

CIRCULARITY IN PLASTICS IN SOUTH AFRICA

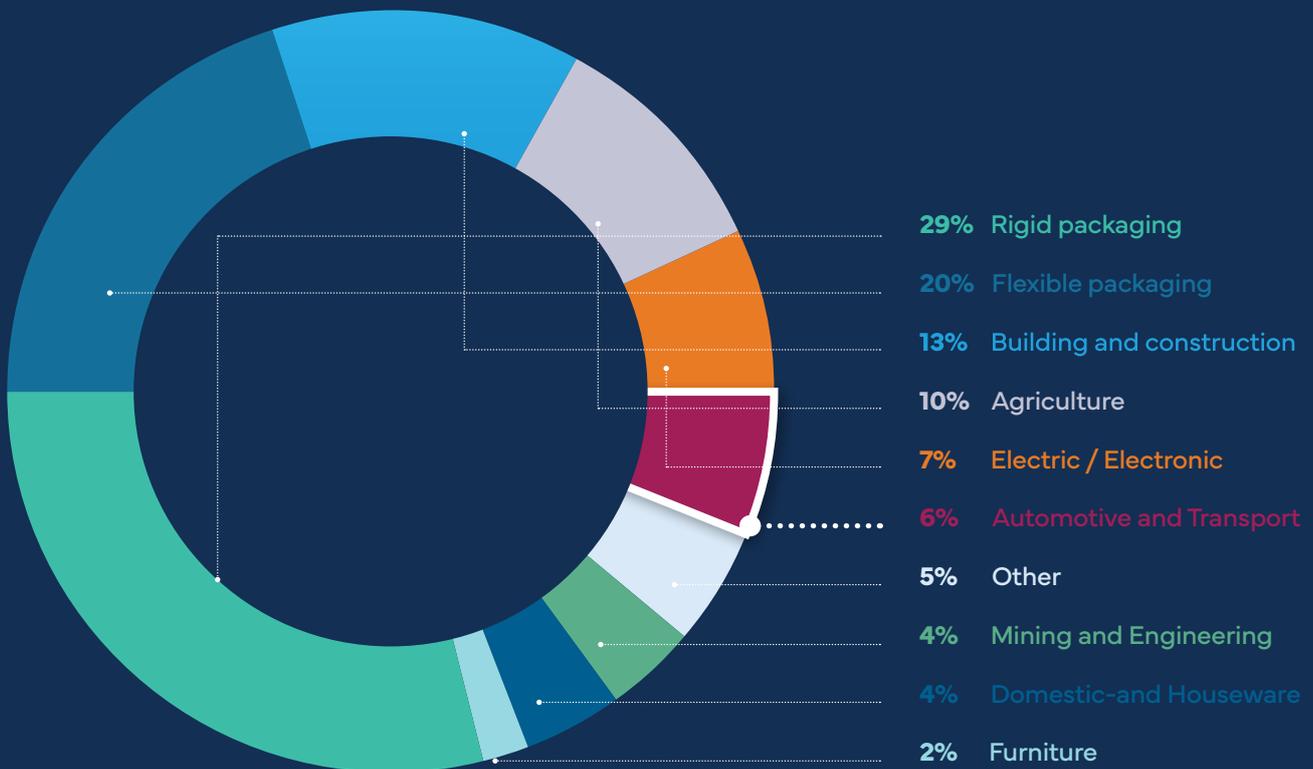
# Opportunities for a circular economy for automotive plastics in South Africa



A circular economy for plastics has projected net economic and job creation benefits in both developed and developing country settings. South Africa has good potential to realise the benefits in a circular economy for plastics, building on expertise in both the plastics production and recycling sectors. This series of 10 briefs provides the context of the plastics industry in South Africa and highlights opportunities in a circular economy: Part 7 of 10

**Automotive industry: The South African plastics market**

Plastics produced for the automotive sector in South Africa constituted 6% of the plastics converted locally in 2019 (Figure 1). Plastics produced include automotive components, products (full systems, such as an air-conditioning system) and semi-finished products for the automotive industry, which encompasses a complex range of plastics.



