

**PACKGUIDE**

**A GUIDE TO PACKAGING ECO-DESIGN**





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# 1

# BACKGROUND

## WHO THE GUIDE IS FOR

Have you ever been told by a senior manager that your future packaging has to be one of the following - recyclable, re-usable, compostable, minimised? Or maybe a combination of some of them? If so, then this is the guide for you.

The PackGuide has been produced by Envirowise and INCPEN (Industry Council for Packaging and the Environment), in conjunction with the INCPEN charter members (see back cover), to help product designers, packaging designers, marketing managers and procurement managers to combine eco-design principles with packaging functionality - not forgetting the legal requirements.

It has been specifically designed to assist you if you are given the task of incorporating eco-design into your packaging. It aims to provide a quick reference guide for you to refer to and gain an understanding of:

- what the issues are within each of the different design approaches;
- how to incorporate the design ideas into your design process;
- what impact these changes will have on your costs and environmental impact.

If you would like additional guidance, to take a systematic look at packaging design with a view to reducing costs and impact on the environment, then the Envirowise guide *Packaging design for the environment: reducing costs and quantities* is for you. Download it at [www.envirowise.gov.uk/GG360](http://www.envirowise.gov.uk/GG360) or order it through the Envirowise Advice Line 0800 585794 quoting ref GG360.

Also, the Government's advisory body WRAP (Waste & Resources Action Programme) provides online packaging design guidance at: [http://www.wrap.org.uk/retail/the\\_guide\\_to\\_evolutionary\\_packaging\\_design/index.html](http://www.wrap.org.uk/retail/the_guide_to_evolutionary_packaging_design/index.html)

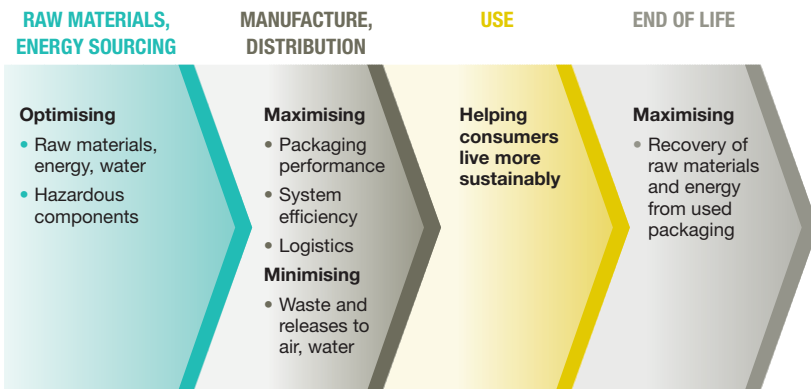
# WHAT THE GUIDE IS ABOUT

This Guide explains how packaging and packaged goods producers and distributors can design packaging and product systems so that, as well as protecting the product and performing all the other functional roles, they also make a positive contribution to sustainable production, distribution and consumption.

This means obtaining materials and energy from known, responsible sources and designing the packaging and product system so that the materials and inherent energy can be recovered after use.

The main purpose of packaging is to contain and protect food and other goods from their point of production through to the point of consumption. The challenge is to do so by optimising the use of materials, water and energy, minimising waste (of product and used packaging) and maximising the recovery of used packaging.

## The concept of sustainability for packaging and product systems



## THE BUSINESS OPPORTUNITIES

Today's consumers expect products and services to fulfil their needs, while having the lowest possible environmental and social impacts. Society in general wants to be confident that companies are acting responsibly. This Guide will help you do that and will also help to:

- support applications for ISO 14001 or other environmental management certification systems;
- save money and make your business more profitable by making your operations more resource efficient;
- demonstrate your commitment to sustainability and thereby improve your reputation;
- increase your company's competitiveness in the marketplace;
- meet the objectives in the 2007 Waste Strategy for England by leading to optimised packaging and product systems.

It applies to complete systems, incorporating sales (primary), grouping (secondary) and transport (tertiary) packaging. It also includes advice on how to communicate with a wide range of stakeholders.

It refers specifically to UK legislation, but will help companies anywhere design packaging to reduce environmental impact.

## WHAT IS YOUR COMPANY'S MAIN ENVIRONMENTAL OBJECTIVE?

There are many different ways to reduce the environmental impact of your packaging through design, and this Guide splits each design strategy into its own section for easy reference.

Your company needs to take into account all the design strategies covered within this Guide, or it may run the risk of causing unintended consequences within other areas of the life-cycle. However, it is likely that one design strategy will be favoured above the others.



This may be due to your company having specific targets to meet or perhaps it has made a detailed PR statement about future packaging. This Guide aims to help you, as the design, marketing or procurement team, on your road to meeting these targets.

## WHAT IS THE MAIN ENVIRONMENTAL OBJECTIVE?

If your Board asks you to add 'greening your packaging' to your design requirements, you must clarify what environmental objectives you should be aiming for:

- **Reducing product wastage?**
- **Reducing your carbon footprint?**
- **Increasing the proportion of renewable materials that you use?\*** (overleaf)
- **Reducing the amount of packaging you use?**
- **Reducing the amount of your packaging that goes to landfill?**

These objectives can then be split into focused design strategies. (Note: to maximise the reduction in environmental impact, all these need to be considered together.)

- **Section 3 - Design for minimisation**
- **Section 4 - Design for re-use, recycling and recovery**
- **Section 5 - Design for compostability**

And don't overlook the main purpose of packaging, ie getting the product to its point of use in good condition. Typically, ten times more resources are used in products than in their packaging.

\* Remember that there is a difference between a renewable resource and a renewable material. Wood, paper and board and some biopolymers are derived from crops, a renewable resource. Glass and metals are derived from non-renewable resources. They can be reprocessed into new materials without loss of quality, though with some melt losses, so these are renewable materials.

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# 2

**HOW TO START**

## FITNESS FOR PURPOSE

Packaging has to fulfil a number of functions.

- It must **ensure that the contents are delivered to the consumer or business end-user in good condition**, whatever stresses and strains it undergoes during distribution and storage.
- It must **protect the contents from hazards** such as vibration, moisture, heat, odours, light penetration, micro-organisms or pest infestation, and it must not leak.
- It must be **easy to open** (but difficult to open accidentally) and pilfer-resistant.
- It must allow liquids to **pour without spillage**.
- It must be **as easy as possible to carry**.
- **Packaging for consumer goods must be attractive** enough to encourage people to buy them.

