

## Plastics Industry Report on Beneficiation Portfolio Committee: Trade and Industry 27 August 2014

### 1. Plastics | SA

Plastics | SA, the umbrella organisation for the plastics industry in South Africa plays an active role in the growth and development of the South African plastics industry. Together with our associations we strive to address plastics related issues, influence role players, and to make plastics the material of choice. Plastics | SA is a NPO (Section 21, Company not for Gain). Plastics | SA is a Federation of Plastics Associations in South Africa. Plastics | SA operates from three centres: the Head Office in Midrand, Gauteng and the two regional centres located in Pinetown, Kwa-Zulu Natal and Maitland, Cape Town.

Our vision is: To enable a vibrant and sustainable plastics industry in South Africa:-

- Valued and respected by local and international industry, customers, suppliers, government, community and employees;
- Promoting the use of plastics as the material of choice;
- Developing the skills needed through accredited training programmes;
- Supporting environmentally responsible actions that benefit industry and society.

### Our Purpose

Plastics | SA has set itself the task of creating a vibrant and sustainable industry. To achieve this, our industry needs leaders that change, adapt and embrace the challenges to grow our plastics industry as the leader across the African continent.

### Plastics Sector Imperatives

- Grow the plastics sector
- Diversify the plastics sector
- Promote labour absorbing downstream investments
- Promote exports of plastics products
- Zero plastics to landfill – 2030
- Develop career paths and provide skills to meet the needs of the plastics industry and its people

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## 2. THE WORLD PLASTICS INDUSTRY

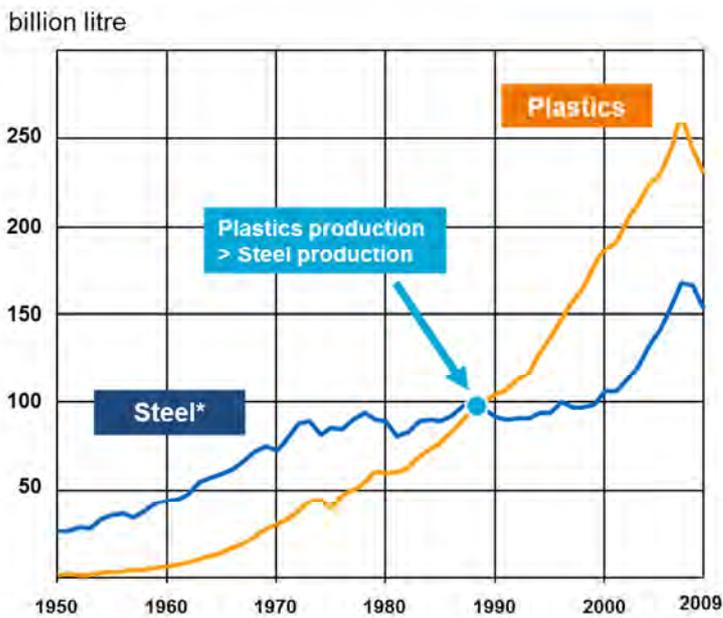
Globally plastics are a vital part of any economy and having widespread use in the manufacture of a variety of goods. There is not an economic sector that does not use some plastics as an input or finish product.

Plastics globally consume around 4% of oil produced. Oil is produced for transport, heating and chemical usage. Plastics are mostly manufactured from the waste gases from drilling operations. Therefore reducing the amount of plastics is not going to save much oil or coal. The main feedstock for the production of plastics in South Africa is coal.

Plastics are a global success story. The world plastics production has seen continuous growth over the last 50 years and in 2012 it rose with more than 2,8% to 288 million tons. Europe has seen a decline of 3% from 2011 to 2012. South Africa has seen an increase of 5,4% in 2012 from 2011. This increase was slightly lower in 2013 at 2,2%.

More plastics than steel is now produced worldwide since 1989. More plastics are better for the environment as plastics:-

- are versatile, easily and efficiently converted, and safe in use
- contribute significantly to sustainable development and the quality of life
- were developed to outperform other materials in economic terms and are now being developed to surpass them on an ecological basis as well
  - help save energy
  - reduce emissions and environmental impact



Plastics in 1989, passed steel production by volume

Production worldwide is as follows:-

- Plastics: 230 Mio t = 230 billion litre
- Steel: 1,224 Mio t = 153 billion litre