**Figure 1: The proportion of polymer converted locally by market sectors**

Source: Pretorius (2021)<sup>1</sup>

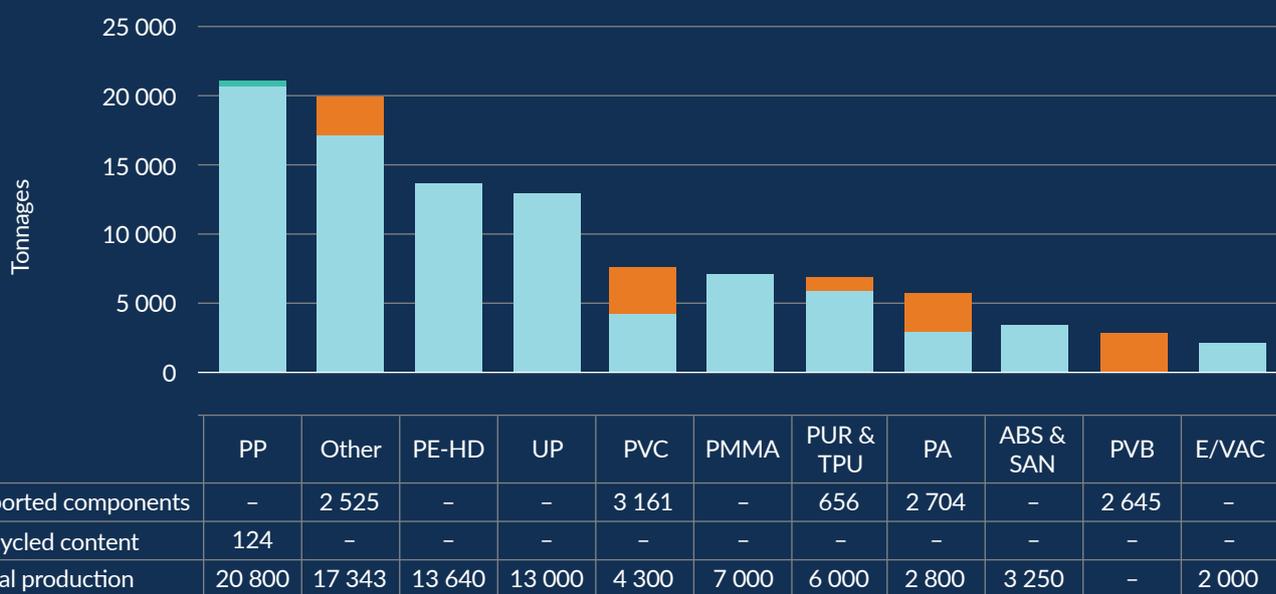
<sup>1</sup>Pretorius, A. (2021) Plastics Industry in South Africa in 2019

Components are produced locally for BMW, Ford/ Opel, Isuzu, Mercedes, Nissan, Toyota, and Volkswagen, as well as for the independent aftermarket (domestic and international), while replacement parts are also locally manufactured for other brands.

There is a wide range of polymers used in the automotive sector, with additional complexity required of engineering grades with specific additives included to achieve the desired specifications of the Original Equipment Manufacturers (OEMs), all of which are international companies that define their own specifications, which is a barrier to local supply of polymer – virgin or recycled.

The range of base polymers used in the automotive industry are presented in **Figure 2**. Although the graph reflects that most plastic components are made locally, the OEMs’ stringent specifications and internally approved list of polymer suppliers means that most polymer is not locally sourced. The proportion of local polymer versus imported polymer used is not known.

The recycled tonnages presented are post-consumer recycled content. The largest tonnage of polymer used in the automotive industry is PP, however PP in particular is available in multiple grades with specific additives, and therefore should not be seen as homogenous material. The largest imported tonnages are PVC, PA and PVB. All components containing PP, PE-HD, UP, PMMA, ABS and SAN, and E/VAC are made locally.



**Figure 2:** Automotive plastics by polymer including trade balance on imported/exported products, and tonnages of locally produced virgin plastics and locally produced recycled plastics

**This brief:**

- o Sets out the opportunities for circularity for automotive plastics in the South African context in the short term, namely recovery, reuse, and recycling of plastics in the automotive industry; and
- o Discusses potential levers to drive greater circularity in the automotive sector in South Africa.