There is nothing more wasteful than a product that is never sold or used. Packaging for luxury or gift items may be more elaborate than necessary to just contain and protect the item, but this does not mean it should be excessive.

Packaging must usually carry information about the product, the company taking responsibility for it and instructions for handling or use.

It may bear a logo indicating the material it is made from, a symbol or statement about recycling, and the anti-littering ‘tidyman’ symbol. If the packaging doesn’t have sufficient surface area for all the necessary information to be displayed, there may have to be an outer box so that a leaflet can be inserted, but consider other options such as fold-out labels.

It may have to be re-sealable. Tamper-evidence and child-resistance may also be required.

You need to balance reducing the environmental impact of packaging against the need to ensure that it meets all relevant performance criteria during production, distribution, storage and use.

## Under-packaging and over-packaging

Under-packaging is usually far worse for the environment than over-packaging.

- Over-packaging by 10% means that 10% of the resources needed to produce the packaging are wasted, and extra fuel will be needed to distribute it.
- Under-packaging that results in the product being spoilt or damaged wastes 100% of the resources used to produce both the contents and its packaging, and all the fuel used to distribute it.

Ten times more energy and materials are locked up in household goods and food than in the packaging around them (Source: Dr J M Kooijman).

## DESIGNING FOR THE ENVIRONMENT AND THE LAW

The European **Packaging and Packaging Waste Directive** sets the basic requirements for packaging design and it is obligatory to comply with them for any packaging sold in EU countries.

What follows in the box overleaf is a guide and you should consult the Government guidance notes for the respective regulations to have a full comprehension of your obligations.

## PACKAGING AND PACKAGING WASTE DIRECTIVE: ESSENTIAL REQUIREMENTS

- Packaging volume and weight must be the minimum necessary for safety, hygiene and acceptability of the packaged product for the purchaser and end-user.
- Packaging must be suitable for recycling, composting or energy recovery, and suitable for re-use if re-use is intended or claimed.
- Any noxious or hazardous constituents of packaging must be minimised to reduce the impact on the environment when it is finally recycled, composted, incinerated or landfilled. The combined concentrations of lead, cadmium, mercury and hexavalent chromium must not exceed 100 ppm, except in plastic crates and pallets used in a closed loop system or in containers made from lead crystal or recycled glass.

The UK has implemented the Directive in two laws:

**The Producer Responsibility Obligations (Packaging Waste) Regulations**, which require companies over a certain size to make a financial contribution to the recovery and recycling of used packaging.

**The Packaging (Essential Requirements) Regulations**, which require anyone packing or filling products into packaging or importing packed or filled packaging goods to:

- ensure that packaging complies with the Essential Requirements in the EU Directive (see above);
- produce technical documentation demonstrating compliance within 28 days of a request being made by an enforcement authority.

It is a criminal offence to fail to comply with these laws and companies have to show that they have taken all reasonable steps and exercised all due diligence to avoid committing an offence.

Reasonable steps would include:

- applying the methods for designing packaging set in the CEN standards (see below);
- seeking best practice advice from Government advisory bodies such as Envirowise and WRAP;
- carrying out ‘best-in-class’ comparisons;
- seeking advice from Trading Standards;
- following the Responsible Packaging Code of Practice (see the reference on page 23);
- following the advice in guides such as this one.

## **CEN packaging standards**

CEN, the European standards organisation, has developed a set of standards to help companies comply with the Essential Requirements. Using the standards isn’t the only way of demonstrating conformity, but it is the safest way because it means that enforcement officers have to prove that you are not in compliance. You don’t have to prove that you are.

The standards are based on a management system approach. The aim is not to ensure compliance with a specified minimum level of performance, but to ensure continuous environmental improvement.

To comply, you should work methodically through the checklists in the standards to ensure that your decisions take account of the often conflicting social, environmental and economic factors affecting the choice of packaging, and find a solution that is right for the product, for the distribution system and for how it will eventually be stored and used.

You can apply these principles as an integral part of your formal management system if you have one, for example, by incorporating the procedures into an existing EN ISO 9000/14000 scheme.

## RESOURCE EFFICIENCY

The ultimate aim in designing packaging and product systems is to minimise the use of resources and the overall burden on the environment throughout the product life-cycle.

Taking the environment into account shouldn't add to cost, provided it is considered throughout the design process. If environmental considerations are only factored in at a late stage, then any changes necessary are likely to be costly in terms of both money and project delays.

It does not make sense to base choice of packaging on just one environmental parameter, because this will often lead to unintended consequences in other parts of the supply system.

A single focus on reducing the weight of primary packaging can have unintended effects, such as:

- an increase in product wastage, or an overall increase in packaging weight if secondary or tertiary packaging has to be increased to provide the same level of product protection;
- a disincentive to use recycled paper and some plastics (because they may need to be thicker to provide equal functionality).

Similarly, the unintended consequence of a single focus on easily recyclable materials can be:

- more waste for final disposal, even if a very high recycling rate is achieved - see example from Germany opposite;
- more vehicle movements to deliver the same quantity of product if the packaging is bulkier.



In the 1990s, packaged goods producers in Germany were under pressure from the Environment Ministry to move away from multi-layer, composite materials towards more recyclable packaging. The laminated pouches then being used for instant coffee weighed 11 g, a metal can for the same amount of product 120 g and a glass jar 470 g.

Even with an (unrealistically) high recycling rate of 80%, the can would still generate 24 g of waste and the jar 94 g. Only 11 g becomes waste if pouches are used, though they are not currently recyclable. Three times more lorries would be needed to deliver the same amount of product in jars or cans than in pouches.

This does not mean that the multi-layer packaging is necessarily environmentally better than the other packaging options. Many other factors have to be taken into account, such as length of shelf-life for the product, the amount and type of grouping and transport packaging and the stresses and strains of the distribution system.

It is seldom possible to optimise every environmental requirement when selecting a material or designing packaging for a particular purpose. It will rarely be practicable to prioritise these parameters in a particular order and apply the same priorities across an entire product range.

You should aim for overall optimisation rather than pursuing one environmental objective at the expense of all the others.

## ADDING SUSTAINABILITY TO TRADITIONAL DESIGN CONSIDERATIONS

If you are only just beginning to consider eco-design, start with your new packaging developments and then work back to your existing packs, prioritising your biggest selling lines and those packs which you feel might fall short of best practice.