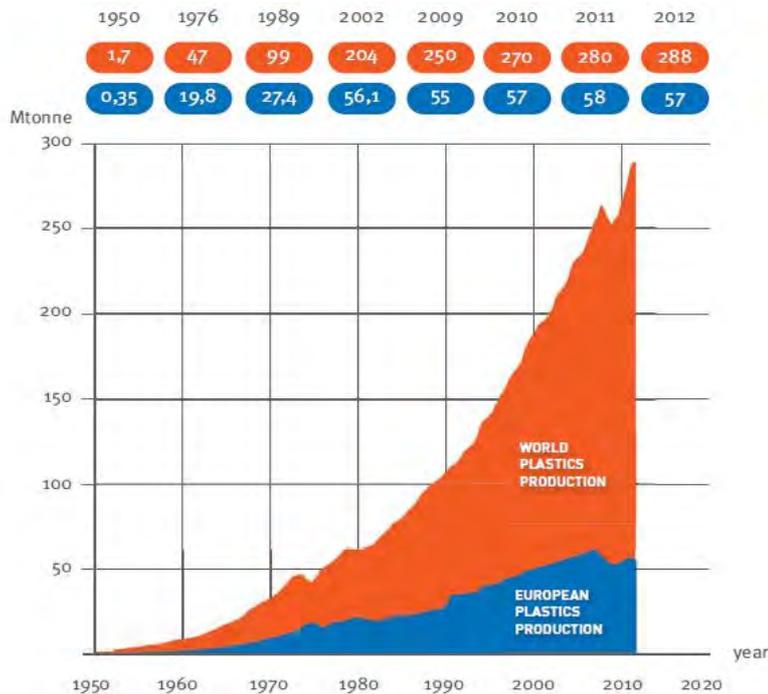
Calculation Model:-

1 kg plastics = 1 litre

8 kg steel = 1 litre

## World Plastics Production Growth 2012

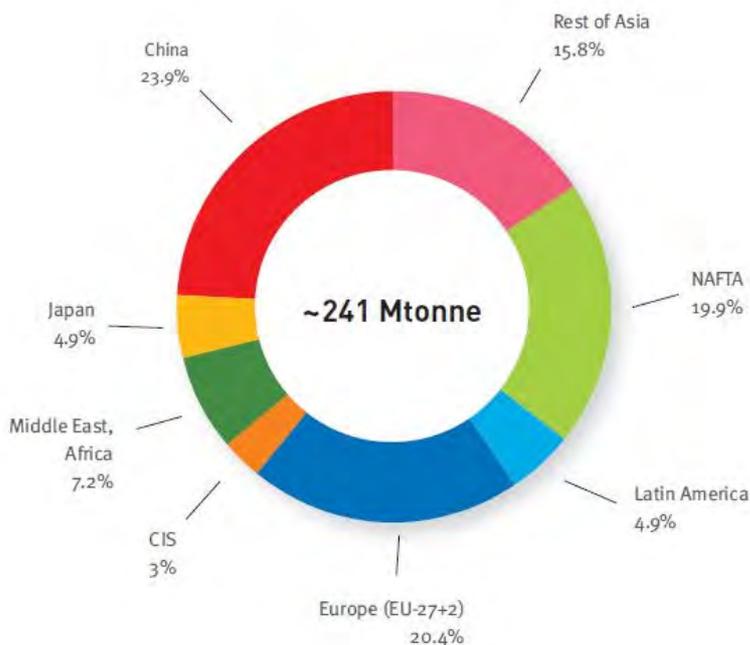
In 2012 a total of 288 million tons polymer (virgin material) was produced in the world. The graph below shows the growth of polymer production over the last 62 years.



Source: Plastics Europe (PEMRG)/ Consultic

## World Plastics Materials Production 2012

The world production of plastics materials in 2012 was estimated at 241 million tons. China is the biggest producer at 23,9% of world production. The Middle East and Africa only accounts for 7,2% of production.



