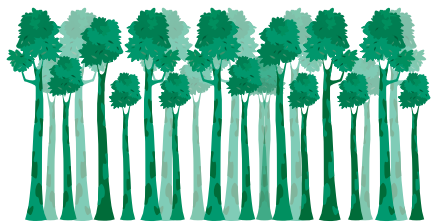




INDUSTRY PROGRESS REPORT

PAPER IN PERSPECTIVE 2016

PAPER IS TANGIBLE AND VERSATILE. IT STIMULATES OUR SENSES AND PRESERVES OUR MEMORIES. IT PACKAGES, CLEANS AND PROTECTS. PAPER IS RENEWABLE. PAPER IS RECYCLABLE. PAPER IS REMARKABLE.



600 million

trees across 762,000 hectares are grown for pulp and papermaking. Trees are planted, grown and harvested in cycles - like any agricultural crop.

This means that you are not 'killing' trees by printing on paper.

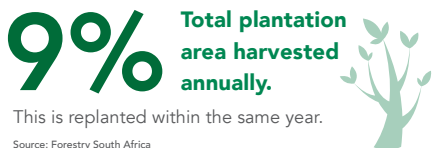
Source: Forestry South Africa



260,000

Average number of trees planted every single day.

Source: Forestry South Africa



9% Total plantation area harvested annually.

This is replanted within the same year.

Source: Forestry South Africa



1 TONNE of recovered paper saves 3 cubic metres of landfill space

From the grocery cupboard to the medicine cabinet, from your favourite online shop to your front door, paper packaging is an important part of daily life.



38,

Estimated number of jobs created through paper recovery and recycling.

Statistics SA, 2013

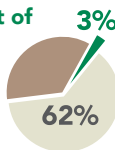
Turning the pages of a paper book is like leaving one footprint after another on the trail -- there's a rhythm to it and a visible record of how far one has travelled. *The Reading Brain in the Digital Age: The Science of Paper versus Screens, Scientific American.*



The annual water requirement of SA plantation forestry is 3%.

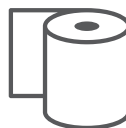
Agricultural crops require 62%.

Source: Strategic Overview of the Water Sector in South Africa 2010, Dept of Water Affairs



The paper industry invests heavily in research and technology to drive water efficiency and recycling and reduce the water footprint of paper production.

Tissue plays an indispensable role in personal hygiene and in daily life.



150,000

people employed because we grow trees, make paper products and recycle them.

Roads are developed in rural areas, and clinics, hospitals, schools and local communities are sustained.

Source: Forestry South Africa



only **5%** of households recycle their paper in South Africa.



RECYCLING keeps carbon locked in paper for longer.



Paper fibres degrade after being recycled 6-7 times which is why virgin fibre from new trees will always be required in the paper cycle.

THE SOUTH AFRICAN PULP AND PAPER INDUSTRY SUPPORTS SUSTAINABLE TREE FARMING FOR THE SUPPLY OF WOOD FOR PAPER PRODUCTS.

All paper in South Africa is produced from plantation grown trees, recycled paper or bagasse (sugar cane fibre).

80%

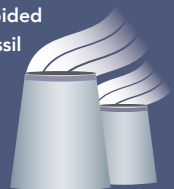
Portion of the land reserved for plantation forestry certified to the standards of the Forest Stewardship Council. Approximately 25% of this land is not planted to trees but conserved for biodiversity.



Source: FSC® South Africa

1,3 MILLION TONNES

The annual amount of avoided carbon emissions from fossil fuels (coal, oil and gas) through the use of renewable biomass-based energy in South Africa.



By recycling your paper, you put renewable, valuable fibre back into the system, create jobs and sustain families.

You also help to reduce GHG emissions because paper that goes to landfill just rots with your leftover pizza and chicken bones, emitting CO₂ and methane.

20

million tonnes of carbon dioxide and greenhouse gases absorbed by SA's commercial timber plantations annually*

15

million tonnes of oxygen released per year



* Based on an average absorption rate of 27 tonnes of carbon dioxide per hectare per year, using the Forest Industries Carbon Assessment Tool. PAMSA is currently exploring the use of a local factor to attain a more exact figure.



6-7 The number of times that paper fibres can be recycled before they become too short to make paper.

PAPER

MANUFACTURERS ASSOCIATION OF SOUTH AFRICA (PAMSA)

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www.recyclepaper.co.za

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FOREWORD

Putting sustainability at the centre

The pulp and paper industry plays an important role both locally and internationally. Locally, we wouldn't have up to 60% of farmed trees planted if it were not for this sector. We also contributed R28 billion to the South African economy and pulp and paper alone contributed R4.5 billion to the country's balance of payments in 2015.

Mills around the world are transforming through engineering with increasingly energy and water efficient machinery and processes. The local pulp and paper landscape has evolved radically over the last 10 years with the sector welcoming the participation of small and medium-sized players. A further example of this change is the increase of Internet and digital communications resulting in the global demand for printing and writing grades declining. South African demand and production in these grades has however leveled out in the past year.

But paper is not just about printers and pencils; it is also about packaging and tissue which are certainly

the grades to watch, along with dissolving wood pulp and innovative cellulose-based composites that are set to replace non-renewable materials. Add in the fact that the sector is a producer of biomass-based renewable energy. As both an end product and a raw material for recycled products, paper also aptly demonstrates a circular economy in action.

With trees and recyclable paper as our primary raw materials, the forest, pulp and paper sector generates billions in economic growth, sustains local economies, conserves and protects the environment on which it depends and enhances communities in the areas in which it operates. Roads, schools, hospitals, clinics are all developed in remote rural areas when trees are planted and pulp and paper produced.

In respect of climate change, without the world's sustainably managed local plantations, the earth would be half a degree warmer.

We invest in all aspects of our sector - our people, through developing skills, uplifting communities and expanding our research capabilities.

Over the years, we have learned that sustainability, growth and competitiveness cannot be mutually exclusive. Striking that crucial balance between people, planet and profit is an ongoing challenge, especially in the face of the global economic turbulence. As an industry we focus on conscientious environmental stewardship, resource efficiency and innovation.

As chairman of our local industry association PAMSA, my executive and I welcome this PAMSA Report which aims to demonstrate how our industry does business – sustainably, responsibly and competitively.

Ron Traill

*PAMSA chairman and Mondi
South Africa CEO*

TIMBER

- Housing and construction
- Timber supports for mining
- Sawmilling
- Furniture
- Charcoal

PRINTING AND WRITING PAPERS

- Coated and uncoated papers - magazines
- Office copier paper
- Newsprint
- Books, book covers, cards, envelopes and stationery

TISSUE

- Facial and toilet tissue
- Feminine hygiene products
- Paper towel for industrial, commercial and home use
- Tissue packaging

SPECIALITY PAPERS

- Security papers
- Passports
- Cheque books
- Vehicle registration documents
- Election ballot papers

DISSOLVING WOOD PULP/ CHEMICAL CELLULOSE

- Viscose staple fibre for use in clothing and textiles and non-woven applications (wipes etc.)
- Pharmaceutical and household products

PACKAGING

- Containerboard for industrial goods packaging, agricultural products packaging e.g. export fruit packaging
- Corrugated packaging for protection of goods in transit
- Cartonboard for fast-moving consumable goods (FMCG) e.g. food packaging cereal boxes, take-away boxes
- Liquid packaging – e.g. milk cartons
- Industrial sacks – e.g. cement bags
- Custom-made packaging to meet specific needs



OTHER

- Ceiling board for construction

BIO-BASED PRODUCTS

- Biofuels
- Biopolymers
- Nanocellulose
- Microcrystalline cellulose
- Xylitol
- Sugars
- Ethanol etc.

EXECUTIVE COMMENT

What was the first paper product you touched today?

Paper, in its countless forms, touches our lives every day and it's a relationship that often goes unnoticed.

Paper products are an enabler; without them, many industries would not be able to convey their messages, ship their products and protect their goods. As the basis for tissue, paper is a bathroom essential and helps to improve lives through personal hygiene. As a medium through which learning is facilitated, paper educates and informs.

Quite simply paper is part of every facet of our lives and has a good environmental and economic story to tell.

Representing more than 90% of paper, packaging and tissue manufacturers in South Africa, the Paper Manufacturers Association of South Africa (PAMSA) has been actively advancing the 'story of paper' since its foundation in 1992.



Even though some of our industry members have global footprints, their origins are firmly rooted in this country, as forest and land owners and producers of renewable and recyclable products.

PAMSA, acknowledged as the 'voice of the pulp and paper industry', promotes the use of paper as a renewable and recyclable material for communication, packaging and a myriad of other applications.

With our member companies continually striving to improve the way they do business, PAMSA supports their efforts by bringing them together on pre-competitive issues of mutual concern. These include education and training, energy production and use, water and waste, and research and development.

As a platform for engagement on common views and industry challenges, PAMSA has the active member participation at an executive and operational level as well as on its education and environmental committees.

Through the Process Research Unit (PRU), members invest in pre-competitive research and innovation in partnership with a number of South African universities and tertiary institutions.

Inextricably linked to PAMSA is the Paper Recycling Association of South Africa (PRASA) which has a member base of paper recyclers and processors.

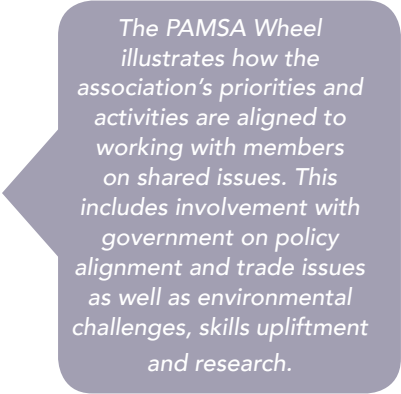
PRASA steers awareness, education and skills development initiatives with the aim of improving the paper recovery rate in South Africa. This diverts valuable paper fibre from landfill and secures a supply of quality fibre for the industry.

The efforts of PAMSA and PRASA, along with those of our members at a company, regional and mill level, have positioned the South African pulp, paper and paperboard sector as one that is conscious of its role in the economy, the environment and society as a whole.

This report profiles our sector's progress in sustainability from 2014 to date. It intends to take you on a journey that outlines 'the South African fibre story', describing what the industry is doing with regard to sustainability as well as highlighting key metrics and progress made by individual members.

Jane Molony

PAMSA executive director



GLOSSARY

PRASA	Paper Recycling Association of South Africa	CSIR	Council for Scientific and Industrial Research
PAMSA	Paper Manufacturers Association of South Africa	DUT	Durban University of Technology
		NMMU	Nelson Mandela Metropolitan University
DAC	Department of Arts and Culture	NWU	North West University
DAFF	Department of Agriculture, Forestry and Fisheries	SU	Stellenbosch University
DBE	Department of Basic Education	TVET	Technical and Vocational Education and Training
DEA	Department of Environmental Affairs	UKZN	University of KwaZulu-Natal
DHET	Department of Higher Education and Training	UNISA	University of South Africa
DOE	Department of Energy	UP	University of Pretoria
DST	Department of Science and Technology	WITS	University of the Witwatersrand
Dti	Department of Trade and Industry		
DWS	Department of Water and Sanitation	BLSA	Business Leadership South Africa
FP&M Seta	Fibre Processing and Manufacturing Sector Education and Training Authority	BUSA	Business Unity South Africa
		ICFPA	International Council of Forest and Paper Associations
QCTO	Quality Council for Trades and Occupations		
SABDC	South African Book Development Council	ITAC	International Trade Administration Commission of South Africa
PETCO	Polyethylene Terephthalate Recycling Company	NBI	National Business Initiative
TGRC	The Glass Recycling Company	TAPPSA	Technical Association of the Pulp and Paper Industry of Southern Africa

SOUTH AFRICA'S FIBRE STORY

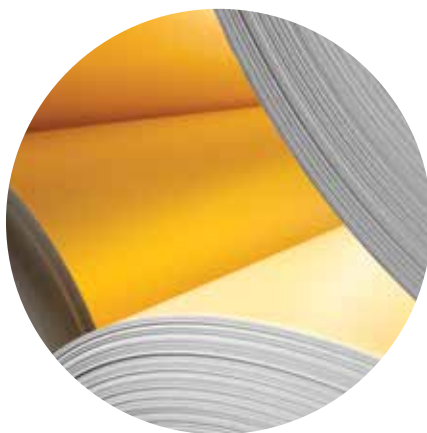
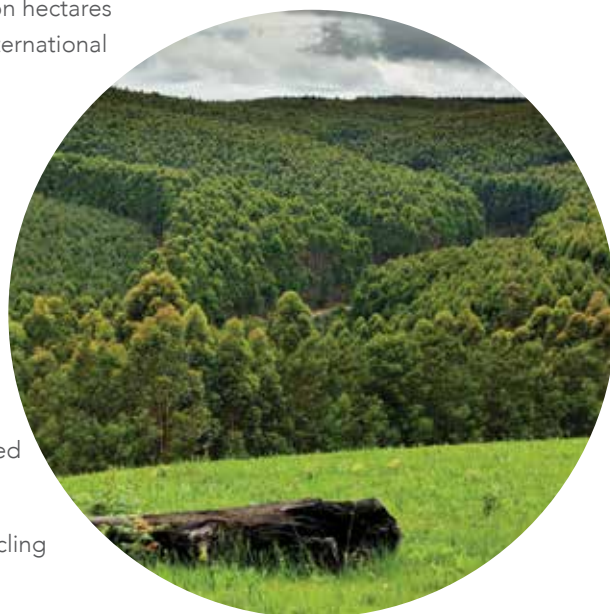
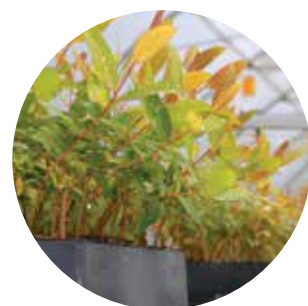
Represented by companies which rank among the top 20 pulp producers in the world, the South African pulp and paper manufacturing sector is robust, well regulated and highly developed. It also has a good story to tell.

Contributing R28 billion value-add to the economy annually and employing around 150,000 people, our forest products sector is built on the country's 1.3 million hectares of commercial plantations which have been awarded the highest level of international certification in the world. Of these 1.3 million hectares, 600 million trees are planted over 762,000 hectares for use in pulp and papermaking.

Contrary to popular belief, the South African plantation forest sector ensures *protection against the deforestation of the country's indigenous forests* and the biodiverse habitats they offer.