Traditional design considerations include:

- fitness for purpose;
- technical performance;
- regulatory and environmental requirements;
- compatibility with existing or proposed new filling equipment and distribution systems;
- customer requirements;
- consumer appeal;
- reinforcing the image and values of the brand;
- matching or distinguishing the product from competitors' offerings;
- logistics;
- cost.

To design your packaging so it makes a positive contribution to sustainable development and helps consumers live more sustainable lifestyles, you need to look at:

- where your materials and energy are sourced from and how they are produced;
- whether the packaging can perform all the functions expected of it;
- what is likely to happen to your packaging at the end of its useful life.

**Checklist: towards sustainability**



## SOURCING MATERIALS AND ENERGY

Find out where your raw materials and energy come from. You will then know if you can obtain them from a more sustainable source. There are a number of points to bear in mind:

- If you require a box made with virgin fibre, ask your suppliers whether the board comes from wood fibre sourced from sustainably managed forests, which comply with recognised standards. Several assessment or 'certification' schemes are in use, with over 50% of the forest area in Europe certified.
- The Forest Stewardship Council (FSC) sets international standards for responsible forest management, while the Programme for the Endorsement of Forest Certification schemes provides a framework endorsement programme for the mutual recognition of independent, national forest certification schemes. Apart from these leading schemes, forest owners can also apply for independently audited environmental management schemes. The common feature of all these schemes is a commitment to continuous improvement.
- In order to demonstrate that wood originates from a certified forest, producers of fibre-based products need a 'chain of custody' certificate. This provides traceability at each stage of processing, from the forest through each stage of manufacturing and distribution:
  - Sustainable forest management - pulp mill - pulp - paper and board mill - paper and board product - certified product.
- If you plan to use biopolymers, check the source of the material. Biopolymers are polymers derived from biomass. They may be natural polymers, such as cellulose, or synthetic polymers made from biomass monomers, such as polylactic acid, or they may be synthetic polymers made from synthetic monomers derived from biomass.
- What is the source of the energy used in the production processes for your packaging? Can you source clean energy?
- Could you do more to use the heat generated in your production processes?

## PRODUCTION

Alongside resource efficiency, packaging design must also take into account whether the product can be manufactured and packed cost-effectively.

The dimensions, strength, material and design of the packaging must be compatible with the filling and warehousing equipment in use. This doesn't prevent changes in packaging design, but it may limit the opportunities.

Filling machinery has a long life, typically many years, but must eventually be replaced. That's the time for a fundamental review of your packaging design.

Will new equipment make a radical improvement in the design of your packaging possible?

You should consider the trade-offs between the environmental impact of the production processes and potential product losses.

Powders and small items such as sweets and breakfast cereals settle after filling. To the consumer, they often look over-packaged, and may even give rise to suspicion that the packaging was designed to deceive.

However, a smaller pack might result in product overflow and wastage, or, in the case of sealed bags, product jamming the seal and causing the line to halt. Slowing the production line may be an answer, but that would add to production costs and to energy consumption.

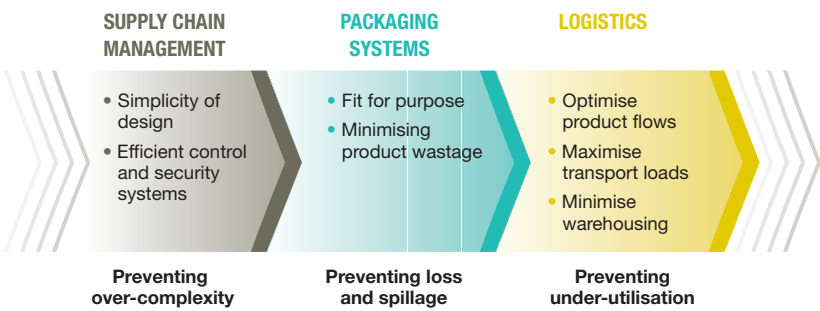
## DISTRIBUTION

Factors to consider when designing packaging for distribution include:

- containing and protecting the contents;
- withstanding pressure from stacking;

- resistance to vibration, vertical impact and climatic changes during distribution;
- ease of handling;
- ability to carry information such as bar coding or radio frequency identification technology;
- effective space utilisation during storage, handling, transportation and at point-of-sale;
- any specific customer requirements.

**Checklist: sustainable distribution**



All of these need to be considered at the same time.

Transport efficiencies can be maximised by designing packaging so that the sales packaging is the minimum needed for the product, the sales packs fit snugly into the transport packaging, and the transport packaging’s dimensions are optimised to ensure good pallet utilisation (unless weight rather than volume is the critical factor for vehicle loading).

If you are testing your packaging to ensure that it survives typical lorry trips and general distribution stresses, don’t forget that it will be subjected to different and greater shocks if transported by sea.

This can happen even if you don’t regard the product as an export line - there’s Northern Ireland of course, and some of your customers may treat the UK and the Republic of Ireland as a single sales area.

The internet is increasingly used to order goods for home delivery. Individual orders can be of any number of items, and it is impossible to configure each consignment for the standards of space-efficiency expected for delivery from warehouse to store.

The distance seller's dilemma is whether to maintain a small inventory of outer carton sizes, and risk delivering half-empty boxes, or to use more storage space in an attempt to match the volume of the consignment to the volume of the available cartons.

Note that in 2004 a stationery supplier was taken to court and fined because goods ordered through its website arrived in boxes which were only 7%, 19% and 29% full.

## PRODUCT WASTAGE

Packaging could be designed to protect against all eventualities and ensure that the contents were never damaged or wasted - but this wouldn't make economic sense and wouldn't be the best environmental option.

Set an acceptable level of product wastage, so that you can check whether you are over-protecting or under-protecting your products.

Acceptable wastage rates will vary from company to company and product to product, as they are largely dependent on the value of the product and its potential for causing injury or damage. A cheap but aggressive liquid such as bleach leaking from the top of a stack of pallets in a warehouse can cause a financial loss disproportionate to the value of the individual pack that has failed.

Tolerable wastage levels will also depend on the expectations of retail customers and of business and private end-users. If experience shows that a single defective item leads to the rejection of an entire consignment or to the loss of business to a competitor, this needs to be factored in and the target wastage level adjusted if necessary.

## FEEDBACK FROM CUSTOMERS THROUGHOUT THE SUPPLY CHAIN

Obtain as much feedback from customers and consumers as you can.