Source: Plastics Europe (PEMRG)/ Consultic

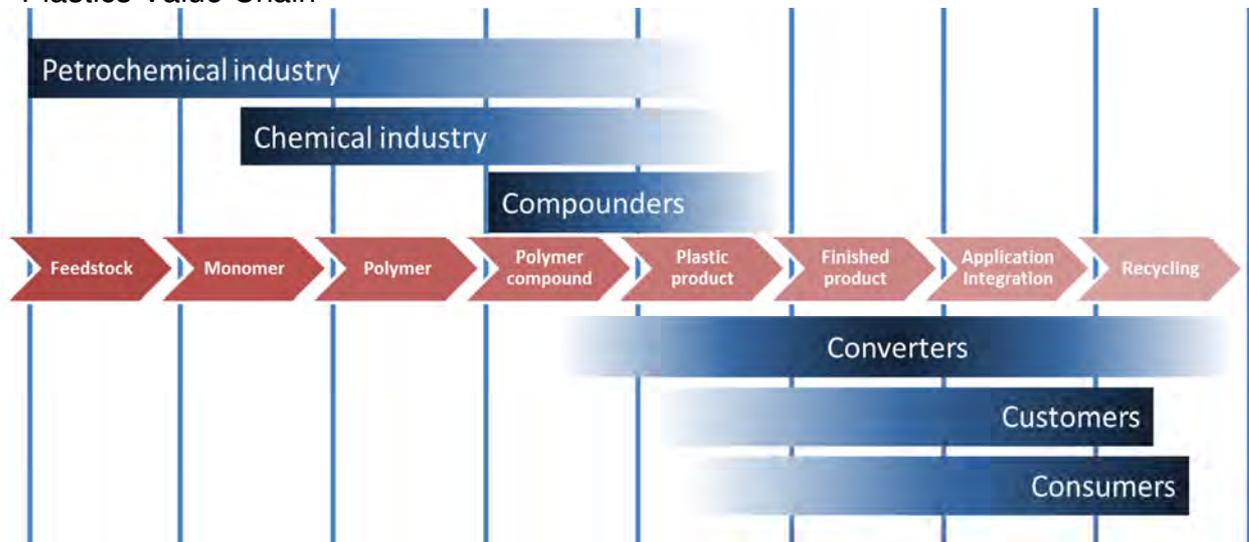
### 3. THE SOUTH AFRICAN PLASTICS INDUSTRY

The plastics sector together with steel and cement produces the basic building blocks of the manufacturing sector in the South African developing economy. Products which is derived in this sector are utilised in industries as varied as home and personal care, food and beverage, automotive and construction. Plastic products are enablers of innovation in society.

The plastics manufacturing sub-sector is part of a supply chain stretching from the polymer manufacturing industry (chemical companies) through to a variety of end-use markets, and is characterised by ease of entry because of its low economies of scale and a high degree of mechanisation. This means that:-

- There are many micro and small companies and a few medium sized plants (80 – 85% of industry is SMME's which creates huge job opportunities);
- The sub-sector employs around 60 000 people;
- Plastics manufacturing cells can be found within manufacturing plants of other manufacturing industries;
- An estimated 1 400 000million tons virgin material converted in 2013.

Plastics Value Chain



Source: Merseta Plastics Chamber Research Report 2012

Some plastic products are in themselves a final product, but the vast majority are inputs into other industries where they form components for the manufacture and assembly of other products and an analysis of the economic performance of the plastics sub-sector without reference to other manufacturing sectors would not be adequate.