## Recovery, reuse and recycling of plastics in the automotive industry

There are limited current drivers for circularity in the automotive sector, with no mandatory extended producer responsibility (EPR) for the sector, and manufacturing incentives in the sector focused on localisation of production and transformation in terms of Broad-based Black Economic Empowerment (BBBEE). Some local OEMs have made commitments to factory resource efficiencies. Examples include Volkswagen South Africa's "Think Waste" Initiative and BMW's commitment to renewable energy and reducing water consumption. Both BMW and Volkswagen also have group policies aimed at reducing greenhouse gas emissions, but no specific policies and plans related to circular materials in the automotive industry in South Africa have been identified.

In South Africa, there is an economic incentive for the recovery, refurbishment and reuse of vehicles and components, with the life time of vehicles and parts in emerging economies often much longer than in developed country settings. However, there is in general no formal recovery or quality control of recovered parts and vehicles. Refurbishment of vehicles, as well as recovery of parts, generally occurs through independent businesses such as mechanics and scrap yards, as well as through some taxi associations.

Recovery of off cuts and materials or components due to manufacturing errors in the factory is becoming standard practice. Furthermore, there are a few notable examples of post-consumer recycled content included in certain elements such as carpeting, and most recently in air-conditioning systems. There is no reported recycled content in safety-critical or other visible components yet.

## Potential levers to drive circularity in automotive plastics

Globally the most impactful initiative driving circularity in the mobility space appears to be the World Economic Forum's (WEF) "Circular Car Initiative" with partners Accenture and McKinsey. The initiative is a multi-stakeholder platform including representatives at executive level from 40 companies across the value chain from OEMs (including electric car manufacturers), to component and chemical manufacturers and distributors (including tyres), recyclers of automotive components, car hire companies, public transport organisations, and fleet management companies.

In collaboration with Accenture Strategy, WEF's Circular Cars Initiative published *Raising Ambitions: A new roadmap for the automotive circular economy* in December 2020<sup>1</sup>. The report aims to provide a framework to guide and evaluate progress towards a circular economy for the automotive industry, which includes levels of circularity (0-5) and four transformation pathways. Two of these the transformation pathways, *material circularity* and *lifetime optimisation*, are most relevant in the context of circularity for automotive plastics.

For progression towards an automotive circular economy the five levels of circularity under each of these proposed transformation pathways are outlined in **Figure 3**.

Levels of circularity	0	1	2	3	4	5
	<b>No circularity</b>	<b>Low circularity</b>	<b>Moderate circularity</b>	<b>High circularity</b>	<b>Full circularity</b>	<b>Net positivity in system</b>
	Past	Today	2025	2030	2035	2040
	Classic make-use-waste mentality	Silo optimization and sales focus	Product improvement and better coordination	Aligned incentives and life-cycle optimization	Full circular value chain in as-a-service models	Ecosystem optimization
 <b>Materials</b>	Linear value chain	Production scrap looping	Recycled content increased	High-quality recycling loops	Full "at level" recycling and transparency	Upcycling of waste
 <b>Lifetime</b>	Sales-driven model	Repair networks and used car markets	Increased reman in aftermarket	Modular design for upgradability and reman	Purpose-built vehicles	Second-life applications

**Figure 3:** Five levels of circularity in material circularity and lifetime optimisation

Source: Accenture Strategy in World Economic Forum (2020)<sup>2</sup>

Although South Africa has no direct external drivers towards circularity in the automotive sector, the economic climate in South Africa incentivises refurbishment and repair, as well as recovery of parts, through the private sector (formal and informal), generally distinct from the OEMs. Additional early-stage materials circularity (level 1 in **Figure 3**) occurs at OEMs and component manufacturers through the recovery of factory scrap for reintroduction into the manufacturing process.

<sup>2</sup>World Economic Forum (2020) Raising Ambitions: A new roadmap for the automotive circular economy, in collaboration with Accenture Strategy. Circular Cars Initiative, Business Models Cluster.