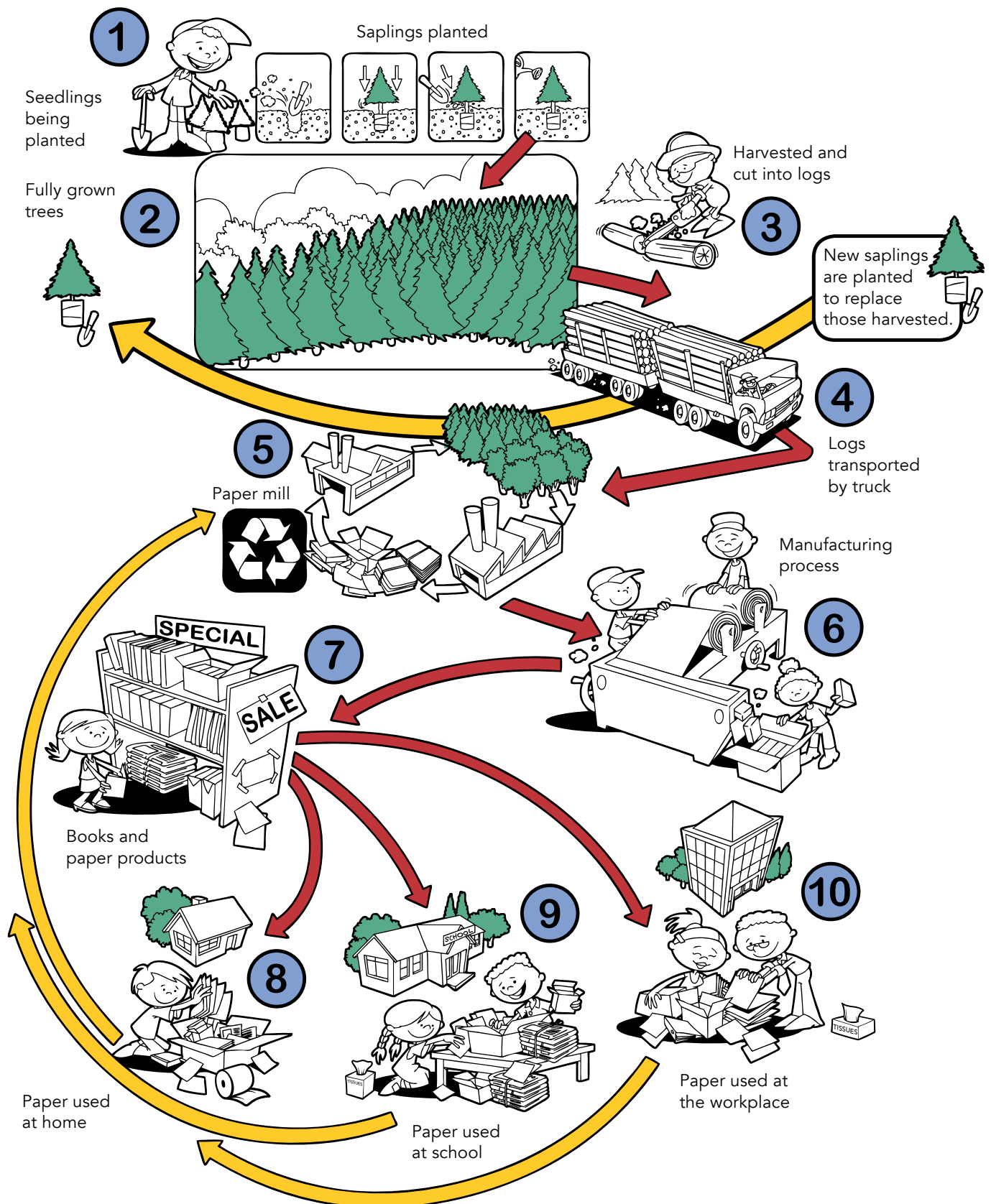
For plantation forestry to be ecologically sound requires a number of factors. Sustainable harvesting practices is one of them – this means that as one tree is felled in one part of the plantation, a new tree is planted in another area. This crop-like rotation ensures that the fibre supply is supported into the future. With only 9% of the total plantation area harvested each year, the carbon sequestration cycle is also kept in balance.

To augment the sector's virgin fibre supply, South Africa's recovery and recycling of paper is also well developed.



The fibre story in pictures

The paper manufacturing process, as depicted in PRASA's school curriculum material for foundation and inter-senior phases, illustrates the circular nature of the 'Fibre Story'.



Responsible and renewable

Remarkably renewable

Trees are the source material for thousands of goods - from traditional products such as timber, pulp, paper and wood-based energy to liquid biofuels, biochemicals and biomaterials. Wood fibre – cellulose – is now being applied through nanotechnology in automobiles, aerospace, defence and even medical science.

Bio-energy: The industry generates at least 45% (up to 70% in some cases) of its own electricity and steam using carbon neutral, renewable sources such as bark, black liquor and paper sludge (waste). A recognised enabler of bio-energy production in South Africa, the sector has invested in successful biomass-based energy and in-plant energy efficiency projects.



Carbon profile of plantations and paper

Plantations are globally recognised as high impact carbon sinks. Fuels derived from a renewable resource – such as wood and other biomass in the papermaking context – are regarded as carbon neutral. This is because carbon is sequestered (captured) by the trees and stored within the wood. When used for energy, the carbon is re-released. The net carbon effect is therefore equivalent to zero.

Plantation carbon sequestration:

South Africa's 1.3 million hectares of commercial timber plantations annually sequester approximately 20 million tonnes of carbon from the atmosphere. Therefore, the plantation forestry industry has a considerable positive impact on South Africa's net carbon emissions profile.

Green and circular

Renewability is in the foundation of the pulp and paper industry. Once they have served their purpose, paper products can be collected and recycled into a raw material for the production of new products.

Apart from diversion from landfill and the recovery of raw material for re-use, the spin-off of recycling is business development and job creation. It is estimated that between 80,000 and 100,000 people benefit from collecting recyclables across all waste streams, particularly in the informal sector.

South Africa's paper recycling rate

stands at 66% of recoverable paper, compared with the global rate of 58% (ICFPA, 2015).

Recyclable products: The issue of landfill space notwithstanding, the landfilling of products such as paper has a significant impact on carbon emissions. Within its molecular structure, paper contains the carbon which the trees absorbed from the environment. If paper fibres are recycled, the carbon remains intact for a longer period. If paper goes to landfill, it degrades and releases CO₂ and methane.

The pulp and paper industry is widely acknowledged as being a recycling leader especially as paper is recycled more, and compared to metal and plastic, is considerably more recyclable. While paper products are - by nature - biodegradable, the first prize is attaining improved recoverability.

CARBON SEQUESTRATION
is the process involved in carbon capture and the long-term storage of atmospheric CO₂. Carbon sequestration describes the long-term storage of CO₂ or other forms of carbon to either mitigate or defer global warming and avoid dangerous climate change. It has been proposed as a way to slow the atmospheric and marine accumulation of GHGs, which are released by burning fossil fuels.

Source: Wikipedia

Paper. Everywhere. Everyday.

The pulp and paper industry not only plays a role in meeting consumer and business needs for fibre and paper-based products but, at every turn, it adds value to the economy. The range of applications possible with pulp and paper is illustrated on page 3.

Paper today. Paper tomorrow

Despite a global year-on-year decrease in demand for printing and writing grades, paper is still with us, but needs to remain relevant beyond its common form. This requires supporting research that goes beyond paper, looking at value adding beneficiation throughout the chain, from biomass to paper sludge. The research work done by PAMSA students creates the building blocks to sustain and grow its relevance.

And you thought paper was the best product you could make from trees!

Imagine a future in which a family member suffers a spinal injury causing paralysis to the legs, and a brain implant made of nanocellulose gives back their mobility.... Or perhaps one in which degraded knee cartilage could be remedied with bio-composites of nanocellulose and a synthetic polymer? All over the world, medical researchers are looking to wood as a substitute for carbon-intensive materials for use in the human body.

Fibre holds the potential to bring disruptive innovation to industries such as transportation, textiles, housing, electronics, bio-energy, cosmetics and safe food supply.



THE ECONOMIC STORY



PAMSA collates data from industry players and Statistics South Africa to draw up an annual production report that tells the economic story and role that the pulp and paper industry fulfills in the South African economy. The analysis presented here relates to the 2015 trends.

Turnover added to SA economy R3.8 billion	Value of pulp and paper production R28 billion	Direct contribution to the balance of trade R5 billion
Forestry-paper contribution to total SA GDP* 0.5%	Forestry-paper contribution to manufacturing GDP 4.2%	Forestry-paper contribution to agricultural GDP 23.3%

*Gross Domestic Product

Trends indicate that packaging, tissue and chemical cellulose are growth sectors for South Africa, and demonstrate the work, energy and refocus of an industry that was under pressure but which is emerging with increased global competitiveness in its chosen grades.

The local industry continues to drive cost control, and a renewed focus on exports is expected.

Forestry is the sustaining force in the sector - with much potential yet to be realised, especially in the case of smaller, emerging tree growers. This is recognised by government in that a carbon offset paper was published in June 2016 which included small afforestation as a carbon offset.

The end-consumer and the economy in general are struggling. Local demand, strong global competition, policy uncertainty, rising utility and tax costs and constrained energy supplies have all affected the South African economy as well as the pulp and paper industry.

While less recycled fibre was collected from lower production tonnages, recycling rates are higher, supporting the view that more is being done in recycling to keep paper production costs under control. In short, the industry would appear to be pushing hard to make the best of a very difficult situation.

IMPORTS/EXPORTS

Pulp production is currently static in South Africa, however the export value is up just over 6%, reflecting the influence of Forex rates. Printing and writing grades continue to face import pressure - primarily related to economies of scale and declines in local demand.

Packaging and tissue, which are generally growth sectors in South Africa, appeared largely static in 2015 regardless of the current Forex advantages.

EMPLOYMENT

The industry has recorded a 10% rise in employment, with pulp and paper accounting for slightly more new jobs than the recycling sector. In terms of recycling, we can expect growing employment numbers to be sustained as a direct result of increased recycling rates. It appears that independent mills (mostly tissue) are creating more jobs; similarly larger mills are showing sustained growth in technical skilled staff (2% per annum). In the first half of 2015, forestry-related jobs (distinct from pulp/paper) came in with a 20% rise in employment (source: StatsSA and PAMSA Education Research Report).

CONSUMPTION

Although the consumption* of printing and writing grades rose somewhat, per-person analysis reflects a decline that demonstrates how local socio-economic growth and development is not keeping pace WITH WHAT? Packaging grades (pertinent to retail channel volumes) continue to grow. Tissue, which is considered to be a luxury among lower living standards measures, is fairly static in consumption terms.

** Consumption is defined as 'apparent consumption' (production plus imports less exports).*

GRADES

Printing and writing

There is a continuation in the gradual decline in overall production rates, however consumption has risen for the first time in three years by 8.8%. Global reports are showing a rejuvenation in printed paper books as the e-book market appears to have plateaued.

Exports in these grades have declined substantially, while newsprint exports show a pleasing rise of 2.2%. With GDP languishing, it is expected that local consumption will remain stagnant, however Forex trends should result in a rise in export volumes.

Packaging

Despite the emergence of plastic alternatives, imports have remained static while exports continue to enjoy sustained growth. Local consumerism and agricultural exports have contributed to a packaging production increase of 7% (5% local consumption and the remaining 2% attributed to a rise in exports). Continued growth is expected across key grades.



Tissue

Tissue grades are the only grades directly linked to the FMCG market, and as a result any pressure on the end consumer will reflect in the tissue sector.

Production declined locally while consumption remained static. On the other hand, growth in exports over the past few years was sustained in 2015. Imports however have risen substantially.



RECYCLING

For the past few years, South Africa has been trending upwards towards a goal of 70% by 2020. In 2015, 66.7% of recoverable paper was collected for recycling. (Recoverable paper refers to paper products that are efficiently recycled and excludes archived documents and books, tissue products, wax-coated and laminated paper as well as wet or contaminated paper.)

This percentage equates to more than 1.2 million tonnes of paper – a volume equivalent to 3.6 million cubic metres of landfill space.



Graphs and additional data are contained in the addendum at the back of this report. A summary report – with graphs and tables - is available on www.thepaperstory.co.za under Resources and Downloads.

THE SUSTAINABILITY STORY



Our role in the economy, the environment and society culminates in various activities that improve the sector's sustainability performance. Environmental stewardship, responding to climate change as well as efficient use of energy, water and fibre are important elements of the industry's sustainability story.

Environmental stewardship

Biodiversity

After a seven-year programme, the South African National Biodiversity Institute concluded that the grasslands managed by plantation growers were the most diverse and best conserved of all land uses in the programme.

There are more formally protected grassland and natural forests under management of the plantation industry, than in any other commercial land use sector.

- Only 9% of the total plantation area is harvested annually. Plantations, together with unplanted natural areas, provide biological corridors for a great many native plants and animals. This is not the case where annual crops are grown.
- Plantations do not require annual cultivation involving soil disturbance and intensive fertiliser, pesticide and herbicide application.
- Plantations provide a physical and management buffer to indigenous forests which would likely have been completely destroyed had the country not been able to rely on plantation grown timber.

As a result, the sector is a major catalyst for social upliftment in rural communities.

- Most pests and diseases in forestry are managed using biological control agents and tree breeding techniques, obviating the need for many pesticides and fungicides.



Forest certification

The international Forest Stewardship Council (FSC®), a multi-stakeholder organisation promoting responsible management of the world's forests, appointed a key account officer in South Africa. This demonstrates visible commitment to sustainable forestry in Africa as well as improving market conditions.

South Africa is also investing in the technical process of revising the National Forest Act Principles, Criteria and Standards for Achieving Sustainable Forest Management developed under that act for the promotion and enforcement of sustainable forest management.

- While plantations replace natural vegetation (in South Africa's case, mainly grasslands), over 80% of land reserved for plantation forestry is certified by the FSC®.
- Some 25% of this land is not planted to trees. Instead it is conserved for biodiversity in the form of grasslands, wetlands, indigenous forests and savannah.
- FSC's Chain of Custody tracks certified material through the production process – from the forest to the consumer, including all successive stages of processing, transformation, manufacturing and distribution.
- The industry voluntarily reduced its plantation area by 80,000 hectares in riverine and ecologically sensitive areas.