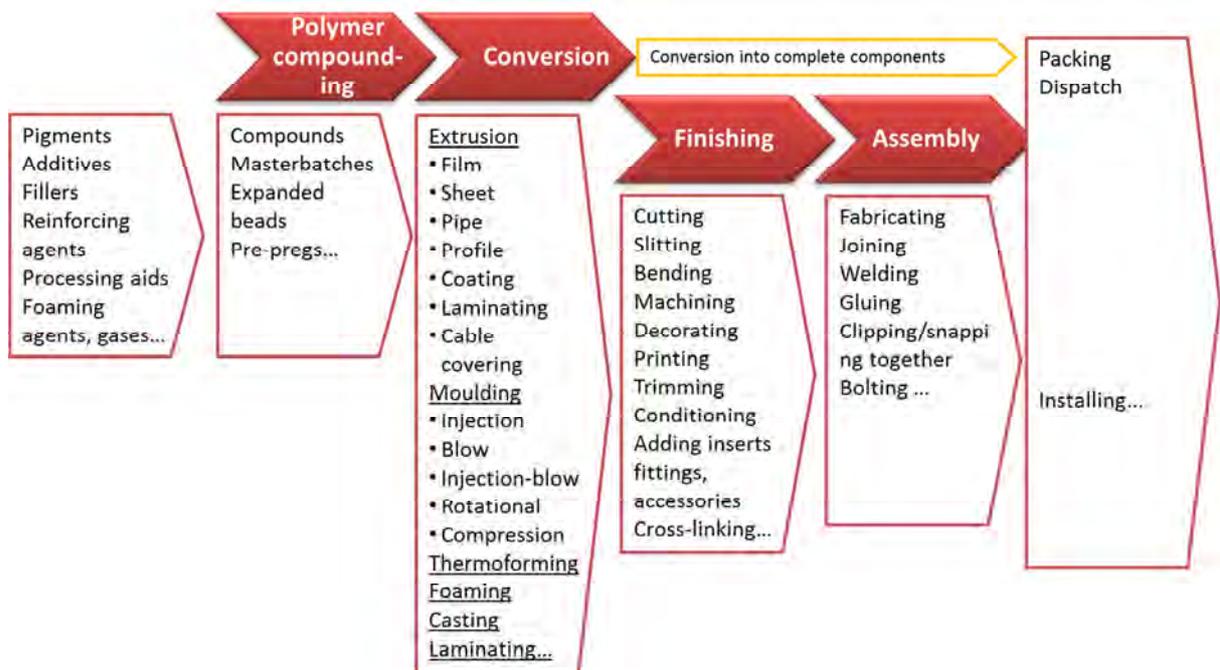
#### Manufacturing Industry

There are some 1 800 companies in this sub-sector, employing around 60 000 people. Plastics manufacturing is also a very diverse sub-sector and can be further broken down into several sub industries related to the raw material (input) and the manufacturing process. These are:-

- Plastics products and components;
- Industrial rubber products and components (this excludes manufacture and re-treading of tyres);
- Composite products and components.

## Plastics, Rubber and Composites Value Chain – Manufacturing Processes

The diagram below reflects a typical process value chain in the plastics industry. The values add activities are mainly in the areas of finishing and assembly. The conversion process is mainly a high volume, low margin process. The diagram depicts the various materials, processes and activities taking place in each node.



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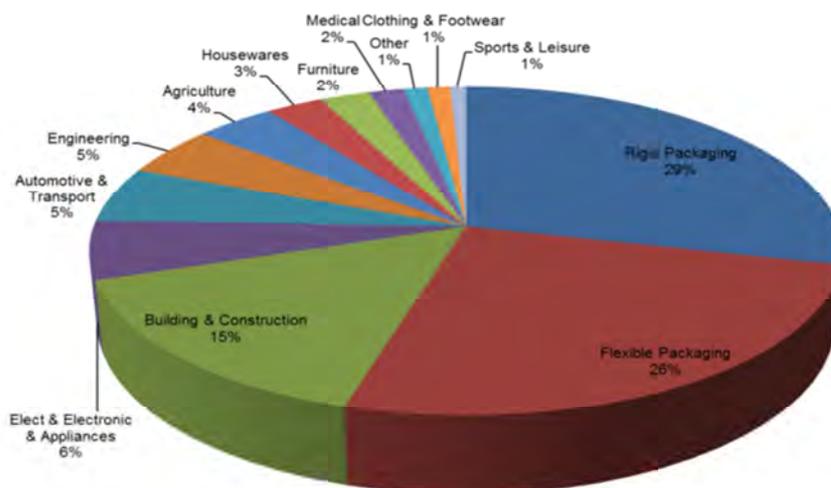
Plastics, Rubber & Composites Value Chains

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Each of the conversion methods listed above offers its own challenges. When considering polymer beneficiation, it is important to note that not all polymers can be converted in all conversion methods. PP cannot be used for cable covering in any substantial quantities; neither can it be casted, for example. The most common process is injection moulding and is used to manufacture many different products in many different shapes and sizes, from automotive bumpers to small medical implants like heart valves for example.

## Sub-sectors within the Plastics Industry (2012)

The pie chart reflects the plastics sub-sectors and their relative market size in 2012.



The size of the plastics packaging sector in South Africa is 54% – both flexible and rigid packaging. The packaging sub-sector in Europe is 39% of the market. A couple of large corporate companies dominate the packaging industry although there are more than 200 smaller companies also dedicated to packaging. It is only in the last couple of years that Building and Construction, Electrical and Automotive and Transport developed into bigger market sectors.

The local industry is not necessarily strong in packaging; it is more the country's weakness in the non-packaging sector that should be highlighted. Very few companies are serious about the engineering sector and even those that can be classified as *engineering suppliers*, have some packaging products in their product ranges. It is a known market with very little risk involved.

### **Contribution to the GDP**

The Gross Domestic Product (GDP) in South Africa was worth R3 154 billion in December 2012<sup>1</sup>. The GDP value of South Africa represents 0.62% of the world economy. According to the World Bank Group, South Africa GDP averaged 112.0 billion USD from 1960 to 2012, reaching an all-time high of 401.8 billion USD in December 2011 and a record low of 7.3 billion USD in December 1960. The GDP measures national income and output for a given country's economy and is equal to the total expenditures for all final goods and services produced within the country in a stipulated period of time.

The plastics industry contributed an estimated R50 billion or **1.6%** to the South African GDP in 2012 or 14,2% to the manufacturing GDP. It is worth noting that the GDP multiplier effect of plastics as a growth driver for the economy is approximately 2,7 and the employment multiplier is 3,5.