Companies are often good at monitoring losses within their own systems, but they don't always have information about what happens to the product further down the supply chain. Consumer complaints are also a valuable source of information - remember that for every consumer that takes the trouble to complain, there may be many others who simply respond by choosing a rival product.

## GREEN CLAIMS

When marking and marketing products, don't make green claims without first checking Defra's Green Claims Code!

## CARBON FOOTPRINTS

There is growing interest in the overall environmental impact of products and packaging. 'Carbon footprint' - the total amount of CO<sub>2</sub> and other greenhouse gases emitted over the full life-cycle of the product - is a measure of climate change potential, and is now often - but wrongly - used as a proxy for total environmental impact.

A carbon footprint is just one part of the data that would be covered by a Life-Cycle Assessment, which measures overall environmental impact and for which there is an internationally agreed methodology developed by ISO (ISO 14040 and ISO 14044).

The European Commission's Joint Research Council has produced a useful leaflet on the subject - see reference on page 24.

Measuring environmental impact is welcome because it can help to inform and influence company decision-making.

However, the results of such measurements are specific to the product in question, to the plant where it is produced, to the location of the points of production and use, and to the time when the measurements were taken.

To achieve real sustainable consumption and production, it is also necessary to take account of social and economic considerations, alongside the environmental aspects.

## REFERENCES AND FURTHER SOURCES OF INFORMATION

**The Packaging and Packaging Waste Directive** 94/62/EC was adopted at the end of 1994 and subsequently amended by Directive 2004/12/EC. It was introduced to prevent European Member States from implementing measures that would discriminate between types of packaging and/or result in restricting free trade of goods within the European Community. See: <http://ec.europa.eu/environment/waste/packaging/legis.htm>

**The Producer Responsibility Obligations (Packaging Waste) Regulations (Amendment) 2008** (SI 2008 No. 413). Downloadable free of charge from: <http://www.defra.gov.uk/environment/waste/topics/packaging/regulations.htm>

**The Packaging (Essential Requirements) Regulations 2003** (SI 2003 No. 1941), as amended by the Packaging (Essential Requirements) (Amendment) Regulations 2004 (SI 2004 No. 1188) and the Packaging (Essential Requirements) (Amendment) Regulations 2006 (SI 2006 No. 1492). Downloadable free of charge from: [http://www.opsi.gov.uk/si/si2003/uksi\\_20031941\\_en.pdf](http://www.opsi.gov.uk/si/si2003/uksi_20031941_en.pdf), [http://www.opsi.gov.uk/si/si2004/uksi\\_20041188\\_en.pdf](http://www.opsi.gov.uk/si/si2004/uksi_20041188_en.pdf) and [http://www.opsi.gov.uk/si/si2006/uksi\\_20061492\\_en.pdf](http://www.opsi.gov.uk/si/si2006/uksi_20061492_en.pdf)

BERR, *Packaging (Essential Requirements) Regulations - Government Guidance Notes*. Downloadable free of charge from: <http://www.berr.gov.uk/sectors/sustainability>



Envirowise Guide GG360 (2008), *Packaging design for the environment: reducing costs and quantities*. Downloadable free of charge from: <http://www.envirowise.gov.uk/GG360>

WRAP online guidance, *The Guide to Evolving Packaging Design*, available at: [http://www.wrap.org.uk/retail/the\\_guide\\_to\\_evolutionary\\_packaging\\_design/index.html](http://www.wrap.org.uk/retail/the_guide_to_evolutionary_packaging_design/index.html)

Institute for European Environmental Policy (2004), *Packaging for sustainability: packaging in the context of the product, supply chain and consumer needs*. Downloadable free of charge from: <http://www.incpen.org/pages/data/IEEPfinalreport.pdf>

INCPEN (2003), *Responsible Packaging Code of Practice* - a seven-point Code to help manufacturers improve their packaging at the design stage. It covers environmental concerns, consumer needs, and functional considerations. Developed by INCPEN, the UK Packaging Federation, the Food & Drink Federation and the British Retail Consortium. Over 85% of UK packaging chain companies are represented by these and other Trade Associations that have agreed to commend the Code to their members. Endorsed by the UK Government and the Advisory Body to Trading Standards Officers. Downloadable free of charge from: <http://www.incpen.org/pages/data/CodeofPractice.pdf>

INCPEN/LACORS (Local Authorities Co-ordinators of Regulatory Services) (1999), *Common Understandings and Common Sense* - guidance on the compliance and enforcement of the Packaging (Essential Requirements) Regulations prepared jointly by LACORS as the enforcement agency and INCPEN on behalf of industry. Downloadable free of charge from <http://www.incpen.org/pages/data/lacorsguidance.pdf>

EUROPEN (European Organization for Packaging and the Environment) (2005), *Understanding the CEN Standards on Packaging and the Environment: Some Questions and Answers*. Downloadable free of charge from: <http://www.europen.be/?action=onderdeel&onderdeel=3&titel=Key+Topics&categorie=1&item=14>

EUROPEN (2005), *Essential Requirements for Packaging in Europe - A Practical Guide to using the CEN Standards*. Downloadable from EUROPEN at: <http://www.euopen.be/index.php?action=onderdeel&onderdeel=6&titel=Publications&categorie=0&item=29&back=%3Faction%3Donderdeel%26onderdeel%3D6%26titel%3DPublications%26page%3D0>, price €150 (or €160 for a hard copy).

Programme for the Endorsement of Forest Certification schemes website: <http://www.pefc.co.uk>

The European Commission's Joint Research Centre, leaflet on Carbon Footprint - what it is and how to measure it: [http://lca.jrc.ec.europa.eu/Carbon\\_footprint.pdf](http://lca.jrc.ec.europa.eu/Carbon_footprint.pdf)

Defra (2000), *Green Claims Code*. Downloadable free of charge from: <http://www.defra.gov.uk/environment/consumerprod/gcc/pdf/gcc.pdf>

## Glass

British Glass: [www.britglass.org.uk](http://www.britglass.org.uk)

FEVE - European Container Glass Federation: [www.feve.org](http://www.feve.org)

## Plastics

British Plastics Federation: [www.bpf.co.uk](http://www.bpf.co.uk)

Packaging and Films Association: [www.pafa.org.uk](http://www.pafa.org.uk)

PlasticsEurope: [www.plasticseurope.org](http://www.plasticseurope.org)

## Paper

Alliance for Beverage Cartons and the Environment UK: [www.ace-uk.co.uk](http://www.ace-uk.co.uk)