Responding to climate change

Industry response to climate change typically focuses on the management of carbon. Less focus has been placed on the sector's vulnerability to a changing climate and the appropriate response efforts. Strategically the industry requires a long planning horizon of up to 50 years that takes into account future conditions for business sustainability and growth. It recognises that climate change is an important future reality that needs to form a critical part of future planning, with respect to both mitigation and adaptation.

Energy and carbon efficiency at mill level implies that the pulp and papermaking industry has the potential, along with carbon sequestration by its timber plantations, to be a key contributor to reducing South Africa's greenhouse gas (GHG) emissions.

Our industry focuses on continuously improving the way it operates in order to minimise the acceleration of climate change. PAMSA members acknowledge the opportunity to maximise their positive role in reducing

the rate of climate change. This can be done through forest-based carbon sequestration, promoting energy efficiency within operations and by producing bio-energy either for their own use or more widely for the South African electrical power distribution network.

Priority actions for climate change

Through PAMSA, the South African pulp and paper industry has committed to:

- Engaging government on the carbon positives of plantation forests which are not widely understood. PAMSA petitions government on the relative carbon benefits of plantation forestry (compared with other land uses), especially under future climate change scenarios. This enables decision-makers to understand that protecting plantation forestry and expanding it is a sensible economic and sustainable development decision and is critical from a climate

change perspective, especially where that expansion does not threaten food crops.

- Driving bio-energy leadership: PAMSA continues to seek opportunities to intensify its bio-energy generation position. This entails both increasing its internal energy generation potential and working with other organisations to build the bio-energy sector.

Emissions reduction and carbon tax

- South Africa is addressing climate change through several national policies and legislative changes and has set a national goal to reduce emissions by 34% below 'business as usual' levels by 2020, and by 42% by 2025.
- The South African government plans to introduce carbon tax in 2018 and carbon budgets are in the process of being finalised. Although the agriculture, forestry, and other



land use and waste sectors are exempt for the first five years of implementation, PAMSA is actively involved.

- The industry is negotiating with the government to take into account carbon sequestration by plantation forests when calculating carbon tax liability. PAMSA members are actively pursuing cogeneration and selling energy back to the national grid but are experiencing challenges with government implementation. Currently the agreement is that all companies emitting more than 0.1 million tonnes (Mt) of CO₂ per annum, will be liable for tax. If one company in any given sector exceeds the agreed limit, then all companies in that sector will be subject to tax but will only pay if they exceed the specified threshold.

Sequestration factor included in revised Draft Carbon Tax Bill

In 2015, the National Treasury announced that it had included carbon sequestration in the Draft Carbon Tax Bill. The draft bill was issued on 2 November 2015 for public comment. PAMSA and its industry members believe that the inclusion of sequestration in the carbon tax calculation and small afforestation as an offset are an acknowledgment by the South African government that the forest products sector plays a vital role in mitigating the effects of carbon emissions and climate change.

The industry's carbon offsets (defined as a measurable avoidance, reduction or sequestration of CO₂ or other GHG emissions) include the sequestration or absorption of CO₂ by trees (planted for the manufacture of paper products) as well as the use of biomass-based energy.

DID YOU KNOW?

If it were not for the pulp and paper industry operating worldwide for the last 150 years, CO₂ levels in the atmosphere would be 5% higher (about half a degree in Celsius) than they are at present.

National Council for Air and Stream Improvement, Special Report No 07-02.

The greenhouse gas and carbon profile of the global forest products industry, February 2007

Energy

GHG emissions from our industry arise due to the use of fossil-based energy in the production of pulp and paper products. However, the industry is an energy and carbon conscious one that already uses a significant quantity of bio-energy, as well as cleaner power technologies.

Our sector has met and exceeded the National Energy Efficiency Strategy's target for the forestry and mining industries. This represents a 15% improvement in energy efficiency by 2015 and is based on a 2000 baseline.

There have been energy efficiency improvements throughout the industry as a result of large increases in the price of electricity and a shortage in supply capacity over that period.

Co-generation and the sale of power back into the national electricity grid are being actively pursued by PAMSA members but have been hamstrung by institutional red tape.

Key activities in the energy space

Energy efficiency has improved markedly over the years as a result of the factors mentioned earlier. Forestry operations in South Africa are currently engaged in developing a bio-energy project that will clarify our approach to managing the interest shown by potential investors and impacts that the removal of bio-energy may have on forest residue.

The industry recognises the potential to further reduce GHG emissions through direct and indirect energy and carbon efficient practices, thereby contributing to reducing the national GHG footprint.

Direct opportunities:

- **Direct reduction in process energy and electricity use** i.e. using less energy and electricity in the production of pulp and paper products will help the industry to reduce its reliance on fossil fuels, as well as fossil fuel-derived electricity;
- **Maximising the use of available renewable fuels**, which are carbon neutral, allows the industry to use less fossil fuel for its energy requirements;
- **Maximising the level of co-generation reduces the reliance of the industry on the national power grid**, and simultaneously reduces the carbon impact of the industry that is associated with electricity consumption, thereby reducing electricity imported from the national grid; and
- **Seeking opportunities to move to cleaner burning fuels**, such as gas. Gas is a relatively clean-burning fossil fuel with a lower carbon impact per unit of energy when compared with coal. While some operations use gas, this can be limited, by availability and distribution constraints. Where possible, however, the industry will continue to pursue opportunities for increased gas utilisation and reduced reliance on coal supplies.

Indirect opportunities for energy and carbon efficient practice:

- **Using more recycled fibre:** the amount of energy involved in making a piece of paper from virgin wood fibre is higher than that required to convert waste paper into new paper products. Increasing the amount of recycled paper used in paper manufacture will result in a decrease in the amount of fossil-based energy required, and in turn reduce the industry's carbon impact. While it is not possible to produce all grades of paper with recycled fibre, the industry seeks to maximise its use of recycled fibre where possible; and
- **Promoting the concept of 'reduce, reuse, recycle':** the industry encourages the reuse and recycling of its products, as well as the minimisation of waste.



The power and recovery plant at Mondi's Richards Bay mill



Sappi Ngodwana turbine

Energy in the pulp and papermaking process

Energy is required in various forms to turn a tree into paper. In some cases, both fossil fuels (petrol, diesel, gas, oil and coal) and renewable fuels (biomass and black liquor) are used to power these processes.

Black liquor - a by-product from digesting pulpwood chips in the chemical pulping process - is a mixture of spent cooking chemicals and dissolved wood solids. This is concentrated during the chemical recovery process to yield a fuel which is rich in organic material. The black liquor - regarded as renewable and carbon neutral - is then used to produce energy. Some mills generate all or some of their own electricity by way of condensing power generation and co-generation.

Energy is used for direct process heating and the generation of steam which is the main heating medium in the papermaking process. Steam is also used for energy-efficient electricity generation.

Condensing is the term used for the electricity generation process typically

employed by conventional coal-fired power stations. As the industry uses a combination of fossil-based and renewable fuels, the energy produced has a lower carbon impact than power production relying exclusively on coal. Co-generation refers to the generation of electricity from steam created as a by-product of the papermaking process.

Co-generation is the industry's main method of generating electricity. Steam produced by boilers and furnaces is typically at a temperature and pressure which is too high for use in the pulp and papermaking process. This high pressure steam is passed through a back-pressure turbine where it expands, thereby spinning within the turbine which generates electricity.

Co-generation offers a number of advantages over condensing power generation:

- A greater portion of the input energy from the base fuel can be used in the production process;
- GHG emissions attributed to generated electricity are significantly lower; and

- Water consumption attributed to electricity generation is almost negligible.

Electricity derived through co-generation (using coal only) has been approximated to have less than half the GHG impact of electricity imported from the national grid (mostly from coal-fired sources). Co-generated electricity derived from gas (and not only coal) has an estimated smaller carbon impact of approximately 25% of the impact of electricity imported from the national grid.

Since there is very little water loss attributable to electricity generated via co-generation, this further implies that this method of power generation is a suitable option, within the water scarce context of South Africa. It is important to note however, that although the pulp and papermaking industry does generate a significant portion of its own electricity, it presently remains reliant on the national grid for the balance of its power needs.

Water

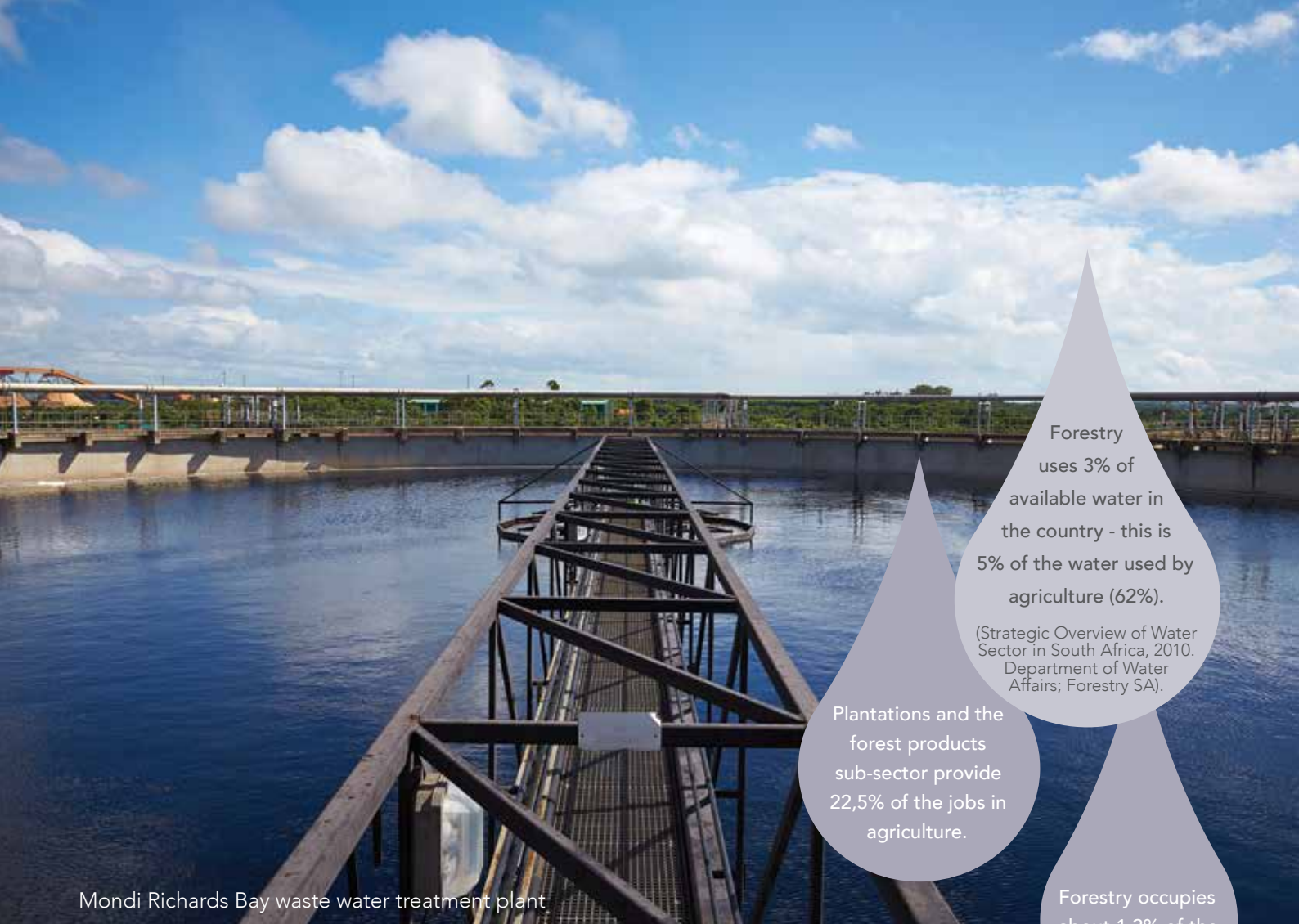
There are three key areas where water is used in the paper value chain: plantation forests, pulp and papermaking and paper recycling.

Forestry, when compared with other users, is one of the most efficient and beneficial water users in the country, in terms of the costs to the State, the social, economic and environmental returns it delivers, especially in rural areas, and the impact it has on water resources.

The trees that are used to make paper generally do not need fertiliser; nor do they require irrigation. Plantation trees get their water from the ground and from rainfall, and most of the water used in paper manufacturing is recovered, recycled and re-used in the process.

Like any other crop, plantations use both soil and water resources but these can be measured against the returns they provide:

SPECIES - RAIN/IRRIGATION FED	TONNES OF WATER REQUIRED FOR GROWTH PER TONNE OF CO ₂ ABSORBED	TONNES OF CO ₂ ABSORBED PER HA PER ANNUM
SA Eucalyptus fibre	274	26.9
Cotton fibre	4,866	2.5
Maize pits	3,943	6.8
Wheat grains	4,776	5.1
Sugar cane molasses	3,152	2.2



Mondi Richards Bay waste water treatment plant

Forestry uses 3% of available water in the country - this is 5% of the water used by agriculture (62%).

(Strategic Overview of Water Sector in South Africa, 2010. Department of Water Affairs; Forestry SA).

Plantations and the forest products sub-sector provide 22,5% of the jobs in agriculture.

Forestry occupies about 1.2% of the land used for agriculture.

KEY ACTIVITIES IN THE WATER SPACE

The pulp and paper sector is a large industrial user of water however much of the water used by mills is recovered throughout the pulp and papermaking process. This water is recycled and clarified, then returned to the system for re-use.

Water is also used to generate steam to power machines and for on-site power generation.

Water licences

On 1 October 1998, the National Water Act, introduced new requirements, which replaced the afforestation permit system under the Forest Act of 1968. Under this act, the establishment of new commercial timber plantations required a water use licence for listed water use activities. PAMSA supports Forestry South Africa in its efforts to work with government to make planting trees

easier within recognised environmental constraints.

Limited fibre supply is the industry's biggest constraint. The Department of Water and Sanitation has now acknowledged that genus exchange can take place without restrictions. For example, a change from pine to eucalyptus or the other way around. This is excellent news for the sector as eucalyptus is the preferred fibre for chemical cellulose and paper production.

Research

The industry has carried out five water reduction studies at four mills under the auspices of the PAMSA Process Research Unit which recruits MSc Engineering students to carry out the projects. Some of these resulted in reduced water usage.



THE RECYCLING STORY



Waste management and fibre recovery

PAMSA, through its recycling arm PRASA, is very active in driving waste minimisation efforts and increasing paper recovery rates. As a recycling rate increases so each tonne becomes more expensive to collect due to diminishing availability of recycled fibre. A weak currency also means that traders like to export their recovered paper which then puts pressure on price and availability of quality fibre.