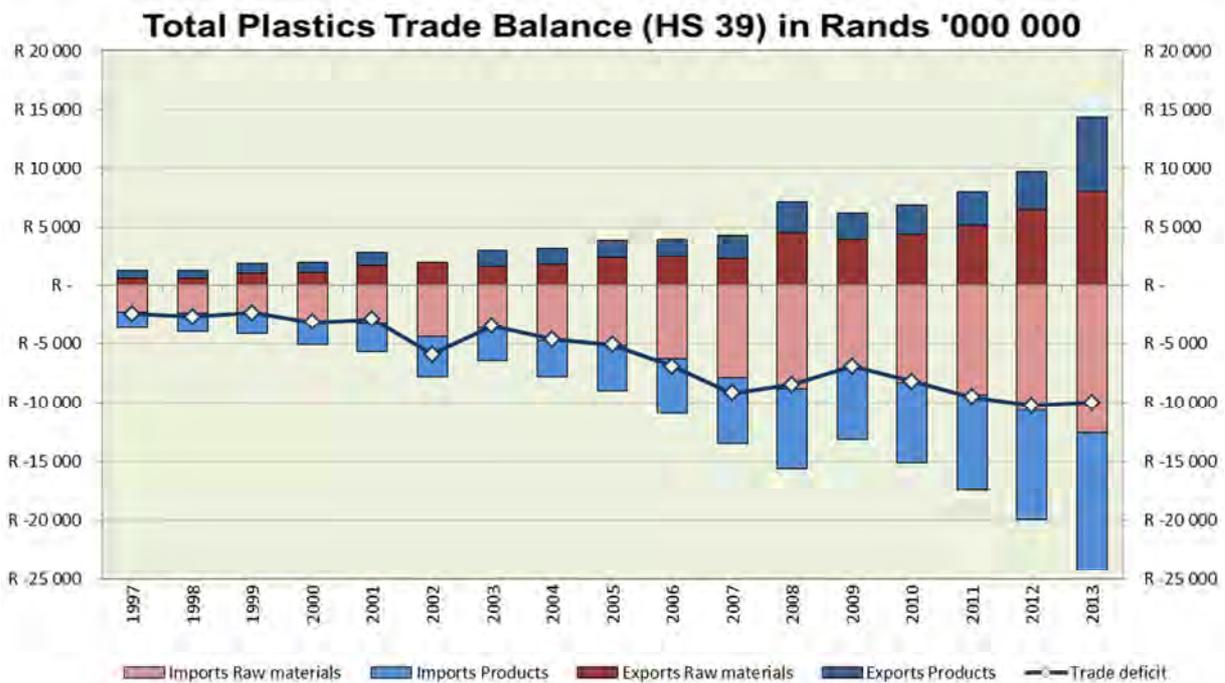
### **Trade**

The total trade deficit for plastics in 2013 amounts to just over R10 billion. This is money that could have added value to the local industry. If added, it would have added 0.3 % to the GDP. Serious programmes are needed to reduce this deficit and a successful beneficiation programme could achieve exactly that.

The trade deficit for polymers alone was 75 482 tons which was 36% less than in 2012. This deficit amounted to R4 456 million which was 8.7% more than the previous year. This illustrates the reduced value of the Rand from 2012 to 2013. The exchange rate is a vital part of the performance of the local industry. Most of the additives (auxiliary chemicals) required are imported. The raw materials used to manufacture engineering and medical components are imported as well. The industry should embrace the poor currency and export finish and beneficiated products, but the higher import costs of some critical raw materials and the volatility of the exchange rate hamper export development.

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<sup>1</sup> <http://beta2.statssa.gov.za/>