CEPI - Confederation of European Paper Industries: [www.cepi.org](http://www.cepi.org)

Confederation of Paper Industries: [www.paper.org.uk](http://www.paper.org.uk)

Pro Carton: [www.procarton.com](http://www.procarton.com)

## Metals

ALFED - Aluminium Federation: [www.alfed.org.uk](http://www.alfed.org.uk)

ALUPRO - Aluminium Packaging Recycling Organisation:  
[www.alupro.org.uk](http://www.alupro.org.uk)

APEAL - Association of European Producers of Steel for Packaging:  
[www.apeal.org](http://www.apeal.org)

BCME - Beverage Can Makers Europe: [www.bcme.org](http://www.bcme.org)

Corus: [www.corusgroup.com](http://www.corusgroup.com)

EAA - European Aluminium Association: [www.eaa.net](http://www.eaa.net)

EMPAC - European Metal Packaging: [www.empac.eu](http://www.empac.eu)

Metal Packaging Manufacturers Association: [www.mpma.org.uk](http://www.mpma.org.uk)

## Aerosols

BAMA - British Aerosol Manufacturers' Association:  
[www.bama.co.uk](http://www.bama.co.uk)

FEA - European Aerosol Federation: [www.aerosol.org](http://www.aerosol.org)

## Packaging

The Packaging Federation: [www.packagingfedn.co.uk](http://www.packagingfedn.co.uk)

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# **DESIGN FOR MINIMISATION**

# **3**

## PRIMARY, SECONDARY AND TERTIARY PACKAGING - THE TRADE-OFFS

Consider the total packaging system when designing packaging:

- Primary packaging - the pack that the consumer takes home.
- Secondary packaging - inner cartons, trays, boxes. This includes retail-ready and display packaging.
- Tertiary packaging - the outer transport packaging, such as pallets and stretch wrap, that gets products to the depot or distribution centre.

Political and press attention focuses on primary packaging, but if you reduce your primary packaging before thinking about the additional protection that you may need from your secondary packaging, you may find that you have actually increased your total packaging usage.

Several items may be packed in a box which is the traded unit delivered to the retailer. A number of these boxes will be packaged in a pallet shipper for delivery from the manufacturer to the distribution centre. If the shipper's only function is to hold the boxes in place on the pallet, maybe it could take the form of a frame. Material would be saved, and the weight of the consignment would be reduced.

The retail trade is increasingly demanding retail-ready packaging that reduces supermarkets' labour and handling costs. This can be at significant extra cost to the supplier and, unless you make changes in other areas, it involves a significant increase in packaging material use. However, since retail-ready packaging also protects the product in transit, it may present opportunities for counterbalancing savings in the transport packaging used.

## Storage and handling

Review your packaging in conjunction with your own and your customers' storage and handling systems. For example:

- If you add to the strength of your packaging system so that it can withstand more pressure, you may be able to stack your products higher in the warehouse, which reduces your storage space requirement.
- Plastic slip-sheets can sometimes be used to avoid the need for pallets, particularly for overseas shipment and inter-company deliveries. Slip-sheets are strong enough to support the weight of the product load without the need for the rigid base that a pallet would provide. This will save both space and materials.
- If you are transporting high-value but fragile products, you may want to consider the mode of transport used.
- Manual handling is a major cause of product damage. This can happen during order picking at regional distribution centres, in roll cage use and during manual shelf-filling. Check whether this applies to you and your customers. If it does, then perhaps better staff training can help.

## Luxury products and pre-packed fruit and vegetables

Depending on the nature of the product and its supply chain, there may well be greater potential for savings in transport packaging than in primary packaging, but the issue of consumer perception must not be overlooked:

- A luxury product may need packaging that looks opulent, but can you achieve that effect with clever graphics and higher-quality print and packaging materials rather than by protecting your primary pack with a box and protecting the print on the box with a layer of film? Could you use point-of-sale displays rather than increasing the packaging on every item?

- It is best to give people a choice between pre-packed and unpackaged fruit and vegetables. Where shops don't have space for both, look up the research on spoilage rates for each type of produce and make a decision which will balance real packaging use (which includes the bags the retailer provides), perceived packaging use (what is on display) and food wastage rates - an issue which is rightly getting more and more attention.

Some people want to buy their fruit and vegetables pre-packed rather than take the time to pack them in the supermarket's produce bags themselves, whereas others want to buy unpackaged produce.

Goods that are not pre-packed are more likely to be damaged or bruised, but the careful shopper will be able to select items in good condition. An unpackaged cucumber is fine if the consumer is going to use it within a couple of days, but a cucumber wrapped in film will keep until the next weekly shop.

Remember that all products need containment to get them to the shops. Crates and trays are always needed to transport the product from grower to the retail outlet, whether the produce has come from abroad or from local growers.

## Combating shoplifting

The conventional way to discourage the shoplifting of small, valuable retail items is by packing them in a blisterpack with a backing card, but is the conventional way still the best way for you?

- Could you use a mono-material trap-pack instead of a blisterpack? A board pack is often used for batteries nowadays.
- Do you need the backing card to provide all the information that the consumer needs? If not, there may be a case for a rethink. If the product is relatively valuable and large enough, a security tag could be a viable alternative.
- Could the product be stored behind the counter, or in a locked display cabinet? This won't always be feasible, but it works for cigarettes, OTC medicines and perfumes.

## BENCHMARKING AGAINST 'BEST IN CLASS'

It can be useful to benchmark your products against those of your competitors. If they have come up with a packaging design that you haven't considered, or have lightweighted an existing design, find out:

- How successful has the innovation been commercially? Has there been any effect on market share?
- Given your filling and handling equipment and distribution chain, would it be feasible for you to copy this development?
- If the new design involves less primary packaging, what changes have been made to the transport packaging? Is there an overall packaging reduction, or only a perceived reduction?
- What effect has the new packaging design had on product loss rates or customer satisfaction/complaints? If that information isn't publicly available, you can always get competitors' packaging tested to ascertain the materials used, its weight and the protection it provides, and compare this with what you have in place.

WRAP publishes 'best-in-class' packaging weight data on its website which may help you identify where you seem to be falling short of best practice. Remember that:

- your packaging may not necessarily be in the same 'class' as the best that WRAP has found (different distribution channels, different markets, ageing equipment that you cannot afford to replace);
- minimum weight doesn't necessarily mean minimum environmental impact.

