

## Facts about paper

### New Zealand Statistics

520,090 tonnes of paperboard packaging is produced each year,

293,315 tonnes is consumed,

209,925 tonnes is recovered =

72% of paperboard is recovered for recycling – this is equivalent of:

- 671,000m<sup>2</sup> of landfill space saved,
- 84,000tonnes of CO<sub>2</sub> equivalent saved,
- 4,970 ML (1,970 Olympic swimming pools) of water saved – each year

### What are the advantages of Paper?

Paper is with us all day. Try thinking of a day without it; no toilet paper in the morning, no newspaper to read at breakfast, no juice carton, an unfiltered coffee, no kitchen tissues to wipe the table, no cigarettes after dinner, no bank notes to pay with, no letters or faxes in the office, no paper to print out emails, no paper to write on, no envelopes nor stamps, no photos of loved ones, no paper napkins for lunch, no magazines to read during breaks, no paper bags for carrying the shopping, no boxes to protect important goods, no book to read in bed.

Paper is all around us, working for us, delivering to us; it contributes to comfort, hygiene, security and information. Using paper doesn't just make our lives easier; it also makes an important environmental contribution to sustainability. Paper is a natural product because it is manufactured from a natural and renewable raw material - wood - and it is 100% recyclable.

Paper provides essential, everyday products that contribute to our quality of life; it also plays an important role in promoting education, democracy, knowledge, information, and culture. More about paper on [www.paperonline.org](http://www.paperonline.org)

### What is paper actually made from?

The paper industry uses two main raw materials for manufacturing paper – wood and recovered paper. Kaolin, starch and other products are used as supplementary materials in the paper production process.

Pulpwood used for papermaking once came from whole mature trees. Today, the papermaker usually uses parts of the tree that are left after wood has been used for other commercial purposes. Nearly all the pulpwood used in northern Europe

could be classed as secondary cuttings, for example, thinnings extracted from the forest so that the remaining trees can grow to healthy maturity.

Recovered paper and board are the other major source of the paper industry's raw material. 47.6% of the raw material used for paper production is recovered paper.

The industry was once based almost entirely on softwoods such as spruce, pine, larch, fir and cedar. Now birch, aspen and other hardwoods occurring in temperate climates are used as an ideal raw material for processing into fluting for corrugated cases as well as printing and writing papers, whilst eucalyptus, originally occurring only in Australia and New Zealand, has been successfully cultivated in other warm climates (e.g. South America, Spain and Portugal) as raw material for high-quality pulp suitable for a wide range of papers. Nevertheless, softwoods provide longer fibres (average 3 mm compared with 1 mm for hardwoods) and continue to be used for papers required to have the highest strength characteristics.

### **What makes the paper industry sustainable?**

Paper is inherently sustainable; its raw materials are renewable and its products are recyclable. The paper industry's strategy is to use natural resources in an efficient way, reducing negative environmental and social impacts and meeting society's need for sustainable consumption.

Choosing paper has an important and positive environmental effect. Utilising forest resources in a responsible way helps to ensure their vitality and continued growth. Paper products store carbon, helping to reduce greenhouse gases. These products can then be recycled, extending their life cycle and minimizing the use of landfill. When they can no longer be used or recycled it is possible to convert them into a renewable energy source.

This is all part of the virtuous eco-cycle that helps make the paper industry one of the most sustainable; working with and for the environment, delivering essential everyday products to society and making an important contribution to economic wealth, including providing vital jobs in rural areas.

### **How do forests and wood-based products help fight climate change?**

The world's forests – and the wood and paper products that come from them – are unique in their ability to remove and store CO<sub>2</sub>. Although young, vigorously growing forests are more efficient at fixing CO<sub>2</sub> than old forests. A portion of the CO<sub>2</sub> that trees remove from the atmosphere remains fixed in wood and paper products throughout their useful life.

The view that bound carbon will disappear once the forest has been harvested is, therefore, erroneous -- many forest products remain in circulation for a long time. Wooden houses and wooden bridges store CO<sub>2</sub> for decades and it may be stored in books for more than 10 years. On average one tonne of paper, for example, contains some 1.4 tonnes of CO<sub>2</sub>.

In newsprint and corrugated fibreboard, the CO<sub>2</sub> circulates several times via the recycling of paper and is therefore stored longer than would otherwise be the case. In this way, the recycling of CO<sub>2</sub> into the atmosphere is delayed. Recycling paper also diverts it from landfill sites.

