



## Printing, Paper and the Environment.

Printing is estimated to be the UK's 4th most polluting industry, mostly because of high energy and chemical use, and associated waste.

People want to know what they can do to reduce environmental impact, not just by using less energy in planes/cars/domestic heating, but also in their purchasing choices. This is especially important when it comes to choosing a printer and it isn't just about recycled paper. In fact to ensure sustainability, all aspects of a company's activities need to be addressed, as well as the design and printing process itself.

## Myths and Misinformation

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Unfortunately many people are dissuaded from making positive environmental choices by myths and misinformation which range from out of date to completely untrue. However, slowly but surely, progress is being made and the message is getting through.

For example:

- **“Recycled paper is more damaging for the environment than non-chlorine bleached paper produced from sustainable forests”**

False:

This vague generalisation with no basis in fact has been perpetuated widely. It is an all-encompassing myth that does not stand up to questioning. With more widespread experience of the use of recycled paper, better general environmental awareness and the scientific rigour introduced by the requirements of forestry-certification, surely its days are numbered.

*Fact: One tonne of recycled paper saves approximately six mature trees and 3.3 cubic yards of rapidly diminishing landfill space (Source: Friends of the Earth).*

- **“Inks contain heavy metals which pollute the environment when removed from the paper during the recycling process”**
- **“The chemicals used to extract ink are bad for the environment”**

Not true:

The pigments in many petroleum-based printing inks do contain heavy metals. However, paper mills are reporting lower levels of heavy metals in the waste they re-pulp due to increased usage of vegetable-based inks.

**Ink is removed using sodium hydroxide, which is the main ingredient in soap. This is so harmless that it is even used commercially for washing fruit and vegetables!**

When recycled fibre is de-inked, the residual 'sludge' is considered harmless enough to be used as fertiliser. Alternatively, it can be incorporated into building blocks or incinerated, when it can be used to generate energy.

Water used during the de-inking process – and papermaking processes in general – is cleaned before being returned to the source.

## Print Issues

*Fact: The print industry is one of the most polluting industries in the UK.*

The environmental impact of a printing company can be considerable and wide ranging.

### Energy

The print industry uses significant amounts of energy. From heating and lighting to powering equipment and final delivery, energy is used at all stages of the print process. It is possible to reduce energy requirements at every stage of the process. Many companies have been innovative in these areas and have, of course, reduced their costs as well as reducing their environmental impact.

***Big Sky use 100% locally sourced renewable energy!***

### Water

Large quantities of water are used in most printing processes. Water usage can be greatly reduced by waterless printing but also by printing with digital processes. Water usage can be reduced by recycling the water used on presses and measures such as sprinkler and pressure taps. A small number of printing companies are investigating the possibilities of rainwater harvesting.

There is strict legislation regarding contaminated water. Printing companies are required by law to clean all water used before disposal; in practice, some printers are more rigorous than others.

### Waste

Given that free audits and advice are available, via Envirowise, this is a straightforward issue to tackle. Relatively high levels of waste are generated by the print process. From printing plates and ink tins to pallets and packaging there is plenty of potential for reducing use, reusing and recycling what's left. There are, of course, financial, as well as environmental, incentives for reducing waste levels.

***Big Sky recycle 100% of their paper waste, non goes to landfill.***

### Emissions

10 per cent of the UK's VOC (Volatile Organic Compounds) are believed to emanate from the printing industry. As ink dries, the isopropyl alcohol (IPA), used as a damping solution, evaporates at room temperature, releasing VOCs. VOCs are colourless, odourless gases that are harmful to the environment, contributing to global warming and the production of ozone, as well as being hazardous to pressroom workers. It is possible to reduce and even remove the need for IPA through fastidious machine operation and maintenance.

***Big Sky have eliminated use of all pre-press chemicals!***

### Ink

For sheet-fed litho inks there are three main areas of concern:

- **VOCs** – emitted as the ink dries
- **Heavy metals** – these are contained in certain pigments (particularly metallic colours) and can result in environmental and worker health hazards
- **non-renewable resources** – the main oils in non-vegetable based inks are petroleum-based

It is not possible to generalise about the hazards of ink: the make-up of an ink will depend on the print process, the substrate, even its colour. However, these issues are less of a problem where there is partial replacement of the petroleum oil content with vegetable oil. A typical sheet-fed litho vegetable ink consists of 60 per cent vegetable oil content.

