its plastic waste for recycling, outperforming Europe’s plastic recycling by a significant margin of 12,5%. This is in stark contrast to reported and observed plastics in the environment, with one [global scientific study](#) putting South Africa in the top 20 contributors to ocean plastics and estimating that 56% of plastic waste is poorly managed and prone to leakage into the environment.

If one adds up the 43,7% headline recycling rate and the 56% of plastic waste poorly managed, one would have to conclude that only 0,3% of plastic waste is properly disposed in landfill sites. Any visual of a South African landfill site would quickly dispel this view.

So it seems that not both of these claims can be true? With a [government-mandated packaging industry waste management plan compiled in 2018 and under review](#), it’s important that a coherent factual basis underpin the debate and the forthcoming decisions leading to interventions. We take a look at what is known and how it is represented.

A coherent picture

Our first step was to compile the available numbers of how much is produced, used, exported, imported recycled and disposed and put them into a material flow analysis (MFA) – one big mass balance. The result is shown in this figure.

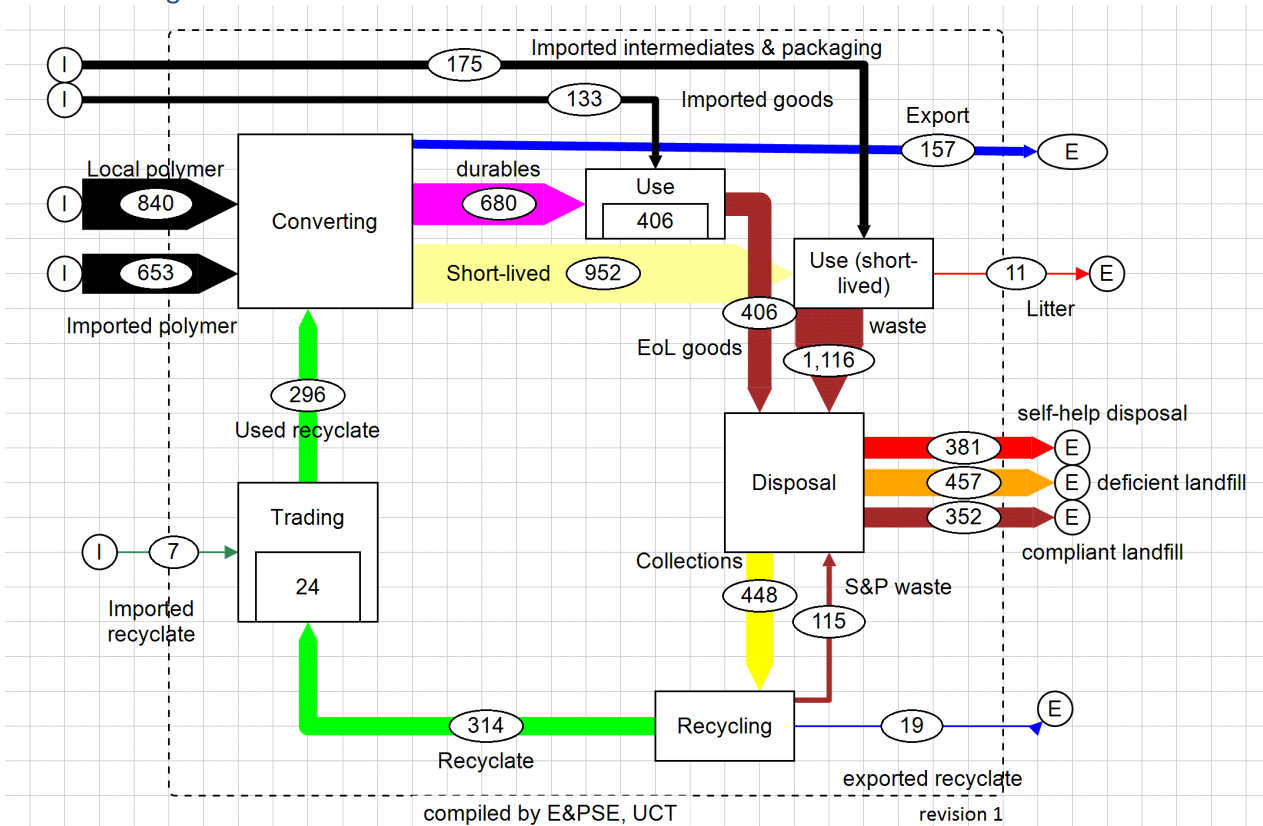


Illustration: Material flows of plastics (in kt) in South Africa in 2017, compiled by E&PSE from various sources