Over the past five years, PRASA has reported a steady increase in the paper recovery rate of recoverable products. PRASA attributes this success to the focus on knowledge transfer, skills development, education and awareness made possible through the grants approved by the FP&M Seta.

Recovery rates of pre-consumer recyclable paper sit at a healthy 85% average. The need for improvement lies in post-consumer waste paper collection from households, schools and businesses.

The practice of 'waste-picking' has come about due to high unemployment. This encompasses street collections by hawkers and reclamation by people at landfills. They then sell their recyclables to buy-back centres.



Minister of Environmental Affairs, Edna Molewa with PRASA's Ursula Henneberry at the Waste Khoro in May 2016

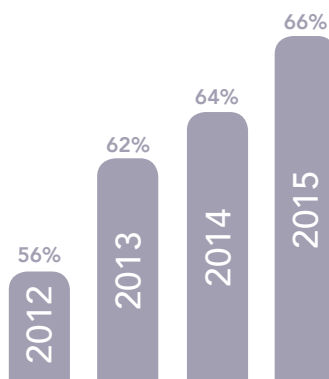
Industry Waste Management Plan

According to a waste information baseline study that the Department of Environmental Affairs (DEA) conducted in 2011, approximately 108 million tonnes of waste is generated annually, of which 97 million tonnes is disposed to landfill.

The contribution by packaging to landfill waste is estimated to be around 35%.

Government has requested that the paper and packaging sector, among others, submit an Industry Waste Management Plan. The aim of the plan is to elevate separation at source from households, not only to minimise the amount of waste going to landfills but also to unlock the economic potential of waste streams.

PRASA and the industry have achieved good recycling rates without subsidies or levies. Going forward the challenge will be to continue to increase recycling rates in order to meet demand and government's requirements once they are legislated.



Recovery rate 2012 – 2015



Extended producer responsibility and designing for recycling

Packaging SA has published the 'Design for Recycling' guidelines to provide packaging and print designers in particular with a better understanding of the environmental implications of their design decisions, thus promoting good sustainability practices without unnecessarily restricting choice.

The concept seeks to facilitate the recovery of recyclate, maximise the opportunities for local and mechanical recycling (without restricting material choice) and increase the value of post-consumer material. In essence, the guidelines are

centred on product stewardship and extended producer responsibility, which has required significant strategic direction in terms of how a product is designed, produced, sold, consumed and disposed in order to lessen its environmental impact through its lifecycle.

The latest version of the 'Design for Recycling' guidelines is available at www.packaging.co.za.



Recycling as an economic lifeline

The collection and on-selling of recyclable materials is a sustainable way of generating income while diverting waste from landfill.

Funded by the FP&M SETA, PRASA offers a four-day entrepreneurship training course to previously disadvantaged individuals, unemployed people, the disabled as well as anyone wishing to start a business in the recovery of recyclables, especially in rural areas.

The course is offered free of charge to participants and to date has inspired more than 5,000 potential entrepreneurs – from elevating their status as waste collectors to seeing themselves as owners of small or micro businesses.



Business basics

The overall objective is to provide relevant training in respect of paper recycling as well as introductory business training and to this end the course provides a framework of understanding around basic business finance and empowers participants to access a sustainable income through recycling therefore giving them an economic lifeline.

A one-day version of the course is available on request for municipal workers, co-operatives and government officials.

Meeting the language challenge

Past experience in delivering the course material illustrated that language was a barrier and that content needed to be adapted to participant's mother tongue. An experienced environmental educator, Joe Peu, who speaks five South African languages was contracted to assist. PRASA is also in the process of training an Afrikaans-speaking trainer.

Monitoring and evaluation

PRASA initiated a one-day monitoring and evaluation session, done approximately three months after each course, with the objective to keep learners motivated and help in making their work prosper and be more sustainable

Engaging municipalities and supporting co-operatives

Small to medium enterprises (SMEs) and co-operatives have a higher probability of success when their local municipality sanctions and supports their collection operation and methods.

PRASA engages with the relevant municipality prior to providing an entrepreneurship course within their precinct, to garner their support of the initiative and assistance with legislation and other local regulations.

Recycling blossoms in Springbok

In 2015, the far-flung community of Springbok, a town situated in the heart of the Northern Cape's Namaqualand spring-flower country, saw the benefit of the Entrepreneurship Course and within hours of its conclusion, community members were already pulling together a co-operative. Some 20 local residents committed to using recycling as the medium through which they can gain a regular income in a region stressed by acute unemployment. The group is in the process of forming a venture to be known as the Namakwa Recycling Cooperative. While paper recycling is obviously their prime focus, they will also collect other recyclable materials like PET, glass and metals to aid the viability of the cooperative as a sustainable operation.

Within days of the course, some of the people already had customers lined up. One of the delegates was so motivated that she was willing to start the next day collecting waste from spaza shops with a wheel barrow.





Windows of opportunity

In early 2016, the Entrepreneurship Course was offered to a group of Mpumalanga-based residents following a call for assistance from a local pastor. Through the course, the participants were alerted to some of the benefits of establishing a co-operative, which could stand them in good stead in the future.

"The course was very beneficial as it helped change their way of thinking. It has given them a greater understanding of the ins and outs of waste collection, separation and recycling, as well as the motivation to help them progress in their new venture." Pastor Kekana.

KZN Society for the Blind

In June 2015, PRASA guided 10 partially sighted and seven disabled participants of the Durban and uMzimkhulu branches of the KZN Society for the Blind through the Entrepreneurship Course which was adapted for better readability, understanding and interaction. PRASA and the Society are collaborating to demarcate and secure a suitable site on the Society's premises.



ADDING ANOTHER LAYER TO PAPER RECYCLING

Milk and juice cartons come in countless shapes and sizes and have become a staple in many a grocery cupboard.

Cartons are made up of 75% paperboard to give them their form and strength. This paper is made from the wood of sustainably farmed trees. The inner layers of the carton include thin layers of polyethylene (21%) and aluminium 4% to keep the food contents safe, seal in liquids and protect the contents inside from external moisture, oxygen and light.

Smaller footprint

Even after a carton is filled, its total weight is around 95% food or liquid content and 5% packaging. This means transporting cartons is much more cost-effective than transporting bottles, for example, as fewer trucks are required. This also means fewer emissions than carrying heavy packaging systems that take up a lot of space. This in turn

translates into less of the greenhouse gases (carbon dioxide, nitrogen oxide and carbon monoxide). And if you add in carbon sequestration (absorption) factor of the trees to make the paperboard, then you have an environmental winner on the shelf!

One carton, two waste streams

The recycled cartons are channeled into a big hydropulper, and with the combination of water and friction, the paperboard becomes saturated into a pulp.

The paper pulp sinks to the bottom of the vessel while the lighter poly/Al composites (as well as the plastic used for the closures) float to the top. The paper pulp is used to make new paper-based products while the poly/Al can be manufactured into a variety of plastic injection-moulded goods.



EDUCATION, TRAINING AND RESEARCH



PAMSA's role in the education, training and research space is multifaceted and covers a broad spectrum of projects:

PAMSA coordinates an industry-wide strategy to ensure that there is an adequately trained pipeline of talent. These include:

- o PAMSA-led tertiary education and training support projects with university and TVET colleges encompassing, among other things, in-service training, capacity building at TVET colleges, and learner tutoring in line with industry's education and training needs.
- o Pulp and paper qualification development for tertiary institutions.
- o Representation of PAMSA's member companies on the Education Committee to ensure that initiatives address industry needs.



Partnerships with the University of KwaZulu-Natal, UNISA and the Durban University of Technology (DUT) in offering elective pulp and paper courses to fourth year Chemical Engineering students and a National Diploma and BTech in Pulp and Paper Technology respectively.



The paper recycling curriculum project aimed at learners in foundation and intersenior phases in collaboration with the Department of Basic Education and e-Classroom.co.za.



Beyond the traditional classrooms and lecture halls, the PRASA-led entrepreneurship training exists to empower and upskill recycling collectors, cooperatives and municipalities.



Development of Masters and PhD students at South African universities through the Process Research Unit.



Access to books, literacy improvement and improving the availability of reading material in indigenous languages through its partnership with the South African Book Development Council, especially during South Africa's annual National Book Week.



Education and training support



Pulp and papermaking is a specialist field of chemical engineering involving the study of processes required for converting raw materials such as wood into pulp and paper products. A career in pulp and paper involves a wide variety of experience and skills and people wishing to pursue this avenue must have a basic knowledge of chemistry and physics, and an aptitude for solving problems logically.

Various education and training opportunities exist within the pulp and paper sector. PAMSA's education ladder outlines three paths for: those who work full-time, school leavers and those students from TVET colleges, with Grade 10-12 or a technical matric.

National Certificate – Vocational (NCV)

The NCV is offered in two certificate programmes - process plant operations and pulp and papermaking technology – from NQF levels two to four. It is currently offered at the TVET colleges of Umfolozi in KwaZulu-Natal, Ekurhuleni East in Gauteng and Capricorn in Polokwane, and provides learners with specialised industry knowledge.

The NQF level 4 NCV process plant operations certificate is preferred by industry for operators involved in the manufacture of paper products, newspapers, facial and toilet tissue, carton containers and many more. The primary function of the people completing this course is to control the high-tech equipment, machinery and systems used in manufacturing processes.

Pulp and Paper Occupational Programme (PPOP)

Although this will be replaced with a Quality Council for Trades and Occupations (QCTO) qualification in 2018*, this programme currently caters for full-time employees who want to expand their knowledge base of pulp and paper operations, giving them the theoretical and practical training required by most companies. Offered nationally and with a distance-learning component, the PPOP is quality-assured by the FP&M SETA.

****To be replaced by QCTO qualification from 2018 with two-year phase out period.***

Unit standard-based certificates

These FP&M SETA quality-assured certificates* are offered to employees as part of their in-house training and continuous development. They include the following:

National certificates:

Tissue conversion (NQF level 2)
Pulp and Paper operations (NQF level 2)
Tissue conversion (NQF level 3)
Pulp and Paper operations (NQF level 3)

Further education and training certificates:

Pulp and Paper operations (NQF level 4)
Tissue conversion (NQF level 4)

****To be replaced by QCTO qualification from 2018 with two-year phase out period.***

QCTO development

In 2015, PAMSA was appointed as the development quality partner to work on four sector qualifications under QCTO.

The project goal is to produce QCTO occupational qualifications and part qualifications for the industry. This work will:

- Convert *three unit standard-based certificates for pulp and paper* into **two new QCTO qualifications**, namely: pulp process controller and paper process controller, each with an NQF level 4 exit.
- Convert *three tissue conversion unit standard certificates* to one **new QCTO tissue converter qualification**.
- Develop **new qualification for Paper and Packaging Collector**.

Diploma and degree qualifications

PAMSA has established alliances with the universities of Pretoria, Stellenbosch, KwaZulu-Natal (UKZN) and Wits, and in 2015, brought the North West University into the fold. PAMSA has also partnered with the Durban University of Technology (DUT), Tshwane University of Technology and UNISA.

The universities are involved in the MSc/ PhD programmes while DUT and UNISA present the PAMSA pulp and paper qualifications i.e. a national diploma and BTech degree in pulp and paper technology.

At UKZN modules on wood pulping technology and papermaking technology are offered as electives to fourth-year chemical engineering students.

PAMSA funds two lecturers at DUT and one at the UKZN to provide specialist technical education to the industry.



Mastering science

Through PAMSA's Process Research Unit, post-graduate BSc chemical engineering students are able to take their studies to a Masters and PhD

level thanks to bursaries and positions offered by our member companies. MSc and PhD students are enrolled at the universities of Pretoria, Stellenbosch, KZN, Wits and North West.

Successful candidates gain advanced skills during their post-graduate training in specialist fields such as wood science, chemical analysis, material and energy balances, process modelling, material flow analysis and separation techniques.

PAMSA supports the Broad-based Black Economic Empowerment (BBBEE) Code of Good Practice and its key drivers of ownership; management control; employment equity; skills development; preferential procurement; enterprise development; and socio-economic development. The industry's massive employee and supplier base provides much opportunity to make a sustainable difference in these spheres.

PAMSA was party to the signing of the BBBEE Forest Sector Charter on 22 May 2008, and supports the Forest Sector Charter council both financially and by serving on the body.

Fibre Processing and Manufacturing Sector Training Authority

PAMSA belongs to the FP&M SETA which consist of 13 sub-sectors, namely the clothing, footwear, forestry, furniture, general goods, leather, packaging, printing, print media, publishing, pulp and paper, textiles and wood products.



Short courses

PAMSA also offers a number of short courses on request which can be tailor-made for specific mill requirements.

- Resource efficiency and cleaner production
- Cleaner production focusing on energy
- Hands-on pulp and papermaking
- Wet end chemistry
- Refining basics
- High yield pulping
- Water and effluent treatment

Process research and development



The opportunities for fibre and waste beneficiation are boundless. As demand for conventional use of paper diminishes, the industry supports precompetitive research, innovation and development through PAMSA's Process Research Unit (PRU).

The unit was formed to expand a regional research initiative and promote the sustainability of the local pulp, paper and packaging industry.

Apart from its bursary programme, the unit coordinates research for the development of processes to efficiently utilise biomass feedstock (trees) for conversion to bio-products (paper and chemicals) and energy with minimal environmental impact. It also seeks to develop academic/research centres of excellence, both locally and abroad, and engages in collaborative partnerships with industry and government agencies.

Some 60% of all trees planted for commercial use are used by the pulp and paper industry, yet a large proportion of biomass is left behind on harvesting (branches, leaves, bark). By re-engineering and optimising processes, the PRU seeks to extract the full benefit of the tree as well as other by-products from pulp and papermaking.