Prior to the 1960s, less harmful vegetable based inks were commonly used for all printing applications. Then petroleum-based (or mineral-based) inks came along, and because, at that time, they were cheaper and performed better, they gradually became the norm – despite the health and environmental issues.

In recent years vegetable based inks have improved greatly – they certainly match the performance of mineral-based inks, and some would say they are superior.

## Progress

### Vegetable based inks

Vegetable based inks use vegetable oil instead of petroleum to varying degrees – hence the word 'based' – a vegetable based ink is not necessarily 100 per cent vegetable.

Vegetable based inks have much **lower rates of VOC emissions** than petroleum based inks. Also, in contrast to petroleum based inks, **vegetable oils are derived from renewable resources** and the inks made from them are more easily removed from waste paper during de-inking. Another plus is that the pigments in the ink do not usually contain heavy metals.

***Big Sky use vegetable based inks as standard!***

### Waterless printing

Waterless printing is basically sheet-fed litho printing using different printing plates and a method of transferring the image to the paper without using water. It eliminates the need for IPA (isopropyl alcohol) and better quality print is claimed through reduced dot gain and improved colour consistency.

### Low alcohol printing

A number of printers are now using 'low-alcohol' printing techniques which reduce both the need for IPA, in the dampening system, and VOC emissions.

***Big Sky use zero alcohol printing!***

### CO2 emissions and offsetting

'Carbon neutral' schemes that simply offset carbon emissions by planting trees, are ineffectual because they deal with symptoms rather than addressing the causes. For this reason, the environmental schemes undertaken by printing companies should focus on both reducing emissions and offsetting carbon emissions. See [www.foe.co.uk/resource/briefings/carbon\\_offsetting.pdf](http://www.foe.co.uk/resource/briefings/carbon_offsetting.pdf) for a joint FOE, Greenpeace and WWF statement on this issue.

***Big Sky voluntarily support various social and environmental projects and we're continually looking at ways of reducing our CO2 emissions!***

## Why use recycled paper?

There are three main reasons to use recycled fibre:

- **Lower resource use:** Paper manufacture is very resource-intensive. It simply makes no sense to use paper only once, when it can be so easily re-used.
- **Less landfill:** Recycling reduces the amount of waste paper going to landfill. It is predicted that we will run out of landfill sites in the UK during the next decade. Landfills will be replaced by incinerators, whose toxic fall-out has been proven to be harmful to human health. Also, as it biodegrades in landfill (anaerobic conditions), paper produces methane, which is 23 times more powerful than CO2.
- **No harm to forests:** Only when using 100 percent recycled paper can you be absolutely sure that your product has not had a detrimental effect on any forest.

### Processing recovered paper

Superficially, it's quite straightforward: waste paper and board is collected, sorted and then sold for re-use. Next, the fibre is pulped, screened (to remove foreign particles, contaminants, and fibres not fit for re-use) and then de-inked. It may or may not then be re-bleached.

The extent to which each of these processes is undertaken depends on the quality of the final product. Fibre for reuse in higher quality materials is chosen accordingly: higher quality waste will be used in higher quality new materials; lower grade waste will go into newsprint or packaging. Around 70% of the original volume of recovered paper will be used in a new material.

## **In summary:**

Waste paper and board is collected and sorted by specialists at central operations.

The sorted waste is sold to paper mills for processing and re-use.

The reprocessing of recycled fibre often has the aim of making it look like virgin fibre - i.e, very white; but the paper manufacturers are simply responding to market demand. Given the environmentally benign nature of the reprocessing, if this is what it takes to persuade people to use recycled fibre then it's a relatively small environmental price to pay. The aims of lower resource use, less landfill and no harm to forests are still achieved.

## **Definitions of "recycled"**

There are different definitions of the term "recycled" within the industry, so it is important to check the fibre detail of a material. It is quite normal, for example, for a paper to be called 'recycled' when only a small percentage of the fibre is actually recycled.

**Post-consumer waste** is when the product has reached the end consumer, and is then recycled.

**Pre-consumer waste** (sometimes known as post-industrial waste) describes printers' waste, such as off-cuts and unused copies which may have been over-ordered.