If you are using more packaging than you need just so that your product occupies the same amount of shelf space as your competitors, talk to your trade association and see if the whole sector could agree to reduce their packaging - and costs.



## OTHER MINIMISATION POSSIBILITIES

- Could a change in product or packaging design allow a reduction in the size or weight of the packaging while maintaining its capacity?
- Could less material be used by modifying the volume sold, eg more sales units per box, larger portions, bulk or even loose?
- Could you reduce packaging by changing the physical nature of the contents or by using an alternative material?
- Are additional materials such as intermediate layers, shrink wrap, adhesives and tapes all necessary?
- Could the distribution system be modified in a way that would reduce energy consumption or the amount of packaging needed?
- Could certain components be strengthened or weakened to reduce overall material use?

## COMPLYING WITH THE ESSENTIAL REQUIREMENTS

The Essential Requirements aim to minimise the amount of waste packaging which is generated at source and ensure that packaging can be re-used, recovered or recycled. Therefore, if you are seen to be ‘over-packing’ your product unnecessarily, you may be reported to the Trading Standards by your competitors or consumers.

It is, therefore, important for you to work with your suppliers and customers to identify what it is that currently prevents you from reducing your packaging further. When you have identified this ‘critical area’, check if there are ways to remove the barriers.

An ‘unacceptable’ pack failure rate must be a matter of commercial judgment - it will be different for a high-value product such as a television set than for a low-value product such as washing-up liquid, and for products where leakage could endanger people or property.

The packaging manufacturing or packing/filling process also has to be taken into account. It may only be possible for you to reduce your packaging further if you buy new machinery. This is not expected or demanded, as it may not be economically practicable or environmentally desirable to scrap equipment before it reaches the end of its life.

## Consumer acceptance

If you reduce your packaging to the point where the product is unacceptable to the consumer, it won't sell, and there is no point producing it.

Consumers have expectations regarding the appearance as well as the functionality of the packaging around the products they buy, but if you are using more packaging than is needed for functional purposes, you must be in a position to justify this.

If you have identified consumer acceptability as the critical area that prevents further minimisation, the enforcement authorities can always ask you to show them the evidence that proves it. Your evidence could be market research results, or the findings from benchmarking exercises - if a competitor changed packaging, what effect did that have in the marketplace?

## The 'critical area'

The enforcement authorities can verify compliance with the CEN standards by asking the producer to demonstrate the steps that have been taken to identify the 'critical area'.

If you haven't identified the critical area, your packaging isn't in compliance with the standard and you need to investigate the potential for further reduction. If, on the other hand, your tests show that further reduction would result in an unacceptable increase in the packaging failure rate, the critical point has already been reached.

## Documents

To show that you have complied with the Essential Requirements, you need to document the results of your assessment, prepare a statement of conformity, and keep your records for possible inspection. Documentation can be based on test results, studies or practical experience.

It is also advisable to maintain a historical record of packaging, so you can demonstrate improvement over time.

The packer/filler puts together much of the information, with help from suppliers and customers. If you supply empty packaging to a packer/filler, remember that you are the packer/filler of the outer packaging you use to ship the goods.

## Minimising heavy metals and other dangerous substances

The components that make up your packaging must contain less than 100 ppm of the combined concentrations of lead, cadmium, mercury and hexavalent chromium and only the minimum necessary quantities of substances identified as noxious or hazardous. As a packer/filler, you need to rely mainly on packaging suppliers and suppliers of components such as closures and labels to meet this.

It is very rare that the heavy metal limits are exceeded or that substances classified as dangerous to the environment are present in packaging manufactured in Europe or the USA.

However, companies must exercise 'due diligence' in the way in which they rely on a packaging supplier's input. This is particularly important for imported goods.

The BERR guidance document referenced overleaf offers advice on the interpretation of these requirements.

You will normally be able to fulfil your legal obligations by asking your suppliers to provide information on the heavy metals and any dangerous substances in the packaging or packaging components supplied to you.

INCPEN's Responsible Packaging Code of Practice has a standard letter requesting this information.

If the heavy metals content exceeds the limits, or if any substances dangerous to the environment haven't been reduced to the absolute minimum necessary, this must be corrected before a statement of conformity is issued.

### **Simplified compliance for glass, and paper and board**

If you are using glass or paper and board packaging, LACORS has endorsed standard protocols and guidance documents drawn up by British Glass and the Confederation of Paper Industries (CPI), that you can use to show compliance with the Essential Requirements.

The reference for the CPI Technical Bulletin appears below; the British Glass Manufacturers' Confederation documents can be obtained from [info@britglass.co.uk](mailto:info@britglass.co.uk) or by telephoning 0114 290 1850.

## **REFERENCES AND FURTHER SOURCES OF INFORMATION**

BERR, *Packaging (Essential Requirements) Regulations - Government Guidance Notes*. Downloadable free of charge from: <http://www.berr.gov.uk/sectors/sustainability>

BS EN 13427:2004, *Packaging - Requirements for the use of European Standards in the field of packaging and packaging waste*. Downloadable from: <http://www.bsi-global.com/en/Shop/Publication-Detail/?pid=00000000030094791>, price £80.00 (£40.00 for BSi members).

BS EN 13428:2004, *Packaging - Requirements specific to manufacturing and composition - Prevention by source reduction*.  
Downloadable from: <http://www.bsi-global.com/en/Shop/Publication-Detail/?pid=000000000030094794>, price £114.00 (£57.00 for BSi members).

CEN CR 13695-1:2000, *Packaging - Requirements for measuring and verifying the four heavy metals and other dangerous substances present in packaging and their release into the environment - Part 1: Requirements for measuring and verifying the four heavy metals present in packaging*, price £142.00 from BSi (£71.00 for BSi members) at [info@bsi.org.uk](mailto:info@bsi.org.uk) or telephone 0208 996 9000.

CEN/TR 13695-2:2004, *Packaging - Requirements for measuring and verifying the four heavy metals and other dangerous substances present in packaging and their release into the environment - Part 2: Requirements for measuring and verifying dangerous substances present in packaging, and their release into the environment*, price £114.00 from BSi (£57.00 for BSi members) at [info@bsi.org.uk](mailto:info@bsi.org.uk) or telephone 0208 996 9000.