Specific activities of the PRU:

- Studies at the universities of Pretoria and Stellenbosch at Masters and Doctoral level for the conversion of paper waste sludge using pyrolysis techniques to create bio-oils and char have produced a number of promising results on how to maximise product yields and calorific values. The use of catalysts in the optimising process has been shown to be a significant route to the optimisation of thermal efficiency.
- The extraction of valuable chemicals from process streams using novel separation techniques such as pervaporation and nanofiltration is being explored by the North West University.
- High solids fermentation of paper sludge to bioethanol using low enzyme doses has been shown to be a viable technique in reducing the waste burden on landfill sites by the University of Stellenbosch.
- The University of Kwa-Zulu Natal has embarked on a PhD study of the lignocellulosic carbon flows in the South African forest products industry. This will provide important insight into the fate of this carbon and its effect on the carbon footprint of the industry. Five water reduction studies have been completed at four different paper mills.
- Current technologies under development include:
 - o Beneficiation of sawdust waste, fly ash and green liquor dregs
 - o Beneficiation of mill sludges:
 - Production of bioplastic polymers
 - Production of biogas
 - Production of nanocrystalline cellulose from waste fibres
 - o System closure and improved water treatment technologies
 - o Technologies and methods to improve quality and efficiency of dissolving pulp production process;
 - o Advanced testing and analytical support for pulp and paper production processes:
 - Pitch/deposits control
 - Papermaking chemistry
 - Odours in paper products



Biotechnical initiative

As part of the PRU's focus on the development of processes for the beneficiation of paper industry waste streams and surplus biomass, research has been conducted into how catalytic pyrolysis can be used to extract chemicals and energy that can be used as feedstock in our own and other industries.

Pyrolysis is the thermochemical decomposition of organic material at elevated temperatures in the absence of oxygen (or any halogen). It involves the simultaneous change of chemical composition and physical phase, and is irreversible.

These may be commercially exploited in the manufacture of liquid fuels and fertilisers and, if further developed, could potentially improve the industry's environmental footprint and mitigate the effects of carbon tax.

A portion of the funds required to carry out this research come from the R9 million investment awarded to PAMSA by the Department of Science and Technology's Sector Innovation fund. The project involves the collective

resources of the universities of Stellenbosch and Pretoria, which will draw interns from local technical institutions in the operation of a planned pyrolysis pilot plant.

The goal of the research is to develop unique bioprocesses that will lead to the up-skilling of the local workforce, developing and improving the expertise of local academic institutions and taking to market commercially viable processes. The development of a catalyst that has the potential to significantly increase the calorific value of bio-oils will result in the registering of patents, which would allow the development of an economically viable liquid bio-fuels market.



Sector Innovation Fund

Department of Science and Technology introduced a Sector Innovation Fund to encourage research and innovation and PAMSA has been granted R9 million over three years to pursue various precompetitive research projects which can then be further developed by individual companies should they show promise.



Improving recycling through education



Foundation and Intersenior Schools Curriculum Project

In a country where recycling was not an everyday activity, PRASA determined to change behaviour from as early an age as possible. In 2012, the Department of Education supported our proposal to have recycling incorporated in the maths curriculum. To stimulate and educate children in their formative years, the subject was introduced to the syllabus from the foundation phase (Grades R to 3) through to the intersenior phase (Grades 4 to 7).

Using paper as the medium to drive the recycling message, the rollout material comprised a teacher manual and learner worksheets. The project was successfully launched nationally at 7,778 schools, reaching 134,000 educators and four million learners. Judging by the number of schools actively involved in recycling, it is evident that this project has resulted in children being more aware of this all-important activity.

Paper meets the "classroom", online

PRASA has partnered with www.e-classroom.co.za, a website that provides printable curriculum-based educational resources for children, their parents and teachers. It also provides educational content support on sustainability and recycling. e-Classroom currently caters for Grades R to 12, focusing on English language, pure mathematics, life skills, Afrikaans (as a first additional language), science, geography, history and economic and management science. Despite the project's use of digital technology, e-Classroom founder Natalie Wood believes that paper has a fundamental role to play in education where responsible paper use and recycling can co-exist.



PRASA-sponsored recycling-focused material forms part of the life skills content for Grade 3 learners. Recycling as a curriculum topic ensures that learners grow up with an awareness of waste and an appreciation of the importance of recyclability.

Content has also been developed for Grade 1 – 6 mathematics (data handling) and English, using paper products as examples.



In October 2015, the Delta Environmental Centre and National Recycling Forum (NRF) unveiled a contemporary and refurbished walk-through display that helps visitors grasp how they can make a difference by recycling various materials and packaging. Situated in the heart of the beautiful 104-hectare Delta Park, north west of Johannesburg, the 40-year-old environmental centre provides education and training on the sustainable use of resources. The upgrade of the recycling display was sponsored by the NRF along with additional financial support from the Paper Recycling Association of South Africa, Tetra Pak, Plastics SA, the Glass Recycling Company, the Aerosol Manufacturers Association, the e-Waste Association and ROSE Foundation (oil).



Promoting literacy and access to books



According to a 2010 study¹ by the University of Stellenbosch, the cost of functional illiteracy to South Africa's economy in unrealised GDP is estimated at R550 billion annually.

Added to this, the findings from a 2007 study by the South African Book Development Council (SABDC) determined that, only 14% of the country's people are avid book readers and a mere 5% of parents read to their children. The survey also indicated that 51% of households in South Africa did not have a single book in their home.

Various studies have shown that paper-based materials promote reading comprehension, information retention and learning, and that print-based texts have been found to be superior to digital texts in facilitating learning strategies.

Along with a group of diverse stakeholders operating within the book value chain, PAMSA is a member of the SABDC, the representative body of the country's book sector.

PAMSA executive director Jane Molony chairs the SABDC.

Three national government departments - Arts and Culture, Basic Education and Trade and Industry, form part of the council.

The council champions a growth and development strategy for the entire book sector, with two of its flagship programmes being the annual National Book Week reading promotion campaign and its Indigenous Languages Publishing Programme. It follows a comprehensive, integrated approach to book development, and as such facilitates capacity building among SMMEs. It has highlighted the critical shortage of quality editing in the indigenous languages.

In line with its ambit of increasing access to books, the council has been looking at library procurement as although library budgets have increased, there is a decline in books being procured.

"It was Nelson Mandela who said that 'education is the most powerful weapon which you can use to change the world'. As the South African Book Development Council, we firmly believe that access to books from an early age is the sharp edge of the spear. That said, we are never too old to learn. By equipping citizens of all ages with books to read, we give them the ability to learn, to gain knowledge and to participate in the economy. Can there be a greater gift? This is why PAMSA is proud to be a member of the SABDC which is building an army and nation of readers."

Jane Molony

Chairman of the South African Book Development Council

More information is available on www.sabookcouncil.co.za

¹The costs of illiteracy in South Africa - A Working Paper of the Department of Economics and the Bureau for Economic Research at the University of Stellenbosch. Martin Gustafsson, Servaas van der Berg, Debra Shepherd and Cobus Burger (2010)



MEMBER HIGHLIGHTS

CORRUSEAL

With its vision Better Packaging for a Better World, the Corruseal Group manufactures and supplies corrugated packaging to the FMCG, agriculture, industrial and automotive sectors nationally. With a 50-year history, Corruseal has grown through a combination of organic growth, acquisitions and partnerships into a fully integrated supplier from waste collection to finished box. It has a footprint across South Africa with 10 manufacturing sites and over 1500 people.

HIGHLIGHTS

Waste – Corruseal has several waste collection sites across South Africa to collect waste paper and other recyclable materials. Waste collection also takes place through other strategic partnerships and collaborations.

Paper production – Through the recent acquisition of the Enstra site's two paper mills from Sappi, Corruseal now produces 100% containerboard on PM6 and security and graphic papers on PM2. With best-in-class lightweight capabilities on PM6, Corruseal can produce lightweight performance papers to reduce fibre consumption and its carbon footprint.

Corrugated production – With more than eight sites nationally that produce volume packaging as well as value added packaging, Corruseal produces a vast array of solutions for its customers. By employing innovative technical solutions it further reduces fibre consumption and also improves performance.

Sustainability – With over a 40% reduction in water consumption since November 2015, Enstra Paper is poised to have further reductions through key investments to improve effluent discharge and fibre recovery. A further 25% reduction in energy is targeted over the next 18 months through key internal efficiencies and projects.

Social – Corruseal over the past years has made a strong impact on the communities with which it interacts through KRUPA – its public benefit organisation. To name a few where the company is making a difference through activism:

- Oliver's Village
- Operation Smile South Africa
- Action in Autism
- Uminathi Organisation (non-profit organisation).
- Local entrepreneurship community-based projects
- Partners for Possibilities
- Donations to Rainbow Trust
- Habitat for Humanity

HUHTAMAKI SOUTH AFRICA

Huhtamaki is considered the number one player in moulded fibre products globally. Huhtamaki is also a leading supplier of paper cups in South Africa. At its two operations in Springs and Atlantis in the Western Cape, Huhtamaki manufactures 100% recycled, moulded fibre packaging for the protection of a variety of fragile foodstuffs such as eggs, fruit and vegetables; carriers for wine and cups; and protective packing for electronic devices. Such packaging is not only 100% recyclable, but also compostable and biodegradable. Huhtamaki South Africa employs 350 people. Its Atlantis factory employs the majority of its people from the local community.

Fit-for-purpose packaging prevents valuable products from being destroyed due to premature spoiling or damage. This way, packaging contributes to improving sustainability from the factory to the consumer.

Huhtamaki recycles all of its pre-consumer production waste, and its post-consumer cups are also recyclable.

Food safety certification is crucial for food packaging manufacturers. Huhtamaki's Atlantis operation is British Retailer Consortium (BRC) and ISO certified. The BRC standard is recognised by the Global Food Safety Initiative. Its Springs site is ISO and Hazard Analysis and Critical Control Points (HACCP) certified. HACCP is the internationally recognised operating method that helps organisations in the food and beverage industry identify their food safety risks, prevent food safety hazards and address legal compliance.

Huhtamaki focuses on product safety and innovations with the aim of expanding externally certified product safety systems to cover all manufacturing units.

The company also fosters close co-operation with its suppliers to ensure traceability, material efficiency, and commonly shared ethical practices throughout the value chain. To enhance this, Huhtamaki aims to constantly innovate and renew its products, for example by taking new raw materials into use, light-weighting packaging or making recyclability easier for consumers.



TETRA PAK

Tetra Pak is a food processing and packaging company which employs more than 23,000 employees in over 80 countries.

Tetra Pak invested R6 million in setting up the PolyAlu recycling operation in South Africa, which has been up and running since December 2015. It is also expanding opportunities for recycled materials by identifying local recyclers in manufacturing products using PolyAlu pellets produced from the plant.

HIGHLIGHTS

- 650,000 tonnes of our beverage cartons were recycled globally in 2014.
- Over 99% of paperboard purchased from FSC®-certified paper mills.
- 11Mt CO₂e emissions across all parts of the Tetra Pak value chain down 16% from a 2010 baseline, despite a 14% increase in production over the same time period.
- 10,934kt CO₂e GHG emissions
 - o Scope 1 and 2 407, 82% from electricity.
- 4,161,063GJ electricity consumption
- 95.5% of waste is recycled, 1.9% to landfill.
- 2204m³ water usage.



South African highlights

- Achieved a recycling rate of 5.5% of used beverage cartons (UBC) in 2014.
- In partnership with Mpact Recycling, Tetra Pak is increasing consumer awareness of carton recycling through a household awareness and collection drive involving 200,000 households in Johannesburg. A similar scheme currently engages over 10,000 households in Cape Town and 350,000 households in Durban.
- **Partnership with Mpact to increase beverage carton recycling:** Mpact recently commissioned its new UBC recycling plant in Springs, east of Johannesburg. The plant has a monthly recycling capacity of 2,000 tonnes of UBCs a month. The partnership with Mpact will increase Tetra Pak's recycling rate in 2016.
- **Collectors Education Campaign:** In partnership with Mpact, Tetra Pak South Africa is reaching out to waste pickers/hawkers to educate them about collecting UBCs for recycling, along with other paper and board products. Many waste pickers do not collect UBCs because they are not aware of the buyers and other commercial opportunities related to UBC recycling.
- **Forest for All Forever:** In partnership with FSC® Southern Africa, Tetra Pak supports efforts to educate consumers about responsible forestry. Globally Tetra Pak aims to offer packages based on 100% renewable materials and secure 100% FSC®-certified paperboard. Tetra Pak South Africa works with suppliers, customers, consumers and NGOs to raise awareness of the importance of ensuring responsible forest management and the value of using renewable materials, like wood. Today, FSC®-labelled Tetra Pak packages are available across South Africa.



Left to right: Amar Zahid, cluster vice president Greater Middle East and Africa; John Strömbblad, MD Tetra Pak SA; Linda Twala, community leader Alexandra; Gisele Gurgle, marketing director Tetra Pak SA

MAKING A DIFFERENCE WITH MILK

The Milk for Change campaign, a partnership with FEED SA, aims to fight undernourishment among South Africa's larger communities, and has successfully collected nearly 60,000 litres of long life milk – nearly 240,000 glasses of nutritious milk for FEED SA's 6,000 daily beneficiaries. These beneficiaries are children who need a healthy meal to help them concentrate to get a good education.

Milk for Change continues to collect long life milk donations by consumers from select Pick n Pay retailers across Gauteng, the Western Cape, and KwaZulu-Natal. Tetra Pak donated 10,000 litres of long life milk alongside donations by Clover, Parmalat, Orange Grove and Woodlands to kick-start the process, bringing the initial donations to 39,000 litres.

Consumers donated the rest of the nearly 60,000 litres in Pick n Pay stores and through five participating schools. Spartan Truck volunteered to collect milk from participating Pick n Pay stores and deliver it to FEED SA's warehouse facility.

Milk was handed over to FEED SA in Alexandra on June 1, 2016, World Milk Day. World Milk Day was established by the United Nations Food and Agriculture Organisation in 2001.

MONDI

Mondi South Africa owns and manages 250,000 hectares of FSC® certified plantations in KwaZulu-Natal and Mpumalanga. It produces hardwood pulp and virgin containerboard at the Richards Bay mill; and uncoated fine paper and newsprint at Merebank mill in Durban.

The Mondi Group is fully integrated across the packaging and paper value chain - from managing forests and producing pulp, paper and compound plastics, to developing effective and innovative industrial and consumer packaging solutions.

Mondi has been included in the FTSE4Good Index Series since 2008 and the JSE's Socially Responsible Investment Index since 2007.

HIGHLIGHTS

Energy and emissions

Mondi's climate commitment focuses on improving energy efficiency and replacing fossil fuels with renewable energy where feasible.