- **"Recycled paper is more expensive than virgin paper"**

False:

This is another over perpetuated myth. The first recycled materials were more expensive, mainly because they were produced in relatively small quantities and systems needed for producing higher volumes, such as waste collection and sorting, were not in place.

Customer demand has led to an explosion of interest in papers containing recycled fibre. Paper companies have responded to this market demand and there is an unprecedented range available. Many recycled papers are now produced in high volumes and compare favourably in cost to virgin fibre options. Stubbornly the myth persists, but it is usually perpetuated by printing companies that have little experience of recycled papers and do not have appropriate suppliers. They are, therefore, in no position to give customers informed advice.

- **"The use of recycled fibre is more energy-intensive than using virgin fibre"**

Not true:

It is simply not possible to generalise but of all the known studies that tackle this issue not one has reached this conclusion. Within the broad range of papers containing recycled fibre reprocessing levels, and, therefore, energy usage, varies immensely. Within the virgin-fibre range, the extremes of energy usage will be much greater, due to the different pulping methods.

In addition, individual paper mills derive energy from different sources: some are even energy self-sufficient. Inevitably, some paper mills are more energy efficient than others.

The actual papermaking process is the same whether using virgin or recycled fibre. According to a study conducted by Kymmene (one of the world's largest paper manufacturers), the mechanical processing of recovered paper uses 20-25% less energy than that of virgin paper.

- **"Recycled papers are usually poor quality"**

Not true:

Quality is subjective but in terms of print quality there is little difference between papers that contain recycled fibre and those using only virgin fibre. The quality of recycled paper has improved steadily over the past twenty years, and more rapidly over the last few, due to advances in papermaking technology, improved sorting and increased recycling rates.

## **Misinformation about recyclability**

There are few hard and fast rules, as different reprocessing mills have different capabilities. Laminated products, for example, are usually removed from the waste stream during sorting. If they are not, some or all of these products will be removed during repulping. Not only will more energy be required to reprocess such materials, but the yield will be reduced. The same scenario applies to heavily inked products, the film from window envelopes, UV varnished products and perfect bound books.

## Virgin Fibre

Shockingly, ancient forests are legally, and illegally, logged for timber products and some of these enter the UK, including paper.

There are only two types of virgin fibre: that produced from certified or uncertified forestry. As of December 2006 approximately two thirds of the world's certified forests come under the PEFC umbrella and one third FSC.

PPE (paper, print, environment) promotes the use of FSC certified fibre because its management practices are more stringent in environmental and social terms.

### **Ancient or old growth forests**

The flora and fauna of ancient or old growth forestry will have been shaped by natural events over centuries. On a worldwide scale such forests are relatively rare, and decreasing, for a number of reasons. Once disturbed or destroyed it is extremely unlikely that the forest environment will be left to recover its former state.

### **'Sustainable Forestry'**

This term is, basically, a meaningless, obsolete marketing term. Formerly it was blithely applied to all plantations regardless of their actual status. In December 2006 Robert Horne, one of the UK's largest paper merchants, announced that they will no longer use the phrase 'sustainable forestry'. Expect other paper companies to follow this lead. It is no longer acceptable for paper to be marketed using this term as detailed information is readily available about fibre sources.

### **Forestry certification systems**

In 1992 the United Nations Conference on Environment and Development made sustainable forest management a priority. In order to be truly sustainable a forest would have to be managed with three criteria in mind:

- \* Environmental
- \* Social
- \* Economic

Of the forestry harvested in the UK only a small percentage, usually trimmings, goes into paper products; the vast majority of virgin fibre is imported. Some of this imported fibre will be certified by the Forestry Stewardship Council (FSC), some by the Programme for the Endorsement of Forestry Certification schemes (PEFC) and much will be uncertified.

PPE (paper, print, environment) favours FSC forestry management certification as it is widely accepted to be more stringent in terms of both social and environmental factors.

FSC [www.fsc-uk.org](http://www.fsc-uk.org)

The Forestry Stewardship Council is an international, non-governmental organisation dedicated to promoting responsible management of the world's forests. Forests are inspected and certified against the 10 Principles of Forest Stewardship which take into account environmental, social and economic factors. The FSC is endorsed by the WWF, Friends of the Earth, Greenpeace and The Woodland Trust.