Commission Decision 1999/177/EC of 8 February 1999 establishing the conditions for a derogation for plastic crates and plastic pallets in relation to the heavy metal concentration levels established in Directive 94/62/EC on packaging and packaging waste.  
Downloadable free of charge from: <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:1999:056:0047:0048:EN:pdf>

Commission Decision 2001/171/EC of 19 February 2001 establishing the conditions for a derogation for glass packaging in relation to the heavy metal concentration levels established in Directive 94/62/EC on packaging and packaging waste, as amended by Commission Decision 2006/340/EC of 8 May 2006.  
Downloadable free of charge from: [http://eur-lex.europa.eu/Result.do?T1=V4&T2=2001&T3=171&RechType=RECH\\_naturel&Submit=Search](http://eur-lex.europa.eu/Result.do?T1=V4&T2=2001&T3=171&RechType=RECH_naturel&Submit=Search) and [http://eur-lex.europa.eu/Result.do?T1=V4&T2=2006&T3=340&RechType=RECH\\_naturel&Submit=Search](http://eur-lex.europa.eu/Result.do?T1=V4&T2=2006&T3=340&RechType=RECH_naturel&Submit=Search)

CPI Technical Bulletin No 1, *Confederation of Paper Industries Corrugated Sector Guidelines on the Packaging (Essential Requirements) Regulations 2003 (amended 2006)*.

Downloadable free of charge from:

<http://www.paper.org.uk/info/pdfs/tech%20bulletin%201%20packaging.pdf>

Envirowise Guide GG360 (2008), *Packaging design for the environment: reducing costs and quantities*. Downloadable free of charge from: <http://www.envirowise.gov.uk/GG360>

IGD (2007), *International Retail Ready Packaging*. Available from [www.igd.com](http://www.igd.com), price £695.00 (£495.00 for IGD members).

INCPEN (2003), *Responsible Packaging - Code of Practice for optimising packaging and minimising packaging waste*.

Downloadable free of charge from:

<http://www.incpen.org/pages/data/CodeofPractice.pdf>

WRAP database on 'Best in Class': [http://www.wrap.org.uk/retail/tools\\_for\\_change/uk\\_best\\_in\\_class/index.html](http://www.wrap.org.uk/retail/tools_for_change/uk_best_in_class/index.html)

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# 4

## **DESIGN FOR RE-USE, RECYCLING AND RECOVERY**

## DESIGN FOR RE-USE

Although refillable beer and soft drink bottles have more or less disappeared and the doorstep delivery system for milk is in decline, re-usable packaging is on the increase in the business-to-business sector - pallets, roll-cages, metal, plastic and fibreboard drums, beer kegs, crates, and trays for bread and other products.

When it is left to private consumers to return the used packaging, their willingness to do so depends on how easily this fits into the way they live. If you want to introduce re-usable consumer packaging, you must make it as convenient as possible for them to return the empties.

The most common form of re-use for consumer products is re-usable, strong packaging which stays with the end-user (eg biscuit tin, spice jar, coffee jar, laundry detergent bottle) and is refilled from one-way, lighter-weight packaging which is used to take the product home (eg roll wrap for biscuits, plastic sachet in a box for spices, laminate coffee pack, flexible pouch for laundry detergent).

Re-usable packaging may be part of a 'closed loop' system in which it circulates within a company or between two companies or within an organised group of companies. This could be the case for the supply of components to, say, a car manufacturer. In 'open loop' systems, re-usable packaging circulates amongst unspecified companies (CHEP pallets, for example).

## CHECKLIST FOR RE-USE

- Ensure that the packaging is designed for and is robust enough for re-use.
- Check that your business partners will also treat the packaging as re-usable and will return it as appropriate, or that collection arrangements are in place to enable private end-users to return it.
- Ensure that facilities for cleaning, repair or reconditioning are available if this is necessary before the packaging can be re-used.



- Obtain written confirmation from your supplier that the packaging is capable of re-use, and confirmation from your customers that they intend to place the packaging into a re-use circuit.

Re-usable packaging benefits the environment only if it is actually returned for re-use. Keep your system under review, and take corrective action if the return rate falls to an unacceptable level.

CEN has published a report setting out methods of assessing the performance of a re-use system by calculating the proportion of re-used packaging in use.

### ‘Informal re-use’

You may also find an informal secondary use for packaging not actually designed to be re-usable, particularly if this use isn’t as demanding as the principal function.

- Could you re-use the transport packaging around goods you have received for sending out products to your customers?
- Could you re-use transport packaging in-house, for example, as trays in which consumers can take plants away from a garden centre?

**DON’T be tempted to re-use packaging not designed for re-use if there is any question of a risk to safety** - for instance, if you are filling products such as carbonated soft drinks which exert a pressure greater than atmospheric pressure.

## DESIGN FOR RECYCLING

Design for recycling if the infrastructure is in place (or can be created) to collect, sort and clean the packaging in a way that will yield a net gain in resources.

Designing for recycling makes sense for packaging made predominantly from glass, metals, board or rigid plastics because the packaging typically contains sufficient material to justify spending additional resources to collect it after use for recycling.

In these circumstances, recycling will yield a net gain in resources and therefore make a positive contribution to the overall resource efficiency of the complete life-cycle. It is important, therefore, to avoid adding any components that may become contaminants in the recycling process.

The packaging materials most widely collected for recycling from householders, either directly from the kerbside or through 'bring' banks, are aluminium cans, steel cans, glass bottles and jars, and plastic bottles. In some areas, folding cartons, milk and juice cartons, and plastic carrier bags are also collected. Note that aluminium foil can be recycled but metallised plastic film (often called 'foil') which looks similar cannot, though its energy content can be recovered. All kerbside schemes also collect newspapers and magazines.

### **Checklist to make packaging compatible with collection for recycling systems**

- Try to avoid materials, combinations of materials or designs of packaging that might create problems in collecting, sorting or recycling.
- Minimise the use of substances or materials that might create technical, environmental or health problems in the recycling process or in the disposal of recycling residues.

- Minimise the use of substances or materials that might have a negative influence on the quality of the recycled material. For example, do you need a colour tint on your plastic bottle or could you achieve the same effect with an eye-catching label?
- Ensure that you don't make the packaging incompatible with the recycling process if you change your raw material sourcing or your manufacture, converting and filling processes.
- Ensure that you don't create new compatibility problems if you change the coatings, adhesives, inks, labels, closures and other sealing materials that were selected at the design stage.
- Try to design your packaging so that minimum product residues remain when the used packaging is collected for recycling.
- Construct your packaging so that the end-user can easily separate any components that should not go into the recycling process ('design for disassembly').