- Reduced carbon emissions (per unit of saleable production) by 28% in 2015 compared against 2004; share of renewable energy in the overall fuel consumption of its mills was 59% in 2015; electrical self-sufficiency reached 103% in 2015.
- Energy consumption: 27.5mGJ (28.5mGJ in 2014)
 - Investment in energy generation has resulted in Richards Bay mill being self-sufficient and a net exporter of electricity
 - Richards Bay mill installed new technology at the wood yard to enhance efficiency
- Scope 1 and 2 GHG emissions: 1.35m tonnes (1.36 in 2014)
 - Scope 1: 988,585 tonnes
 - Scope 2: 363,080 tonnes
- Continued focus on reducing odourous emissions from Richards Bay mill.

- Environmental incidents in 2015: Black liquor from a leaking valve at Richards Bay mill was released into the emergency basin, leading to levels of (chemical oxygen demand), total suspended solids, colour and pH above agreed limits. A clean-up operation was successfully implemented and measures were put in place to prevent a repeat.

Fibre

Mondi places great importance on proactive and responsible stewardship of forests as well as freshwater ecosystems and maintaining biodiversity and habitats.

- All wood sourced is FSC® Chain-of-Custody certified or meets Mondi's minimum requirement that complies with the FSC® standard for Controlled Wood.

Water

Throughout the paper production process, from growing trees to processing fibre into products and for 'non-contact' purposes such as cooling water in production facilities, Mondi recognises its responsibility not only to mitigate the impact of its business on the environment but also to limit water consumption. Responsible water use involves protecting water resources and fresh water ecosystems on or adjacent to forestry land supported by environmental management plans and water impact assessments.

- 9% reduction in specific water consumption at Richards Bay mill
- Operating well below water restriction limits of the Department of Water and Sanitation
- 95% of potable water usage replaced with second-class water at Merebank mill
- All contaminated effluent is channelled through waste water treatment plants before reuse or release into the aquatic environment
- Continued with work of the World Wildlife Fund-Mondi Wetland Programme on forestry land

Waste

Mondi strives to do more with less, through optimising processes and products, and promoting recycling, reuse and the substitution of resources to reduce waste and improve resource efficiency.

- 703 tonnes of hazardous waste sent to landfill (2014: 1,446 tonnes)
- 80% reduction of total waste to landfill at Merebank mill

Community development

- Refurbished and equipped two new science laboratories at schools in Lamontville and Isipingo, Durban
- Three-year partnership with GIZ (a German sustainable development entity) focuses on youth development and crime prevention in forestry and mill communities
- Orphans and vulnerable children programmes reached 2,000 children
- 52 bursaries and internship opportunities for disadvantaged youth
- 216 schools and community organisations received donations of Mondi paper
- 43 schools are involved in the 'Green Schools' programme reaching 17,620 learners
- 46,600 learners and educators visited the Mondi science and career guidance centre in Piet Retief in 2015

Enterprise development

- Mondi Zimele adds value through equity, loans and business development support to employment-creating small businesses within Mondi's forestry value chain and surrounding communities.
- Mondi has invested over R175 million in support of 158 small enterprises in forestry communities. These rural small businesses make a critical contribution to local economic development and employment.



Mondi Richards Bay Mill

Health and wellness

- HIV/Aids
 - All employees and contractors had access to testing, counselling and anti-retroviral treatment (ART)
 - 36 employees and 130 contractors received ART
 - In 2015, 938 employees and contractors participated in the HIV/Aids voluntary programme, with 702 opting for testing.
- Contractor workforce in the forests benefited from the Food4Forests programme, supplying 655,000 nutritious meals.

People

- 22% of 1,700 employees are female.
- Two of nine board members are women; one of the three South African-based board members is from a historically disadvantaged community.
- 45% management from previously disadvantaged backgrounds.
- Training and development
 - Four employees received their international Pulp and Paper Craftsman qualification in Europe.

Safety

- Zero fatalities and life-altering injuries occurred in 2015
- Total recordable case rate per 200,000 hours worked: 0.49 (0.42 in 2014)
- OHSAS 18001 certification achieved at operations
- Focus on minimising risk and embedding a strong safety culture, especially during maintenance.

ENVIRONMENTAL STEWARDSHIP AND BUSINESS CAN GO HAND IN HAND

The Mondi Group is a long-standing supporter of the WWF-Mondi Wetlands Programme (WWF-MWP), celebrating its 25th anniversary in 2016. Since 2001 Mondi has sponsored and supported the programme, which has catalysed wetlands conservation in South Africa through effective partnerships with government, non-government organisations and companies. Forest and freshwater stewardship is promoted through a landscape approach, bringing together stakeholders across three priority sub-catchments of the uMngeni and uMvoti catchments in South Africa. Collaborative learning and exploring solutions that create shared value are central to this approach that integrates forests with agriculture and attempts to maintain ecosystem services in the landscape. Freshwater stewardship is being piloted by the WWF-MWP in the Upper uMngeni and the adjacent Upper Umvoti catchments (both in KwaZulu-Natal), and the Groot Brak catchment (southern Cape). In 2014 Mondi and WWF entered into a global partnership to promote environmental stewardship in the packaging, paper and agricultural sectors. The partnership aims to show that environmental stewardship and business can go hand in hand.

MPACT

Mpact is a leading manufacturer of paper and plastics packaging in southern Africa. Mpact Paper is integrated across the recycled paper-based corrugated and converted paper packaging value chain. Mpact's BBBEE rating is Level 3.

Its paper division manufactures recycled-based packaging and industrial paper grades such as containerboard and cartonboard while the corrugated division makes and sells a comprehensive range of printed and unprinted converted corrugated products, including board, which is used to manufacture corrugated packaging, corrugated boxes, die-cut cases, folded glued cases, trays and point-of-sale displays.

Mpact Recycling forms an essential part of Mpact's value chain, having processed over 500,000 tonnes of recovered paper in 2015.

HIGHLIGHTS

(As at 31 December 2015)

Recycling

Mpact recovered 527,000 tonnes (2014: 450,277 tonnes) of paper fibre and plastics for recycling from pre- and post-consumer sources, diverting the material from landfills.

- About 75% of the recovered paper is recycled into containerboard and cartonboard at Mpact's three paper mills. The balance is sold to newsprint manufacturers.
- Mpact Recycling has initiatives under way to expand the recovery rates of paper and plastic, such as improving collections in rural areas, setting up new buy-back centres, expanding kerbside collections, assisting and developing dealers and investing in new collection equipment. The acquisition of Remade Recycling in May 2016 complements these initiatives.
- A state-of-the-art liquid carton packaging recycling plant at Mpact's Springs paper mill commissioned in April 2016 will recycle approximately 25,000 tonnes per year of cartons such as Tetra Pak and SIG Combibloc, generating 18,000 tonnes of recovered fibre for use in new paper products.

Manufacturing operations

Mpact has 42 operating sites in South Africa, Namibia, Mozambique and Zimbabwe, 22 of which are manufacturing operations.

- All operations have been certificated by recognised international standards as appropriate to their products.
 - ISO 9001 (quality), ISO 14001 (environment) and ISO 22000 (food packaging safety)
 - FSC® mixed-source certification of the three paper mills
 - German Federal Institute for Risk Assessment (BfR) Recommendation XXXVI: food contact safety standard for packaging papers
- In 2015, Mpact successfully concluded numerous projects that optimised processes and product offerings at its paper mills to drive efficiencies and cost savings as well as reduce environmental impact.
 - Felixton mill is being transformed through two phases of development and investment to produce advanced lightweight containerboard. Its latest paper machine technology and equipment will improve the mill's overall competitiveness, with significant improvements expected in energy and operational efficiencies. Phase 1 - the completion of an advanced recycled fibre plant - was commissioned in June 2015, with Phase 2 on schedule for commissioning in 2017.

Environment, energy and emissions

The Energy Centre of Excellence (EnCoE) was established to reduce energy consumption and CO₂ emissions, by coordinating and driving energy efficiency and green energy generation. Likewise, the Environmental Centre of Excellence (ECoE) coordinates other elements (including water, waste and legislation) of environmental management. EnCoE initiatives include:

- Energy saving:
 - Optimisation of boiler efficiency
 - Production process monitoring and optimisation initiatives
 - Installation of variable speed drives

- Replacement of old lighting technologies with modern low energy lighting
- Replacement of various heating and cooling equipment with modern high efficiency units; and
- Energy conservation awareness campaigns among employees.
- Energy generation investigation:
 - Solar generation feasibility
 - Energy generation from incineration of waste.
- Mpact is progressively reducing its environmental footprints per tonne of saleable product.
- Mpact recognises environmental excellence by presenting the Scarab Award to the best performing operation, based on results of an externally conducted audit on environmental management practices.

Water and wastewater

Mpact's interventions to reduce water consumption over the years include monitoring and awareness, equipment upgrades, process optimisation, rainwater harvesting, and the treatment and reuse of waste water.

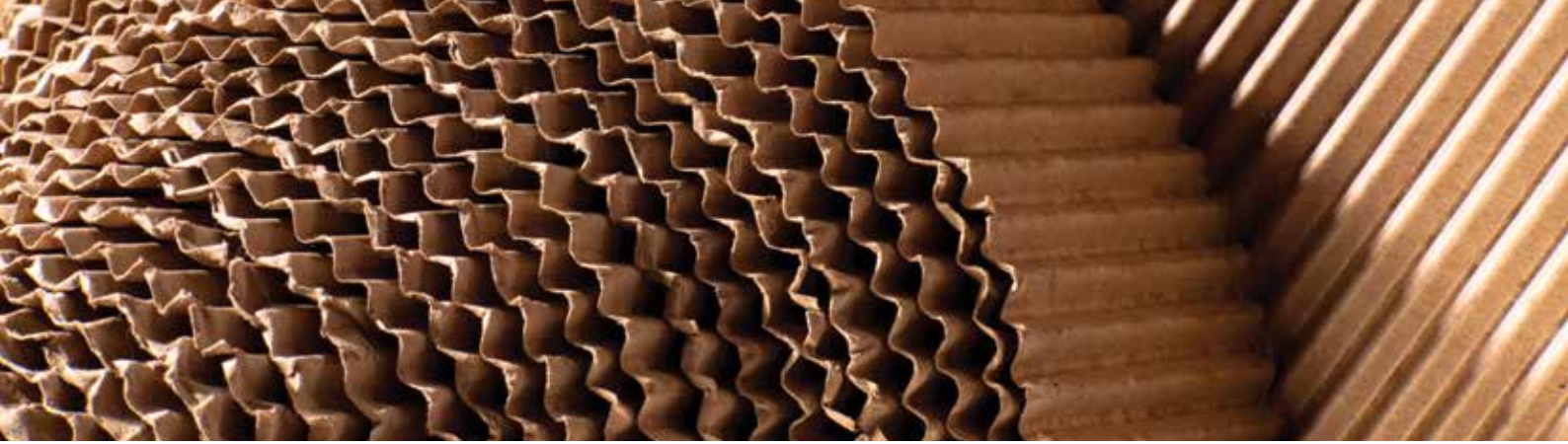
People

With over 5,000 employees, the Group embraces diversity of people across race, gender and disability, and is committed to attracting, recognising and rewarding talent.

- 16.7% ownership by black individuals
- 6.7% ownership by black women
- 57% union membership



A buy-back centre worker assists a collector with offloading his cardboard for weighing on the scale.



Training and development

On-the-job learning, leadership development and formal skills development interventions are monitored against individual development plans, performance targets and the Group's competencies applicable to each talent segment.

- 67,412 man-hours devoted to training and skills development
 - 206 individuals on apprentice and learnership programmes
 - 91% from previously disadvantaged backgrounds
- 3,364 employees on skills development programmes
- Awarded 'Best Practice Workplace Provider for Apprenticeship Training and for Learnerships' by the FP&M SETA.
- New learnership programme for 36 unemployed black disabled people.

Code of ethics

Mpact's code of ethics defines the Group's ethical values and behavioural standards. The leadership team not only endorses the code, but is committed to applying it in their decisions and actions in mapping the Group's strategy and in managing its operations. The code applies to all employees, and covers the foundation of the Group's ethical behaviour, including its vision and values.

Enterprise development

Mpact provides economic opportunities to small businesses owned by previously disadvantaged people, enabling them to grow into sustainable enterprises and create jobs.

Mpact Recycling's broad national footprint of community recycling and collection projects forms an essential element of enterprise development.

- Well-established networks create employment opportunities for the dealers, traders, buy-back centres, owner-drivers, and street hawkers or "trolleypreneurs".
- Dealers, traders and buy-back centres receive additional support

(equipment, financing and business training) while hawkers get paper barrows for easier paper collection and transport.

- Mpact has set up small business entrepreneurs through over 100 buy-back centres countrywide.
- Through Mpact Polymers and the Felixton mill upgrade, Mpact expects more than 2,000 new job opportunities to be created in the recycling industry, many of them in rural areas.

Health and wellness

The wellbeing of employees is a strategic imperative. Occupational health compliance is the responsibility of line management and a key indicator of business performance. All operations and sites provide wellness programmes and support to employees for primary healthcare and chronic illnesses, including HIV/Aids

- Site clinics and mobile medical facilities provided free annual medical assessments to employees
- 3,340 employees underwent an annual medical test
- 2,516 employees opted for voluntary counselling and testing.

Safety

Mpact's zero harm approach is guided by the CEO's Philosophy: "All injuries, occupational illnesses, safety and environmental incidents and fires are preventable and the target for them is zero".

- Mpact fosters a safety culture through effective safety systems and three levels of intervention:
 - Primary level: physical interventions such as machine guarding, designated walkways, safety railings, equipment inspections, and personal protective equipment.
 - Secondary level: systems founded on a solid safety policy that informs the way people interact with work hazards.
 - Third level: behaviour-based

safety programmes (aimed at identifying unsafe behaviours and eliminating barriers to safety) and the Mpact Safety Culture cartoon series.

- Operations compete annually for the Excellence in Health and Safety awards, an internal recognition programme, while the annual Mongoose Trophy for Excellence in Health and Safety is awarded based on comprehensive independent health and safety audits.

Community development

Mpact's CSI programmes create value and make a meaningful difference in its host communities, as well as build dignity and self-esteem of the people within them:

- Springs Mill Entrepreneurial Skills Development runs a 13-week course for Grade 10 and 11 learners through Junior Achievement of South Africa.
- The Piet Retief High School Project is fully funded by Mpact with equipment and classroom facilities to implement electronics as a new subject at high schools in the area. This has given learners a chance to qualify for technical school status.
- Kalkfontein Primary School Garden Club is a collaboration between Corrugated Kuils River and Stodel Garden Centre to encourage a sense of pride among schoolchildren, teamwork, research skills, gardening skills, commitment and responsibility.
- Thol'impilo Mobile Clinics is Mpact's partnership with the Mpumalanga Department of Health; the German province of North-Rhine-Westphalia; private farmers, churches, Business Against HIV & AIDS and Mondi Limited, to provide primary healthcare in the rural areas of Mkhondo.
- Cape Oasis Association supported by Mpact Recycling provides over 450 intellectually challenged people from the greater Cape Town area with employment opportunities, skills development training, and homes.