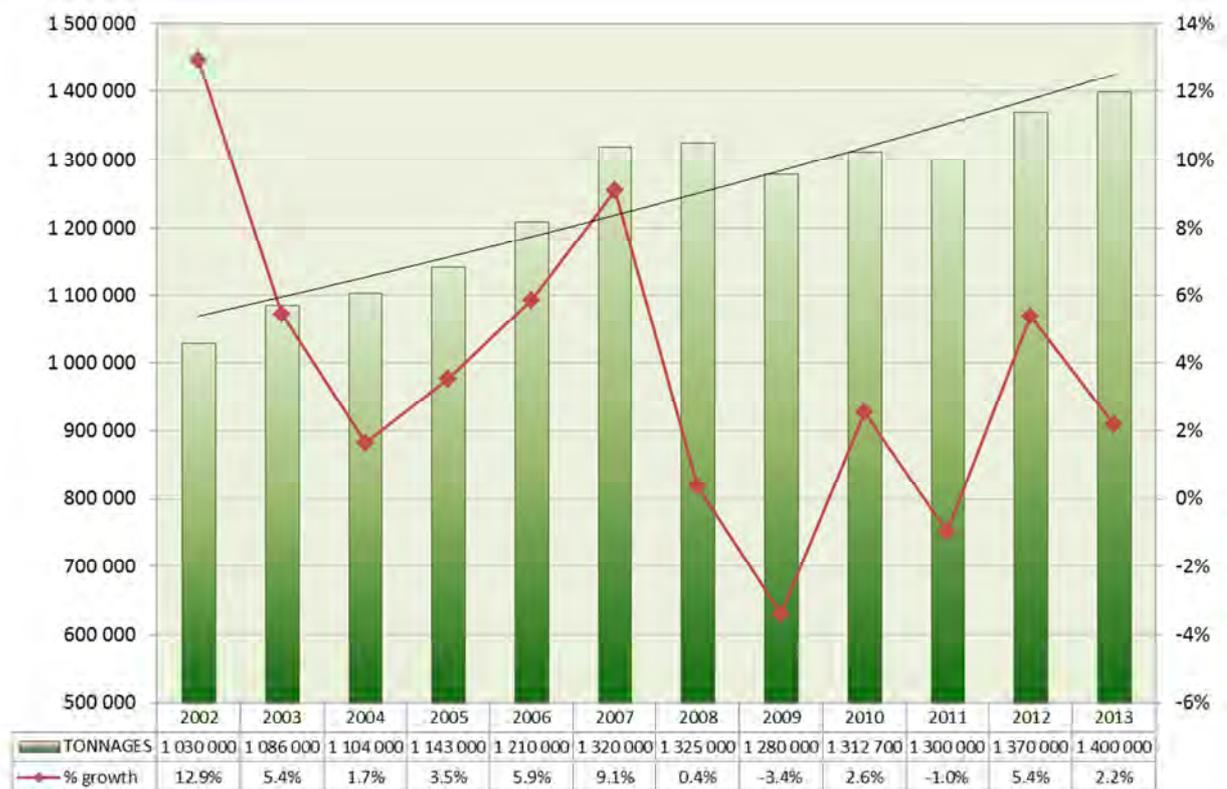


## Growth in the Plastics Sector

An overall growth in polymer production of 28.7% was experienced in the last 10 years, despite the international economic down turn in the last decade.

Growth forecasts for the plastics and rubber industry are very variable and depend largely on the performance of the sectors which use their products. As such, the market growth for plastics is a factor of the overall growth in the economy.

The Plastics Industry appears to have grown quite consistently over the last five years, despite the impact of the global financial meltdown in 2008. The industry consumption of virgin raw material has grown by 2.2% and the use of recycled raw material has grown by 2.7% in 2013.



## Raw materials

Raw materials used in the plastics industry include polymers in its pure format and modified polymers used as compounds, blends and alloys. Additives would also form part of the raw materials and can be used in its pure state or as master batch. This section is focussing on the polymers only.

More than 30 different materials are used by the converting industry to manufacture a whole range of products, from single use packaging items to engineering components designed to last thirty or more years. Most of the commodity polymers are produced in South Africa. Most of the other polymers are imported as they are not locally produced.

Figure 1 is indicating the various plastics used in the converting industry. Most of the volume or commodity polymers are produced in South Africa except for PS. Most of the local production of plastics raw material is utilized or converted in South Africa into products. The following volume or commodity polymers are produced in South Africa where downstream beneficiation could take place:-

**Polypropylene (PP)** in primary, or unconverted, form is part of the Primary Polymer and Rubber sub-sector of the chemical industry. Polypropylene is the fastest growing commodity polymer category globally, and is only surpassed by polyethylene in market size. PP has a very low density and good mechanical properties (especially when filled or compounded), and is therefore very suitable for sectors where large volume, cost and weight are issues.

**Poly(vinyl chloride) or PVC** is manufactured from ethylene gas and table salt which makes it a very economic, and resource friendly raw material. It is never used in its pure format and is always compounded with other chemicals. This property results in many different PVC formulations with a broad property range. Flexible PVC imitates rubber properties and is used in medical tubing and IV sets, chemical hoses, imitation leather cloth and footwear. Rigid PVC is use predominantly in the building and construction industry due to its excellent weathering and fire resistant properties and is find in water- and waste-water, plumbing and sewage pipes as well as gutters, window frames, skirting and cornices.