### **Are Europe's forests increasing or decreasing?**

Contrary to public opinion, forest area in Europe is increasing, not decreasing every year. In fact it's increasing annually by an area of 5810 km<sup>2</sup> - that's equivalent to an area the size of 4000 football pitches a day! One of the unique things about paper is that its main raw material, wood, is renewable. This combined with the sustainable way that European forests are managed, means that 33% more new trees grow in Europe each year than are felled. The European paper industry actively supports and promotes sustainable forest management.

### **What paper products can be recycled?**

Almost any household and office waste paper can be recycled, including used newspapers, cardboard, packaging, stationery, printing and copy paper, notebooks, "direct mail", magazines, catalogues, greeting cards and wrapping paper. It is important that these papers are kept separate from other waste -- 'contaminated' papers, those that have been in contact with food for example, are not acceptable for recycling.

Paper products can have several 'lives' as a result of recycling as they can be recycled several times - your stationery may go on to be a newspaper and then packaging for example. Recycling has its limits though. Every time a fibre in paper is recycled, it loses some of its strength. After being re-used about five to six times, it is no longer strong enough for papermaking.

### **Why can't we recycle 100% of paper products?**

More than half of the paper used in Europe (and most countries) today is already recycled, 55.4%. And the paper industry is part of a drive to increase that rate to 66% by 2010.

When looking at targets for increasing recycling rates we need to consider the percentage of paper that can actually be recycled. If we take into account paper that cannot be recycled such as cigarette papers, archives, or papers used in

construction materials, then the maximum theoretical recycling rate for paper would be 81% instead of 100%. In practice, further amounts of paper would not be available for collection because they are used for other purposes - such as lighting fires - and it would not be economically viable or environmentally sustainable to collect every piece of paper.

### **What are the advantages of paper and board packaging?**

Paper and board forms the basis for 40% of all packaging in Europe today. Its use has become increasingly popular for a number of reasons

- **It is versatile** - coming in a variety of forms from functional brown cardboard boxes to beautiful wrapping papers.
- It is **robust and adaptable** - corrugated board can be used to protect a range of goods from delicate porcelain to large electrical items
- It is **practical** - cartons can be delivered flat to the packager, reducing both space and transport costs
- **It makes sense for the environment and the economy:**
  - It is **easily recycled** – paper and board packaging has a recycling rate of 77%, higher than any other packaging material in Europe and well beyond the 60% target set for end 2008 by the European Commission.
  - It is **made from renewable materials**, recovered paper and woodpulp
  - Corrugated board boxes have **lower environmental impact and costs** than plastic crates. Corrugated boxes perform better in both areas than reusable plastic crates – according to a recent study by the packaging Transport and Logistics Research institute (ITENE) at the University of Valencia, Spain.

Thanks to cepi for this information      [www.cepi.org](http://www.cepi.org)

### **What is paper made from?**

The vast majority of paper produced around the world is made from a mixture of recycled paper and wood pulp.

### **Can paper be made from non-wood plants?**

Excellent quality paper can be made from many sorts of fibrous plants, including cotton, flax, hemp, kenaf and bagasse, if it is processed appropriately. However, each of these resources has its own significant environmental, agricultural, commercial and processing issues — just as wood does.

### **There seems to be more printed matter than ever before.**

#### **Are forests suffering because of that?**

Wood is a renewable raw material that replenishes itself when forests are managed in a sustainable way. The industrial use of wood assigns a value to the

trees in the forest, and provides us with an incentive to look after our natural resources. The industrial use of forests is strongest in Europe and North America. In these areas, the forest area has not decreased — on the contrary, the annual growth in these areas exceeds the wood removed by felling, thanks to planting and natural regeneration. For example, in Europe only about 65% of the annual growth of forests is harvested.

In Finland, where forests cover 86% of the land area, the wood volume is greater than it has ever been. The growing season in Finland is about 80 days in a year and, during one day of the growing season, the increase of timber in Finnish forests is equivalent to a woodpile that is one metre high and wide – and one thousand kilometres long.

### **What types of wood are good for papermaking?**

There are two broad classes of wood: hardwoods (such as eucalypts) which have short fine fibres suitable for printing grades of paper, and softwoods (such as pine) which have long coarse fibres which are suitable wherever strength is required (e.g. for bag and sack papers, and in small proportions for reinforcing printing papers).