SIG COMBIBLOC OBEIKAN

SIG Combibloc is a supplier of aseptic carton packaging and filling machines for beverages and food. Headquartered in Switzerland, SIG has a global presence with its South African operation located in Cape Town.

The long and interesting story of SIG (Schweizerische Industrie Gesellschaft) started in 1853 with the manufacture of railway cars, and encompasses weapons technology, tool design and construction, and manufacturing systems engineering, culminating its current focus on packaging and filling machines. In 1989, SIG entered the packaging sector for liquid products such as milk, juices, soups and sauces - thus laying the foundation stone for the present SIG Combibloc division.

HIGHLIGHTS

- Over the past year, SIG's development of new filling machines and modification of existing models has seen them significantly reduce consumption of water, energy and compressed air.

In 2014, 40% of global SIG packaging was labelled with FSC® and from August 2016, 100% of SIG carton packs received the certification mark. This can be attributed to a global network of cardboard suppliers who have been certified according to the FSC® criteria, thus guaranteeing that sufficient quantities of responsibly sourced wood are used in SIG cartons.

In cooperation with the manufacturers of the unprocessed paperboard, SIG Combibloc has worked consistently to enhance its cartons, reducing the packaging, for instance, by more than 23% over the past 20 years. This was achieved with the aid of a new cardboard layer structure and by optimising the weight of the closure mechanisms.

In 2016, SIG launched combibloc EcoPlus, a packaging with a new composite structure comprising 80% renewable paper board. EcoPlus carton packs also carry the FSC® label. A string of life-cycle assessments also proved that combibloc EcoPlus generates 28% less CO₂.

NEOPAK

Neopak is a paper-based packaging manufacturer that offers solutions to businesses in the FMCG, agricultural and export markets. Neopak has four major facilities in Johannesburg, Cape Town, Durban and Port Elizabeth as well as two paper recycling mills in Tshwane. Its operations source flexographic printing and die cutting tooling from the in-house Corroflex operation, while research and development (R&D) is channelled through the R&D facility in Cape Town. Environmental sustainability and responsibility are key, and as such Neopak has invested in a world-class recycling business, Neopak Recycling.

HIGHLIGHTS

- Increased recycled paper fibre content in applications where traditionally virgin fibre has been used i.e. replacing virgin liner with high performance recycle-based paper.
- Over and above having FSC® certification for its paper mills, all four of its converting facilities have been FSC® certified, meeting the requirements for responsible sourcing.
- By optimising the construction of corrugated board, Neopak reduced the weight of packaging material while maintaining the required performance qualities.
- Optimised paper specifications for improved runnability and consistency, thus reducing the use of energy, time and raw materials.
- Neopak Recycling supplies the majority of reclaimed fibre to Neopak paper mills in Rosslyn for the manufacture a wide range of recycled-based papers for the corrugated and core making industries, both locally and into the rest of Africa.
- Rosslyn mill milestones:
 - ISO 9001 and 18001 accreditation in addition to the ISO 14001 accreditation already in place.
 - FSC® accreditation for the production and sale of recycled liner and fluting.
 - A project was implemented to de-commission the PM1 waste plant and consolidate waste supply for both machines from a single waste plant. Energy and water savings were realised as a result. Gas and electricity usage have subsequently been reduced by 8.1% and 7.6% respectively.
 - Water recycling capabilities at PM3 were increased through the installation of a second sump pump in the waste plant. This reduced flooding, and thus generated water savings.
 - Water usage was above target and effluent was on par with targets. Chemical oxygen demand was achieved although this was below target.
 - Achieved 98% uptime with its gas boilers thereby eliminating the use of coal-fired boilers.



LOTHLORIEN RECYCLING

Lothlorien is an independent paper recycling company that focuses on handling paper, packaging and plastics at a plant situated in Ekurhuleni that is fed from 17 depots and a wide customer base within Gauteng.

Having increased its provincial footprint, Lothlorien is also in the process of establishing a plant in the east of Tshwane to handle expansions and strengthen its position in the market. It is also identifying new waste streams that will diversify its product range.

Lothlorien sees regulatory compliance as a priority and successfully realised its goal of certification on the integrated management system, namely safety (OHSAS 18001:2007) and environment (ISO 14001:2004).

KIMBERLY-CLARK SOUTH AFRICA

Kimberly-Clark South Africa, a subsidiary of the US-based Kimberly-Clark Corporation, is a marketer of tissue and hygiene products. With manufacturing facilities in Gauteng and the Western Cape, the company focuses on professional consumer products such as feminine care, baby and child care, and family care.

HIGHLIGHTS

- **Social impact** – Increased the number of Kimberly-Clark communities with socially-focused programmes such as Toilets Change Lives and Mothers Against Malaria from 62% in 2011 to 97% in 2015. Kimberly-Clark's total global donations and community investments in 2015 amounted to \$29 million, or roughly 2.9% of the company's net income.
- **Forests and fibre** – Increased the amount of FSC®-certified virgin fibre in Kimberly-Clark tissue products from 7% in 2006 to more than 75% in 2015, and collaborated with FSC® to support ending deforestation and safeguarding ecosystems.
- **Waste and recycling** – Diverted 95.6% of manufacturing waste from landfills as of December 2015.
- **Energy and climate** – Reduced absolute GHG emissions by 7.2% since 2010, exceeding the company's 5% target. Kimberly-Clark was also awarded a 2016 US Environmental Protection Agency Climate Leadership award for excellence in GHG management.
- **Supply chain** – Exceeded the 25% water use reduction goal with a 27% reduction rate from a 2010 baseline, up from just 2% in 2011, in addition to recording zero fatalities and achieving 100% key supplier participation in social compliance programmes.
- **Safety** - 2014 was Kimberly-Clark's safest year ever, with a 19% reduction in reportable incidents and zero fatalities and a 75% reduction in machinery-related risk.

TOILETS CHANGE LIVES

In 2014, Kimberly-Clark co-founded the Toilet Board Coalition which aims to develop commercially sustainable and scalable solutions to the sanitation crisis. Around 2.5 billion people around the world live without access to improved sanitation. Millions of girls miss school every month because menstruation becomes too difficult to manage without proper facilities. Countless children are absent from school because of the spread of disease and infection from a lack of basic sanitation. Kimberly-Clark provides financial support and contributes through drawing on the skills present in its human capital workforce in an effort to accelerate the coalition.



SAPPI

Headquartered in Johannesburg, Sappi Southern Africa (SSA) employs 5,372 people, owns 492,000 hectares of plantations, two paper mills, one paper and specialised cellulose mill, one specialised cellulose mill and one sawmill. SSA has an annual capacity of approximately one million tonnes of dissolving wood pulp, 1,780 million tonnes of paper pulp and 935,000 tonnes of paper. It produces uncoated graphics and office papers; as well as tissue, newsprint, linerboard, semi-chemical fluting and lignosulphonates.

Sappi ReFibre, its secondary fibre division, is responsible for the recycling of used paper and paper products.

HIGHLIGHTS

(As at end September 2015)

Emissions

- Scope 1: 1.18 tonnes CO₂ per air-dried tonne (adt)
- Scope 2: 0.50 tCO₂/adt

Energy

- Since 2011, energy intensity has decreased by 21.9%. Scope 1 emissions have decreased by 25.8%; Scope 2 emissions by 30.9%
- 2015
 - 27.26GJ/adt intensity
 - Consumption:
 - Purchased fossil fuels: 25,000,000 GJ/a
 - Own renewable fuels: 21,000,000 GJ/a
 - Power consumption: 7,500,000 GJ/a
 - Steam consumption: 32,000,000 GJ/a
 - In 2015, SSA achieved a 31.9% reduction in specific purchased fossil energy against the 2015 target of 26% reduction against a base year of 2000
 - Energy self-sufficiency of 42.3%
 - 42.8% bio-energy, of which 98% is own black liquor
- Ngodwana Energy (RF) (Pty) Ltd, in which Sappi is a shareholder, will involve the supply of biomass to the mill from local plantations which is then used as boiler fuel to produce

steam at the mill. This in turn will generate 25MW of renewable electrical energy which will be sold into the national grid from 2018.

- The R120m upgrade to Saiccor mill (Project Buyisa) increased energy self-sufficiency by 12%. Because more steam is being generated from the recovery boilers, less steam from coal is required, with a resultant decrease in coal consumption of more than 4,400 tonnes for 2015 (7% reduction per tonne of pulp produced).

Enterprise development

- R24.6 million in interest-free loans for enterprise development in 2015.
- In 2015, Project Grow supplied more than 360,000 tonnes of fibre into mills, injecting R247 million into the local economy.
 - Growers make land available for planting eucalyptus trees and in return receive sponsored seedlings, an interest-free loan, technical advice and a guaranteed future market.
 - The initiative currently incorporates 3,800 small growers and 41 community projects farming over 22,022ha of Eucalypt plantations (2014).
 - Sappi expanded Project Grow beyond the borders of KwaZulu-Natal to the Eastern Cape and is also working with communities to help them obtain water-use licences for the establishment of new plantations.

Fibre

- 71,000 tonnes of pulp bought in
- 4.85 million tonnes of wood fibre used, 83% of which is certified
- 71,500 tonnes bagasse used
- 248,000 tonnes recovered fibre
- 492,000 hectares owned and leased plantations – 100% FSC® certified
- One third of land managed for biodiversity conservation
- Achieved 2015 target of recovering 31.3% of fibre put into the market

Health and wellness

- Sappi's major focus in terms of occupational health has been to reduce and eliminate noise levels in the workplace.
 - Some 52% of employees are exposed to noise levels above 82 decibels for more than eight hours per day.
 - Hearing loss measurements are undertaken as part of occupational hygiene monitoring programme. Corrective actions have been instituted in the few cases where hearing has deteriorated as a result of exposure at work.

Employee wellbeing and healthy lifestyles

Various wellness offerings available including substance abuse (alcohol and drugs), weight-loss and awareness programmes related to cancer, testing cholesterol, blood glucose, body mass index, blood pressure, HIV/Aids and TB.

- 71% of employees participated voluntarily in the most recent HIV prevalence survey.
- 57.1% of employees voluntarily check their HIV status every year.
- 16.5% overall infection rate among employees.
- 63.8% of predicted HIV-positive employees are on managed care
- ART has been available to HIV-infected employees since the beginning of 2003.

People

- R48 million spent on training and development – R421,000 per employee.
- SSA exceeded its training target of 60 hours/employee, achieving 121 hours per employee per annum. Most of the training was focused on individual development and improving skills of the employees in their current positions.

¹Two mills were sold at the end of 2015, reducing the number of mills producing only paper from four to two.



Sappi Ngodwana mill near Nelspruit

Safety

- LTIFR (lost time injury frequency rate) for own employees declined to 0.46.
- Three forestry contractors lost their lives, and there were three amputations in 2015.

Suppliers

- R11.6 billion paid to community and contracts for serving the business.

Waste

- 12.4% reduction in landfilled solid waste since 2009.
- The 2015 target of 37% was not achieved as certain waste beneficiation projects have been placed on hold.

Water

- 85.7 million m³ water drawn (86% returned to the environment).
- 14.5% reduction in total specific fresh water usage since 2007. A significant part of this has been due to curbing production as a result of the drought and low river flow in KwaZulu-Natal.

Communities, education and literacy

- Corporate social responsibility spend for 2015: R28 million
- Recognising the impact of early childhood development (ECD) on educational and life outcomes, Sappi has initiated ECD programmes in the provinces of KwaZulu-Natal and Mpumalanga. In the former province, 25 women are being trained as ECD practitioners and in the latter province, Sappi has combined forces with Penreach, Entabamhlophe Combined School and the Luvolvethu ECD Centre to establish an ECD programme which is training five ECD practitioners in a four-year cycle. Since the inception of the programme, 90% of learners in the Entabamhlophe Grade R class have shown improvement in literacy.
- Following a series of plantation fires, Sappi launched the Abashintshi (the 'changers' in Zulu) training programme in KwaZulu-Natal with the aim to reduce fires and to uplift communities.

- The programme trains two young people from each of the nine communities selected in pilot programme as Abashintshi change agents. The change agents implemented four key projects during 2015:
 - o Youth life skills project which reached 1,800 youth.
 - o Asset-based community development programme made over 900 contacts and a further 60 projects were activated.
 - o Launched Ifa Lethu – a legacy project whereby the elderly will document their heritage and the lessons learned to be transferred to the youth in the life skills project. Over 880 people have participated so far.
 - o Established school holiday programmes, the first of which was held in July 2015 attended by 1,500 children.

Ngodwana Mill to develop a second generation renewable sugar extraction demonstration plant

Sappi has commissioned the construction of a second-generation sugar extraction demonstration plant at Ngodwana mill. The plant aligns to Sappi's strategy to extract more value from the production processes and as an extension of the move into the biomaterials and bio-energy fields. The plant, with start-up scheduled in 2017, will extract hemicellulose sugars and lignin from Sappi's existing dissolving pulp line. The sugars platform will include beneficiation to higher value organic acids, glycols and sugar alcohols which find application in many everyday products.





Twinsaver's new 2-ply converting line at its Bellville operation in Cape Town.

TWINSAYER GROUP

The Twinsaver Group is a national manufacturer, marketer and distributor of branded tissue products – supplying both consumer households and businesses across South Africa. The company was an acquisition by Ethos Private Equity Group of what was formerly known as Nampak Tissue. The head office is situated in Bryanston, with manufacturing and converting facilities in Vereeniging, Pretoria, Durban and Cape Town. Twinsaver Group also holds 50% equity in Neopak Recycling.

In August 2016, Twinsaver committed a R580 million investment in production lines that will boost its overall capacity, making it the largest tissue manufacturer in sub-Saharan Africa. The first investment was a two-ply converting line at the Bellville factory, which will double its two-ply production capacity and create additional employment across the company's value chain.