## Opportunities for circularity for automotive plastics in the South African context in the short- to medium-term



### Materials and components

- o Circular plastics drivers are ideally linked to existing industry requirements and policies for maximum buy-in:
  - **Preferential procurement legislation** and associated specified products could be employed to drive circularity (not only) in the automotive sector, though inclusion of requirements for recyclability and recycled content.
  - **Localisation and transformation** have challenging industry targets associated – linking circular design, recyclability, the inclusion of recycled content, and requirements/incentives to refurbish to localisation and transformation initiatives will likely have the best results.
  - With increased commitments to **greenhouse gas reductions, and incoming carbon budgets required for industry sectors**, a focus on reducing carbon-intensity of vehicle manufacturing should also result in a move towards recycled content where this is associated with carbon emission reduction. There is already a shift towards renewable energy at OEM manufacturing plants.
  - **Localisation of resin supply** could include a percentage post-consumer recycled content: A drop-in resin (compounded and including a percentage recycled content) at consistent quality would be useful for converters in manufacturing to specifications, and would then require once-off approval for the resin, and then approval for each component manufactured from the resin.
  - Although there are multiple grades of PP supplied to the automotive industry, the formulations for bumpers are largely identical across the OEMs, and therefore represent an excellent opportunity in terms of both localisation and inclusion of recycled content (although it will be more difficult to achieve approval on a safety-critical element).
- o It is likely that there will be growing requirements in export markets for local OEMs – for example, 80% of the local Volkswagen manufacturing is exported to Europe. As WEF's Circular Car Initiative sees increased commitments to circularity, this may be used as a driver to grow local recycled content supply, and avoid increased imports of resin or components with recycled content to comply with export market targets.



### Design

- o Europe is setting end-of-production targets for vehicles with internal combustion engines (ICE), which is the focus of manufacturing in South Africa. Some OEMs are likely to focus on ICE production and boost exports to Africa, while some are looking to pursue electric vehicle (EV) manufacture in South Africa. EV production may in the short term result in OEMs losing their local production incentives as certain components can only be manufactured internationally:
  - Both manufacturing focus areas would need to be accompanied by developments towards a circular economy, although drivers for circularity in the African context will likely lag behind Europe.
  - A focus on modular design which allows upgrading of certain components, and easier refurbishment, could be a focus to assist in recovery and refurbishment.

## Conclusion

Although there is limited circularity currently in automotive plastics in South Africa, there are signs of change. For example, there has been a recent approval from an OEM for recycled content inclusion in an air conditioning system, which opens the door for the associated recycler and component manufacturer to include recycled content in other non-safety critical automotive plastics, thereby demonstrating the business case for other players in the market.

Due to the economic constraints on the automotive sector in South Africa, requirements for circularity not linked to industry imperatives, such as localisation and transformation, are unlikely to see uptake.

A potential lever is European export market drivers such as proposed measures to limit greenhouse gas emissions, and any stipulated circularity in automotive components, possibly driven by OEMs engagement with WEF's Circular Cars Initiative. However, if OEMs focus on growing their African market, requirements for that export market are likely to be less stringent, and current drivers in Africa for circular plastics are largely focussed on plastic packaging.

Driven primarily through economic constraints as well as the high price of new vehicles, the most accessible circular intervention for the automotive industry in South Africa in the short term thus remains supporting recovery, refurbishment and remanufacturing.

This summary is an extract from the report "*Market assessment of circular plastics opportunities in packaging, construction, agriculture and the automotive industry*", which forms part of a series "*Circularity in the plastics value chain in South Africa – opportunities and barriers*". The reports in the series are:

- o **Part 1:** The Plastics Landscape in South Africa – Mapping value chains and key players.
- o **Part 2:** South African enabling environment for a circular economy for plastics – a scan of best practice and current local and international policies and legislation.

- o **Part 3:** Market assessment of circular plastics opportunities in packaging, construction, agriculture and the automotive industry.
- o **Part 4:** A focus on increasing recycled content in packaging through multi-layer conversion.
- o **Part 5:** Advanced recycling technologies in South Africa – status quo and potential.
- o **Part 6:** Alternatives to problematic plastic packaging in South Africa.
- o **Part 7:** The current state of waste plastics management in South Africa.
- o **Part 8:** Realising opportunities for a circular economy for plastics in South Africa: actions for the short, medium- and long-term.

The individual reports and a summary of the entire series can be accessed by contacting the GreenCape Circular Economy team via [circulareconomy@greencape.co.za](mailto:circulareconomy@greencape.co.za).

The series is a product of the staff of the World Bank in collaboration with a research and analysis team comprising of GreenCape, the African Circular Economy Network (ACEN) Foundation, the South African Plastics Recyclers' Organisation (SAPRO), WRAP, and WWF South Africa. Financing for this work comes from the PROBLUE Trust Fund.

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