### **What part of the wood is used to make paper pulp?**

Wood consists of approximately equal amounts of cellulose fibre and a binder called lignin, which glues the fibres together. It is the cellulose fibres which give paper its structural strength and physical properties. Whether the lignin is used in paper is determined by the pulping process.

### **How is wood turned into papermaking pulp?**

There are two main processes, depending on the end use of the pulp. To make *mechanical pulp*, the wood is first chipped (a wood chip is typically about 50mm x 30mm x 5mm in size) and then the chips are fed to a refiner which disintegrates the chips into individual fibres, by forcing them between two large ribbed disks which counter-rotate at high speed, very close together. Often the chips are first softened by heating, or soaking in caustic soda or other chemicals. Mechanical pulp is typically used in newsprint, magazine paper and paper towels. In mechanical pulping, the lignin remains with the fibres.

To make *chemical pulp*, the woodchips are cooked with chemicals (e.g. caustic soda) to dissolve the lignin, leaving the cellulose fibres intact. The dissolved lignin is burnt to (a) provide energy, and (b) recover the chemicals. Chemical pulp makes stronger paper than mechanical pulp (which is why the most common process is called “kraft” — the German word for “strong”). Chemical pulp is thus important for packaging grades like bag and sack kraft and linerboard (for corrugated cardboard boxes). Chemical pulp fibres are much more flexible and conformable than mechanical pulp fibres, so they are ideal for making fine papers (such as copy paper).

### **How much wood is required to make a tonne of paper?**

Green wood consist of roughly 50% moisture, 25% cellulose and 25% lignin. So, 4 tonnes of green wood are required in order to produce 1 tonne of chemical pulp. For a typical fine paper containing, say 3% starch and 15% calcium carbonate filler, this would make 1.4 tonnes of paper.

### **Is recycled fibre the same as new fibre?**

At a molecular level, there are subtle differences between fibres which have never been through the papermaking process (new or virgin fibres — AP prefers the term “new”), and those which have recycled fibre. These differences can manifest themselves as reduced bonding power leading to weaker paper, and improved dimensional stability in the face of changing moisture levels.

Depending on the way the fibres are treated, they may also contain specks of ink, and traces of “stickies” (residue from contaminants such as hot-melt glue), but the papermaker has means for dealing with these if necessary.

### **Is paper containing recycled fibre inferior in its properties?**

If the recycled fibre is from an appropriate source, and it is properly treated, it is possible to make products such as copy paper which contain a significant proportion of recycled fibre, yet are virtually indistinguishable from paper made only from new fibres.

In the case of envelope papers and some forms of cardboard, the properties of recycled fibres are actually an advantage. It makes sense to steer recycled fibres towards such applications.

### **How does recycling paper help the environment?**

The main consequence of recycling fibre is that it reduces the amount of paper dumped in landfill. Over 270,000 tonnes of paper is kept out of landfill every year by recycling in New Zealand (67,000m<sup>2</sup> of landfill space saved.)

Recycling paper also reduces the demand for new fibre, which reduces the land required for pulpwood plantations. Whether or not this “saves trees” depends on the alternate use to which the land is put.

### **What is recycled white paper used for?**

It may seem that the only appropriate thing to do with recycled copy paper, say, is to turn it back into copy paper. But there are many other good uses for recycled copy paper, and any other form of recycled white paper. These are some of the applications in Australia (not all of these are done by Australian Paper):

- Brown cardboard
- White or white-topped cardboard
- Newsprint

- Tissue
- Envelope papers
- Bag and sack papers
- Offset and specialty papers
- Photocopy papers

All of these uses achieve the same environmental benefit: reduction of landfill.

### **Is 100% recycled paper sustainable?**

No it is not. Manufacture and use of paper damages the fibres, and there is a practical limit to the number of times a fibre can be recycled, before it has disintegrated. It is not easy to establish what that limit is, but the real limitation is the collection efficiency. Currently New Zealand recycles about half the paper it uses, which means that only one fibre in 32 gets recycled more than 5 times, for example.

Even if all paper available for collection were collected, there would still be paper which will be kept permanently, and there are inevitable losses in processing.

New fibre is therefore continually needed to replenish the fibre lost from the system.

### **Why isn't all paper made from recycled fibre?**

Recycled paper is an important raw material for the paper industry. Paper is one of the few materials that is recycled efficiently, and the recycled material has real market value. The majority of recovered paper is used for packaging grades, newsprint and tissue.