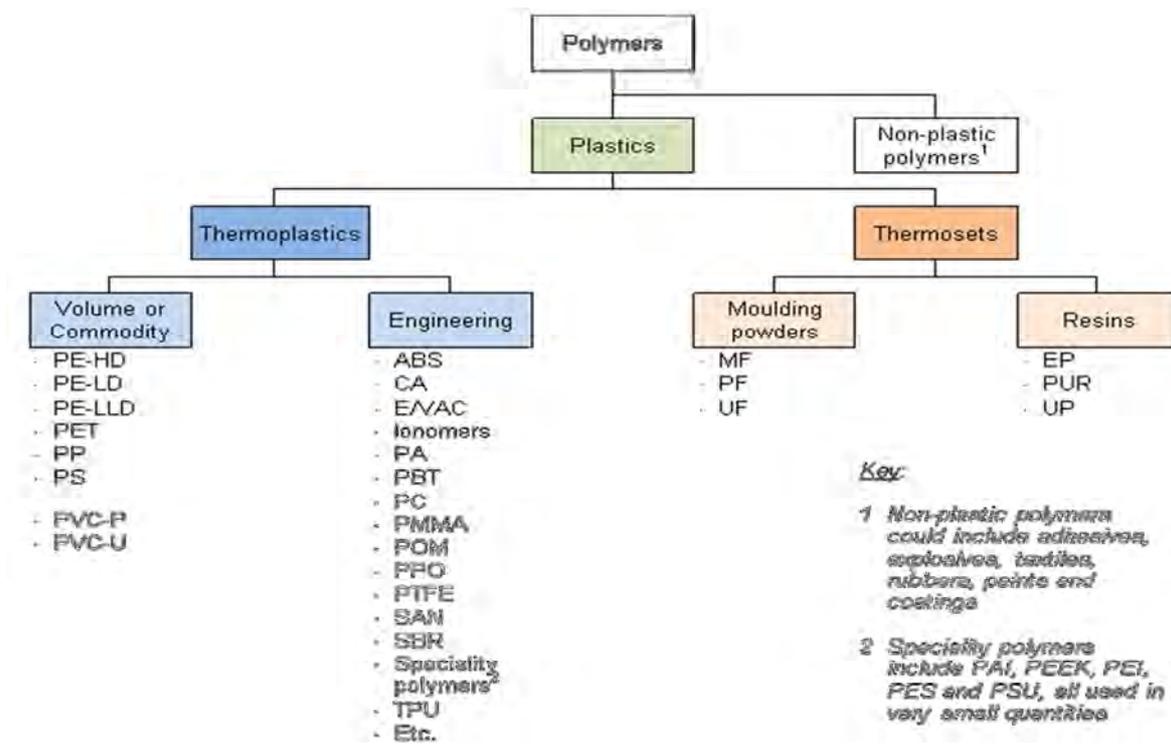


Figure 1: Polymers used in the converting industry

## **Polymer Beneficiation (Downstream)**

South Africa faces an enormous challenge of diversifying away from resource extraction towards value added manufacturing that will create jobs. This position seeks to ensure more value is added to domestic polymer products before export, so as to generate greater economic value and the creating of employment. Polypropylene, PVC and composite beneficiation has been identified by government as key pillars of South Africa's industrialization push.

The plastics sector is in many ways representative of the diversified manufacturing industry in which growth is necessary as part of broader-based economic development. The manufacture of plastic products is not ultra-labour intensive, but it is labour absorbing. It is not ultra-capital-intensive but requires investment in the appropriate, relatively sophisticated, machinery and moulds if world-class products are to be made with the design and characteristics consumers expect. As such, it requires bringing together a set of production capabilities, along with ensuring the basic conditions are in place such as competitively priced inputs, access to finance and the ability to source appropriate machinery and moulds.

Research and comparisons worldwide indicate that the plastics sector is one of the engines of growth under industrialization.

### **Key Opportunities**

Key areas of opportunity for growing the plastics sector might include:-

- Automotive
- Food Packaging
- Medical Products
- Construction – pipes, flooring, building sheets, window and door frames
- Electrical and electronic cables, appliances and casing components
- Recycling
- Composites

(This is not meant to be a comprehensive list)

The integration of plastics products with the initiatives of other sectors and cross cutting areas are critical and could result in specific beneficiation programmes.

Some of the advantages of the South African plastics industry are:

- Sufficient and cost competitive propylene feedstock
- Owner driven small and medium businesses with entrepreneurial spirits
- Globally competitive polymer production technology and facilities
- Industry location relative to the Southern African markets
- Well-developed downstream converter sector with widespread end-product applications
- Large automotive sector

### **Cross-Cutting Constraints to Beneficiation**

- Infrastructure – Shortages of critical infrastructure such as rail, water, ports and electricity supply have a material impact on sustaining current beneficiation initiatives and a major threat to future prospects of growth in the chemical value addition.
- Research and Development.
- Skills sought for expediting local beneficiation.
- Access to international markets for beneficiated products.