HIGHLIGHTS

- As an ISO 140001 accredited entity, Twinsaver is creating a safe working and sustainable environment through identifying risks and implementing programmes to minimise them.
- Reducing energy consumption.
- Recovered fibre constitutes 87% of total fibre used in the manufacture of its tissue products.
- 100 % of the virgin fibre used is sourced from FSC® certified plantations.
- Using a significant percentage of recycled raw materials.
- Twinsaver currently diverts 70% of its manufacturing waste to clay brick manufacturing processes where the waste is disposed in an environmentally responsible manner.
- Implementing controls to prevent pollution.



Kliprivier Plant, south of Johannesburg where Twinsaver's new PM5 will be installed.



PEOPLE DEVELOPMENT

The Twinsaver Group offers learnership and apprenticeship programmes, including the Pulp and Paper Learnership Programme which develops unemployed matriculants with no previous work experience. On successful completion of the programme, participants obtain a National Diploma in Pulp and Paper Technology, NQF level 6 from the Durban University of Technology.

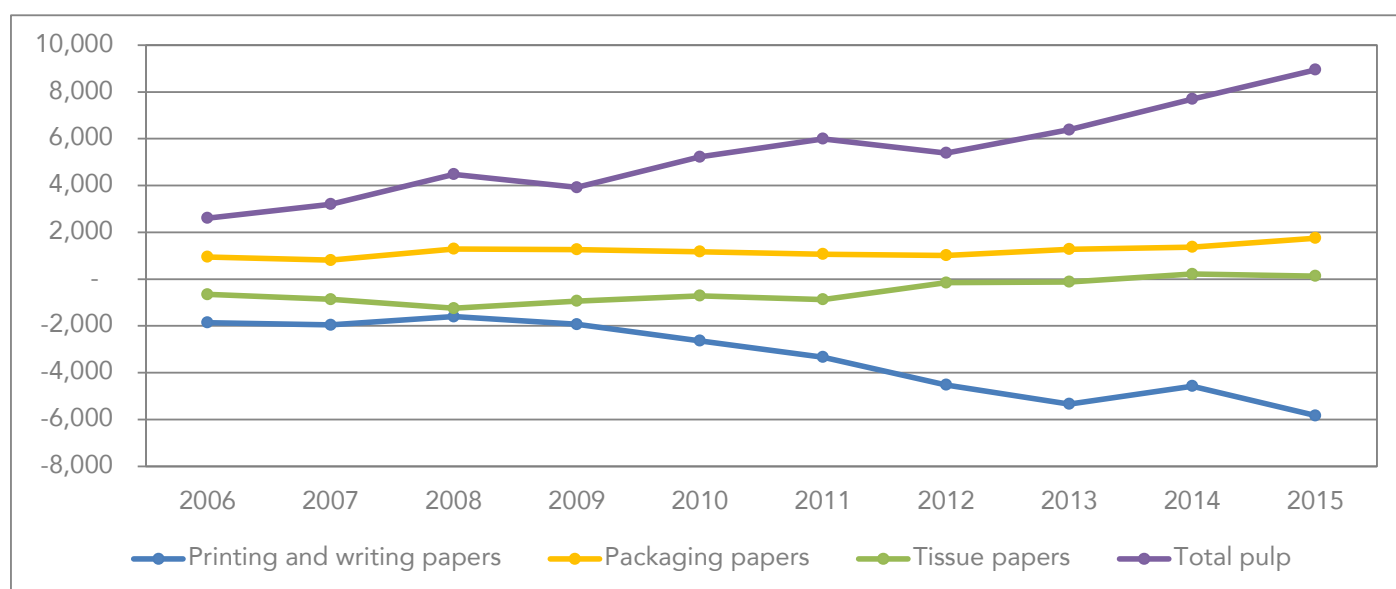
Its Engineering Apprenticeship Programme is a structured four-year training programme for applicants with a mechanical and electrical aptitude, governed by an apprenticeship contract approved by the relevant SETA. The main focus is on practical skills and theory gained at an institutional training centre at a technical college to prepare candidates for trade testing for an artisan qualification. Twinsaver currently offers the following apprenticeships: electrical apprentice, fitter apprentice, fitter and turner apprentice; and instrument mechanic apprentice.

PRODUCTION, CONSUMPTION AND RECOVERY STATISTICS

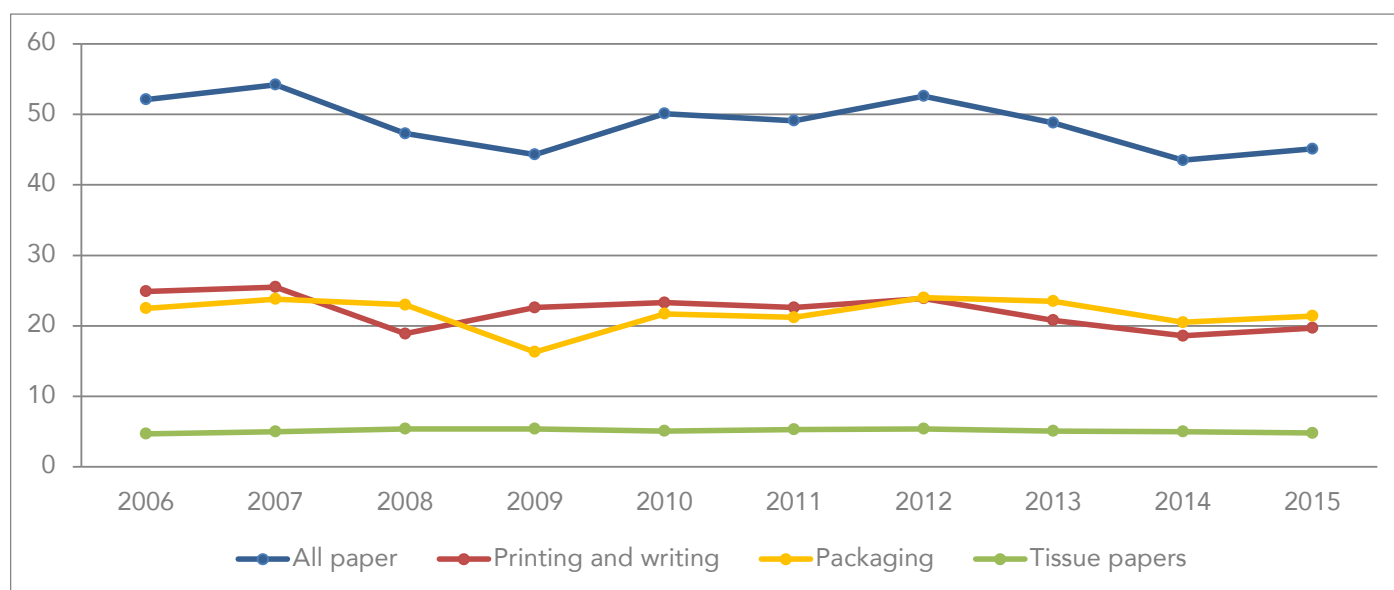
YEAR-ON-YEAR DOMESTIC PRODUCTION PER '000 TONNES

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Printing and writing papers	1,050	1,132	1,066	922	939	790	796	740	718	681
Packaging papers	1,369	1,400	1,440	1,097	1,341	1,251	1,411	1,350	1,303	1,395
Tissue papers	191	195	220	224	217	219	220	223	240	214
Total pulp	2,222	2,311	2,572	2,130	2,307	2,321	2,259	1,985	1,967	1,982
Total paper imports (excluding pulp)	647	685	645	706	708	739	806	825	761	792

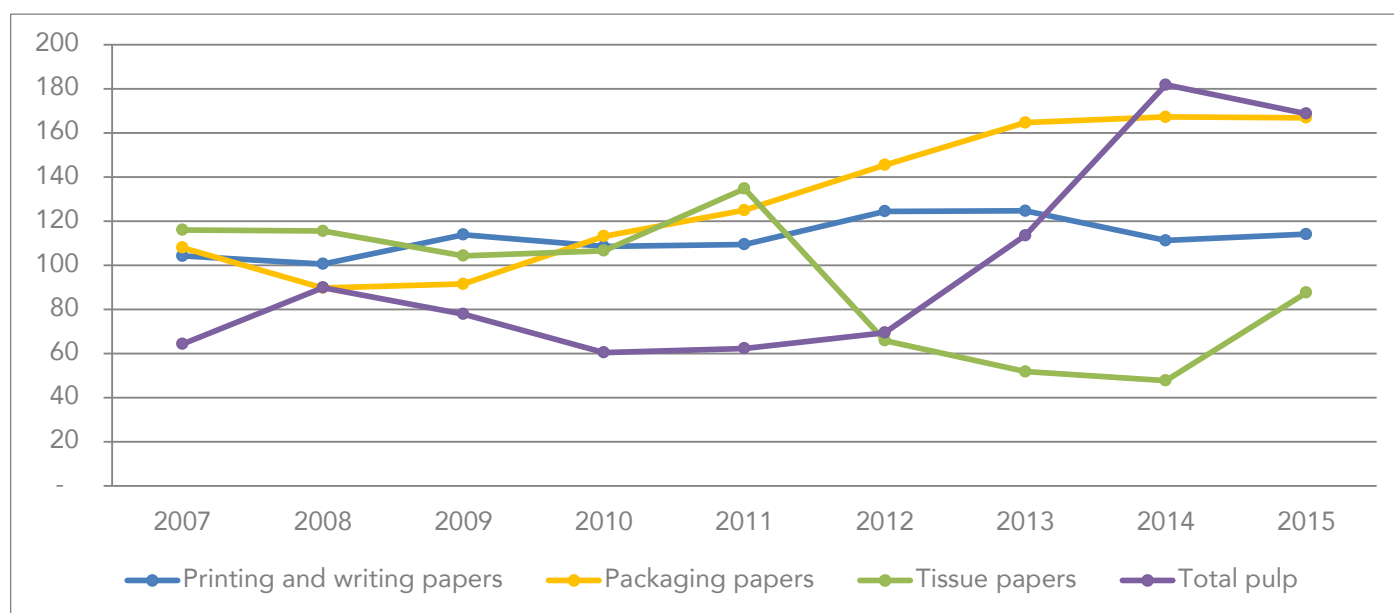
BALANCE OF TRADE | YEAR-ON-YEAR SUMMARY (R' MILLION)



CONSUMPTION PER CAPITA – KILOGRAMS PER PERSON



IMPORTS OF PULP AND PAPER PER '000 TONNES

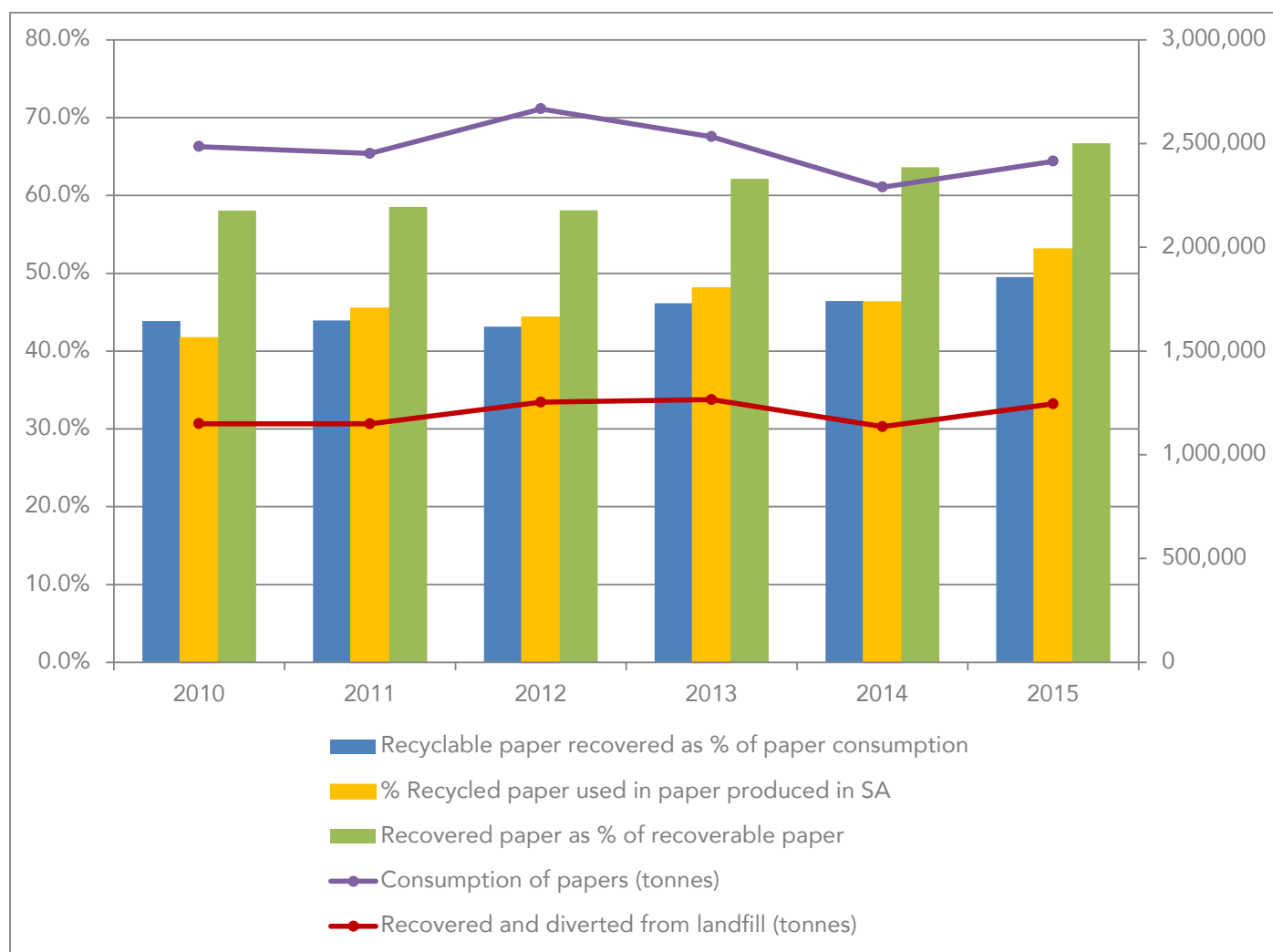


RECYCLING RATES

Recyclable paper recovered as % of paper consumption	49.5%
% Recycled paper used in paper produced in SA	53.1%
Recovered paper as % of recoverable paper	66.7%

RECOVERABLE PAPER	
Paper consumption	2 414 957
Less paper exported with agricultural products	215 442
Less paper unsuitable for recovery	406 425
Recoverable paper	1 793 090

SOUTH AFRICAN CONSUMPTION AND RECYCLING RATES



ACKNOWLEDGMENTS

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