However, even though paper is collected efficiently, there is not enough recycled fibre available for all paper needs. Also, higher-quality paper grades require fresh fibre, due to their demanding technical requirements. You can only circulate fibres about 3-5 times, as during each recycling, the fibres deteriorate. Eventually, they become so weak that you can't use them any more. Without fresh fibre, we would run out of paper in a few months.

### **Why are ream wrappers plastic coated?**

When copy paper goes through a copier or laser printer, it is heated on one side, to fuse the powdered toner into the surface of the paper. Heating one side of the paper dries it and causes it to shrink, and this in turn introduces a tendency to curl. Too much curl may cause paper jams, so to minimise this effect the paper is made with low moisture content. In order to maintain the low moisture content, the paper must be wrapped in a moisture-proof wrapper.

Typically, the moisture-proof wrapper consists of paper with a thin layer of plastic on the inside or on the outside.

### **How should I store part-used reams of paper?**

It is important not to let the paper pick up too much moisture, or curl problems will occur when it is printed. In a fairly dry air-conditioned office environment, this probably won't be a problem and the paper can be left unwrapped. But if the environment is exposed to the outside and subject to fluctuations in humidity, then keep part-used reams wrapped, and secured with adhesive tape.

If paper is stored in a cold environment (e.g. a warehouse in winter), bring it into the printing environment and let it warm up for a day before using it. This will prevent humidity condensing out of the air onto the paper.

### **Which side of copy paper should I print first?**

Lay the ream seam up on the table. The side of paper facing upwards is the best side to print first. The reason is that the paper is made with built-in stresses designed to offset the influence of heating of the paper in the copier/printer, thus minimising the possibility of curl and paper jams. If you are having trouble with curl or paper jams, try inverting the paper in the feed tray.

### **What is the significance of lignin?**

Decomposition of lignin is thought to be one of the mechanisms which leads to the slow degradation of paper in long term storage. This is why newsprint, which contains all the lignin from the wood, has a very short lifetime.

### **How are the standard paper sizes A4, A5 etc determined?**

A4 is the familiar standard paper size for office papers in Europe, Australia and New Zealand and many other countries.

A4 is part of a sequence which starts with A0. An A0 sheet is 1 square metre in area, and its sides are in the ratio of 1.414 to 1. So its dimensions are 1189 mm x 841 mm.

Cutting this sheet in half, parallel to the short side, produces two A1 sheets, each half a square metre in area, with dimensions 841mm x 595. This sheet has the same shape as the A0 sheet, i.e. its sides are in the ratio 1.414 to 1.

Continuing to halve the **sheet** in this way produces A2 and the more familiar A3, A4 and A5 sizes. A4 is 297 mm x 210 mm. These dimensions are each one quarter of the A0 dimensions, and the A4 sheet is 1/16 square metres in area.

### **Facts about paper**

This FAQ has been compiled using information kindly supplied by Paper Round Australia, [PaperlinX](#) and [M-Real](#).

## **Some Statistics from the EU**

The Paper industry is recycling beyond any legal requirements. In total RP utilization amounted to 47.3m tonnes (cf. 47.8m tonnes of woodpulp) in 2005 (+2.6% from 2004).

The utilisation of recovered paper (RP) has increased remarkably year by year, growing at a rate faster than any other raw material in paper, but varies from product family to another: between 91.7% RP in case materials and 9.5% RP in graphic papers other than newsprint.

Sustainable paper production is based on complementarity: virgin fibres are sourced from sustainably managed forests; paper products made of virgin fibres are essential in renewing the recycling loop; and recycling helps keeping harvesting in forest sustainable.

The scarcity of best quality recovered paper is not expected to ease. Industry is therefore utilising recovered paper efficiently in those applications where it is most competitive and gives best environmental benefits. Industry has renewed the commitment to reach higher levels of recycling (66% by 2010b) and to improve recyclability.

## **Some Statistics from the United States**

- By 2012, the paper industry hopes to recover 55 percent of all the paper Americans consume
- In 2005, 78% of paper and paperboard mills used some recovered paper and 149 mills used only recovered paper
- Every ton of paper that is recovered saves 3.3 cubic yards of landfill space
- In 2005, the amount of paper recovered for recycling averaged 346 pounds for each man, woman, and child in the United States
- Every ton of paper recycled saves more than 3.3 cubic yards of landfill space
- More than 36% of the fibre used to make new paper products in the United States comes from recycled sources
- In 2005, 78% of paper and paperboard mills used some recovered paper and 149 mills used only recovered paper