The downstream beneficiation of polymers should focus more on an enabling environment to truly leverage the benefits from any wins from the upstream.

Some of the identified downstream challenges/issues that are deterring the growth of the plastics sector are:-

- Customised incentive programmes for the industry needed
- Cost of input material
- Preferential procurement not assisting plastics industry
- Compliance cost – creates uneven playing field with international competitors
- Specifications used as protectionism – (e.g. local plastics not specified in APDP)
- Trade Agreement – not supporting local manufacturers
- Cost of Labour
- Productivity – unable to compete internationally
- Cost of electricity and reliability of electricity supply
- Skills shortage – technologists/technical management
- Innovation
- Limited Research and Development
- Strong rand undermines competitiveness
- Limited level of export readiness
- Strong competition from imports and economic crises
- The slow pace of technological upgrading
- Shortage of infrastructure and logistics costs
- No or Limited machine manufacturers in South Africa
- Tooling sector weak in South Africa and mainly maintenance orientated
- Relatively small local and regional market
- Long distance from attractive export markets
- Inland location of production facilities in the case of exports
- Develop special economic zones for manufacturing beneficiation that are, for example, duty-free, VAT-free and have tailor-made infrastructure

### **Critical Success Factors**

Plastics are a global success story. Plastics have a positive effect on climate protection as 12% to 15% of a modern car is made of plastic to help to reduce weight, save fuel and reduce emissions. In the aerospace sector, plastic composites reduce weight and fuel consumption. Lightweight plastic packaging reduces the weight of transported goods and the amount of waste crated – both of which reduce greenhouse gas emissions.

The innovative use of plastic in modern washing machine drums reduces water and energy consumption by 40-50% compared to older models. Car airbags, motorcyclist' helmets and protective clothing are made of plastics. Firefighters rely on flexible plastic clothing to protect against high temperatures and plastic equipment provides lifesaving ventilation. In healthcare, plastics are used in a variety of ways; for blood pouches and tubing, artificial limbs and joints, contact lenses and artificial corneas, absorbable sutures, splints and screws that heal fractures.

## Summary

The Plastics Industry has been identified by Government and the Department of Trade and Industry as a priority sector. In January 2012 the following key strategic themes have been identified to address challenges within the industry: PP and PVC beneficiation, Composites, recycling of post-consumer waste and global competitiveness which included initiatives around technology upgrading, skills development and import replacement. Some basic market studies and benchmarking research and initiatives were required to assist in the development of proper implementation programmes. However these were not seen as important as more action was required. In 2014 the key strategic action programmes focused on the development of a plastic production and innovation cluster and plastics trade policy measures.

The concern is that many of the key actions of 2012 are not yet implemented or completed or was not approved. Over the last number of years some gains were achieved by the various programmes and initiatives to gain downstream beneficiation. However nothing significant was achieved to assist the industry to grow, create jobs; enterprises and to achieve the anticipated outcomes associated with beneficiation.

The plastics industry strongly propagates a partnership between the various role players in order to support and grow the industry. This will requires open and transparent dialogue and debates. It is critical to identify sub-sectors or product ranges for beneficiation. This will make the process more manageable and focused. Once sub-sectors are identified a holistic and integrated approached needs to be followed that will address all aspects, from policy, standards, trade issues, input costs, customized incentives, export opportunities and support, market intelligence, skills development , R&D, technology, labour, productivity, consumer, clusters, etc.

The diagram below is an attempt to explain the thinking around an integrated approached to beneficiation. The outer circle of the diagram shows some of the issues to be address. The will be more pending the outcome of discussion. It will be presented and explain during the session at the hand of an example.

## Conclusion

It is important to note that our strategies and programmes seek to advance development through the optimization of linkages in the polymer value chain, facilitation of economic diversification, job creation and industrialization. These strategies are in line with government beneficiation strategy.

Moreover the plastics industry, through its initiatives aims to accelerate progress towards knowledge based economy and contribute to an incremental GDP growth in polymer value addition per capita in line with the vision outlined in the New Growth Path (NGP), and the Advanced Manufacturing Technology Strategy (AMTS).

These strategies are indeed an indication that as the industry we are fully committed to work with government in tackling the triple challenges of unemployment, poverty and inequalities. However these objectives will only be realized if government and the industry work together to unlock the constraints that have been outlined in this report.

***The Plastics sector encourages and invites engagement and discussions with all stakeholders to discuss and develop a plastics strategy for the growth of the sector and to function as a multiplier for the South African economy.***

*Report compiled by A Hanekom and Tobela Tapula  
21 August 2014*

# Integrated Approach to Beneficiation