MFAs of plastics have been done before, notably in the 2017 report published by the Department of Environmental Affairs (DEA), analysing plastics material flow in South Africa. Our picture differs from theirs in that we show circularity in the system where it exists and that we allow for an addition to stock of durable goods. Some of the numbers are very uncertain (as will be discussed below): in this version of the MFA, we use the lowest estimate from DEA (2017) for imported plastic goods. We also simplify that flow here to be entirely short-lived items.

The recycling numbers and their interpretation

The actual recycling quantities are well-reported in the annual [recycling survey](#) of Industry Association Plastics SA. For 2017, it reports that 487 kt of plastics were collected for recycling of which 335 kt became ready-to-use granulate. [Note that since Plastics SA reports 8% of the collected materials to be non-plastics, we show only 448 kt in our diagram.]

Matters become more complicated when relating these numbers to virgin polymer and total plastics production and consumption to arrive at the published recycling rate. It should be noted that the 43,7% claimed is an 'input recycling rate' (meaning that the collected waste rather than the produced granulate is used for the numerator), and that the denominator represents only the fraction of plastic estimated to go into short-lived usage.

Furthermore, whilst exported plastic packaging is duly removed from the denominator, imports of plastic packaging are not considered in this recycling rate (they would make it smaller, increasing the plastic consumption represented by the denominator). Imports are difficult to quantify, with a recent study published by the Department of Environment Affairs (DEA) estimating them to be at least equal to the quantity of plastics recycled and possibly twice as large as total domestic plastics use. [We have used the lowest number in our diagram, as we find it to be consistent with our estimate of total waste quantities, see below.]

Another way to quantify South Africa's plastic recycling achievements would be to combine the available numbers into an average recycled content of plastics products made in South Africa – the way we read the numbers, this would have been 17% in 2017. May we suggest a target to double this in 5 years?

How much (plastic) waste is there and where does it end up?

Diverging opinions on the performance of waste management and recycling derive partly from an incomplete knowledge of how much waste is actually generated in the country. The most authoritative source of information is the now dated [National Waste Baseline Report](#) of 2011, which we have previously critiqued in a chapter of this [book](#) for including some very large flows of 'other' waste on a very speculative basis; importantly this baseline also does not quantify improperly disposed waste at all. A draft of a 2018 "State of Waste Report" is currently circulating.

An often repeated soundbite based on superficial interpretations of this baseline report is that only 10% of waste generated in South Africa is recycled. This may be one of the reasons that the efforts of the recycling industry are not properly appreciated in many circles.

So, whilst plastics recycling in South Africa is indeed achieving impressive results (and in the process employing some 5000 workers formally plus an estimated 50000 informally according to PlasticsSA), at least 700 kt (PlasticsSA, 2018) and possibly as much as 2 500 kt (DEA, 2017) of plastic waste annually is not recycled. Our own best estimate is close to 1 100 kt; in other words, there is 2,4 times more plastic not recycled than recycled. Where does it end up? In order of quantity, there are three main sinks: disposal in landfills, self-help disposal and littering.

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Self-help disposal

The [household surveys of Statistics SA](#) report that 31% of households in the country do not have access to regular waste removal services. A vast majority of all types of rural households dispose of their wastes in "own refuse dumps", by burying or burning, whilst a sizeable fraction of households in urban informal settlements find themselves in a similar position. By combining waste generation rates for different income groups, available in the literature, with the household survey data, a recently completed Masters dissertation (Rodseth, 2018), estimates that 29% of household waste in the country is not formally collected. This provides a first estimate for plastic waste not collected, though some plastic items from the waste of non-serviced households (PET bottles in particular) may be collected due to existing incentives (petco.co.za).