In addition to forest management and certification, the FSC Chain of Custody tracks the timber from the forest to the paper mill and sometimes to the printer. If a printer is FSC certified, then the end product can also be FSC certified ensuring that there has been no contamination between FSC and non-FSC material. However, the Chain of Custody is broken if the manufacturing mill or printer is not FSC certified.

In 2005 the FSC introduced the Mixed Sources label. This label allows for the inclusion of controlled wood and (where stated) reclaimed material as laid down in the standards. Controlled sources exclude:

- \* illegally harvested timber
- \* forests where high conservation values are threatened

\* genetically modified organisms

\* wood from forests harvested for the purpose of converting the land to plantations or other non-forest use.

An FSC accredited paper mill must be able to prove the origins of all the fibre it uses to the FSC.

## Tips for Designers

Designers are well aware of the power of print. Design can also greatly influence the environmental impact of a printed product. Reducing the environmental impact will often reduce material and /or print costs too. Consult your printing company before commencing the design.

### Waste

Check size availability for your chosen material by consulting your printer or paper supplier before designing your product. Many materials are available in a limited range of sizes which will limit the options for waste- and cost-effective formats.

The most waste- and cost-effective formats are A (eg. A4, A3) sizes, as all materials and printing presses are, essentially, based around these. Some materials are available in B sizes which can accommodate, cost-effectively, sizes slightly larger than A range.

Consider factors such as updating; many products are discarded and reprinted due to obsolete information. Choose a design, and binding method, that allows for the updating of information and reduces waste and reprint costs.

### Recyclability

Laminated and UV-varnished and products cannot always be recycled. It is preferable to use water-based coatings – ask your printer about these.

High levels of ink coverage - that is, areas of solid colour, especially dark colours - may render a product non-recyclable as it will be difficult, and energy intensive, to remove the ink.

Designing without bleeds may mean that more pages can be positioned on the printer's sheet, thereby reducing the print run and the cost (substantially for some projects). It will also mean less trimming, thus saving paper and ink, and that the trimmed, unprinted waste can be processed as white waste.

Window envelopes cannot currently be recycled in the UK. Unless the windows have been cut/torn out, the envelopes will be removed from the waste paper when it is sorted. Try to avoid using window envelopes, wherever possible, by personalising the envelope and not the contents.

Avoid perfect binding where possible as it is not easy to recycle such products; consider other options such as saddle stitching and wire binding.

### Other issues to consider

Try to avoid metallic or fluorescent colours as they are only available in petroleum based inks.

Metallic inks also contain high levels of heavy metals which are hazardous to the environment and to pressroom workers.

### Environmental statement on materials

Publicise the steps you have taken, on your materials. Not only does this show that you take these issues seriously and what can be achieved, but it helps to promote awareness and to educate.

## Advise your clients to use an environmental printer!

## Reducing the Environmental Impact of your Printed Materials

- Paper

Choose a material that contains a high percentage of post-consumer waste. The more post-consumer waste we use the less that ends up in landfill sites.

If using a material that contains virgin fibre ensure that it is an FSC certified material. At the present time the FSC certification scheme has the most stringent forestry management standards in environmental and social terms.

Choose a material that is manufactured in the United Kingdom or Europe.

- **Inks**

Vegetable based inks are not available for all print processes or used by all printers where they are available. Ask your printers what their policy is and what your options are.

- **Envelopes**

A wide range of stock, and bespoke, envelopes made from recycled material is available, as is non-plastic (glassine) window film. Even better: try to avoid the use of window envelopes.

- **Recyclability – things to avoid**

All paper is recyclable. It's the additional processes that may render a product non-recyclable. There are no hard and fast rules as different mills have different reprocessing capabilities but the following may not be recyclable: heavily inked products; laminated products; window envelopes.

## Choosing a printing company



Use only environmentally-accredited printing companies. In most cases this will mean holding **ISO 14001** – with a UKAS certified auditor. ISO 14001 demands environmental awareness, and improvement, on an ongoing basis. Beware of companies that claim to be 'green' but are not accredited. There are appropriate environmental schemes for companies of all sizes and print processes.

**\* Choose an appropriate printer for your product . Work with them when deciding designs and formats**

Small changes in size can greatly affect the method of printing, the material options, the amount of waste generated – all of which can impact on cost.

For example: if choosing a web printer choose one with optimum cut offs. On a 16 page web press a 625mm cut off rather than 630mm will save 63 tonnes of waste paper a year!