It is this portion of the waste, combined with the relatively small tonnage but huge number of light-weight items littered (see below), that is most likely to end up in the environment. Estimates for this non-collected plastic waste fraction range from 215 kt (industry figures) via 380 kt (DEA, 2017) to 630 kt (Jambeck et al., 2015). 300-400 kt/a seems a likely range; how much of that (eventually) goes into the oceans is anyone's guess.

Formal waste disposal

All of the large cities (the so-called metros), where the bulk of South Africa's high-consumption population lives, dispose of their waste in reasonably to well-managed large sanitary landfill sites. We estimate that some 30-40% of household waste is disposed this way. Much of the plastic waste collected for recycling is picked from this stream by informal operators, either at the curb-side or the landfill. Separate collections of recyclables and sorting in material recovery facilities are starting to formalise this business – potentially with significant negative effects on established livelihoods.

That leaves roughly one third of household waste collected formally but disposed of under less than ideal conditions, in medium, small or communal landfill sites, of which the majority are not compliant with regulations for the disposal of waste. Again, significant amounts of plastics recycled may originate from this source.

Disposal to land (landfill and dumping) is therefore the predominant disposal mechanism in South Africa. Contrary to richer countries, South Africa does not make use of waste incineration at scale, with only [1,2 kt](#) reported to have become fuel for cement kilns in 2017. [We have omitted this very small flow from our diagram.]

Littering and leakage into the environment

Plastic litter and leakage is the hardest amount to quantify. DEA estimates it at 11 kt annually; [Jambeck et al. \(2015\)](#) cite an estimate of 2% of total plastic used in a country (that would be 30 kt). Whatever the weight, plastic being so lightweight means that an enormous number of individual plastic items end up in the natural environment. As an illustration of these quantities, walking five Cape Town beaches for 5-10 days each and picking up 36000 items, one of us determined wash-up rates ranging from 36 to almost 3000 items per 100 m per day. The average weight of these items was recorded at 1,4 grams. Plastic made up 95% - 99% of the collected items, of which the majority are not currently recycled. The 10 most frequently collected items (which were all single-use consumer goods) accounted for almost half of these items – and 9/10 were related to food consumed on the go! The results have now been published ([Chitaka & von Blottnitz, 2019](#)).

Let's wrap our brains around this: If 20 million South Africans each dropped two items of 1,4 g every day, then that would come to 15 billion items annually, weighing 20 kt (equivalent to about 1000 Southern Right Whales)! [This illustration is compatible with the 11 kt shown in our illustration.]

Of course, not all littered materials end up in the environment (as they may be collected through street or environmental cleaning), just as not all informally or semi-formally disposed waste stays disposed. This makes quantifying leakage all the harder. Our estimate is that South Africa does not rank quite as highly as a contributor to ocean plastics as made out in the [2015 Science paper](#), which used a per capita waste generation rate 2,8 times higher than the likely national average. However that should not indicate good performance. Indeed, [Ryan et al. \(2018\)](#) determined that the majority of plastic fragments and industrial pellets washing up on South African beaches originated locally.

In summary:

South Africa does indeed do comparatively well at plastics recycling, but could recover much more. At the same time almost one third of its population still does not enjoy regular waste removal services and plastic waste is ubiquitous in the environment. As a result, the country does both reasonably well and very badly at managing its plastic materials.

Much more recycling is possible and necessary, but a singular focus on this strategy cannot achieve a plastic-free environment. Interventions should seek:

- i) to protect and grow the impressive plastics recycling industry,
- ii) to develop a national standard for materials management in rural areas (and this might have to involve packaging redesign where distance makes recovery for recycling infeasible), and
- iii) to do away with the small number of plastic items highly prone to littering.

Acknowledgements and Notes

This revision 1 is a slightly modified version of the article first published on LinkedIn and on the E&PSE website in September 2018.

Critical commentary from experts at the Industry Association PlasticsSA is gratefully acknowledged. Our numbers differ from their primarily by including a (admittedly rough) estimate of the fate of durable plastics.

We also acknowledge the encouragement received by a number of colleagues, from across industry, NGOs, government and independents. It seems that our picture which shows whatever circularity does exist in this material life cycle has indeed been appreciated and, equally, that some evidence-based clarity amongst much public hype about this topic is helpful. Thank you for your feedback and interest!

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