If you are introducing an innovative packaging material or system, there may be no established collection or recycling system for it. It takes time to develop and expand recycling facilities for innovative packaging. The CEN recycling standard advises that new types of packaging may be classifiable as recyclable provided active steps are being taken to develop recycling for it.

## Plastics

Designing plastic packaging for recycling involves particular challenges. To provide just the right technical properties for different functions, different polymers are often used in combination.

- If combinations are unavoidable, try to use materials of different densities so as to facilitate separation.
- Fillers that change the density of the plastic should be avoided or their use minimised as they lower the quality of the recycled material.
- Unpigmented polymers are more valuable as recyclate than pigmented, so if you are using a colourless plastic packaging

material it is better to attach an adhesive label than print on the packaging itself. Tubs with a clear or colourless body and with the information printed on the lid are a particularly good idea.

- The reprocessor specification for pigmented plastics is less sensitive to low levels of ink contamination, so where coloured plastics are used there should be no problem printing on the container - but use as little pigment as possible, because automated sorting equipment can't identify strongly light-absorbing objects.
- Match the polymer type used for the label to that of the container. Paper labels don't create recycling problems for plastic containers provided you use water-soluble adhesives and avoid labels coated in a way that prevents separation and removal during reprocessing. For this reason, try to avoid decorative or protective finishes such as lacquers or coatings. Use the minimum amount of adhesive.
- Ensure that closures, liners and cap seals don't interfere with the recyclability of the material to be recycled - they should ideally be recyclable themselves. Again, match the polymer used for the closure with that of the container. Avoid using metal caps on plastic containers, as they are difficult to remove and metal residues cause high rejection rates in plastics reprocessing.
- Tamper-evident sleeves and seals should be designed to detach completely from the container or be easily removed in conventional separation systems.
- The polymer identification symbol should be shown clearly. Ideally, it should be embossed on the base of the container, or at least close to the base. Try to avoid printing the material identifier on the label, as it would not be clear whether it refers to the label material, the container plastic or the complete container, including the lid.

## TRADE-OFFS BETWEEN RECYCLABILITY AND OTHER ENVIRONMENTAL GOALS

Designing for recycling does not currently make sense for packaging made from thin layers of mixed materials or plastic films because it usually requires more energy, water and materials to collect and clean it than can be recovered. Much of this packaging will be contaminated by food residues which means that even if it is collected for recycling, there will be a high rejection rate at the sorting plant.

However, this sort of packaging has environmental advantages further up the supply chain by allowing more product to be packaged onto one delivery vehicle, which means fewer vehicle movements and less traffic congestion and fuel consumption. At end of life, energy can be recovered from it in the increasing number of areas in the UK where waste is being treated in energy-from-waste plants.

In Germany and Austria, where all types of packaging used to be collected for recycling, small plastic items and mixed material packaging are seldom now collected because it isn't resource efficient.

If you find that you have a choice between packaging which will not get collected for recycling and packaging which will probably get collected - assuming that both have the right functional properties - you should compare the resource requirements of the two systems before making your decision.

This is not to suggest that you should carry out a full Life-Cycle Assessment every time you review your packaging, but you can make top-line calculations, looking at:

- What would be the effect on the weight and volume of the pack?
- Would the fuel savings per distribution vehicle be significant, and would you be able to reduce the number of vehicle loads required to ship a given quantity of product?

## TRADE-OFFS BETWEEN RECYCLED CONTENT AND OTHER ENVIRONMENTAL GOALS

Recycled materials have been used in most types of packaging for many years. For some materials, there are trade-offs that need to be considered.

**Metal** packaging, both steel and aluminium, has a high recycled content, and this has no effect on functional performance.

**Glass** packaging also has a high recycled content and this has no effect on functional performance. In recent years there has been an issue about what colour of glass to specify because, owing mainly to our wine consumption, the UK imports a lot of green glass, but we need relatively little for our own production. The surplus tends to be recycled into low-value applications, such as aggregate, that may not be as environmentally beneficial as bottle-to-bottle recycling.

It is therefore worth considering:

- If you are importing drinks or any other product in green glass, would white flint glass do as well for product protection and marketing purposes?
- If you are filling in the UK for the export market, could you use green glass?
- If you use white flint glass, does it have to be crystal clear or could you accept the cloudier appearance that would result from contamination with coloured glass?

**Paper and board** packaging for non-food contact use contains high levels of recycled content. However, paper packaging with a high recycled content may have to be heavier than packaging made from virgin fibres. This is because each time fibres are recycled, they lose strength so more fibres are needed to achieve the same level of protection.

- For weight reasons, do you need to specify virgin fibre rather than recycled fibre?

- When virgin fibre is specified, can you ensure that it is sourced from sustainably managed forests, which comply with recognised standards?

**Plastics** packaging has seldom contained recycled content mainly for safety reasons, especially for food contact applications. However, technology has moved on and it is now possible to use some recycled plastics for food packaging. This is a fast-moving area and it is worth checking with reprocessors, WRAP and the British Plastics Federation to find out what's available.

## RECOVERING ENERGY FROM PACKAGING WASTE

Although recycling is often an effective way of recovering resources from packaging waste, it isn't the only way. The next section covers designing packaging for compostability. (Note that statistics about recycling rates usually refer to the combined amount of material sent for recycling and composted.)

There is another way of recovering resources from used packaging and that's energy recovery.

The UK plans to recover the energy from 25% of its municipal solid waste by 2020 (twice the current rate), so if your packaging is likely to be heavily contaminated by the residual contents, or if you decide that laminates are the most appropriate form of packaging for you, then this is a complementary alternative to recycling.

To be classed as energy recoverable, packaging must generate more energy than that needed to drive the combustion process. To be sure of this 'calorific gain', the net calorific value must be at least 5 MJ/kg.

A CEN standard includes a formula for calculating the net calorific value of a pack consisting of various constituents. In most cases, however, it isn't necessary to make any calculations, since the

standard provides that the following types of packaging can automatically be considered energy recoverable:

- packaging composed of over 50% by weight of organic materials (eg wood, cardboard, paper and other organic fibres, starch, plastics);
- thin gauge aluminium foil (up to 50 µm thick).

Packaging consisting of more than 50% by weight of inorganic material (eg ceramic, glass, clay, metals) may be declared energy recoverable if it can be shown that there is calorific gain.

The only design consideration is to ensure that any noxious or hazardous constituents of packaging should have minimum impact on the environment when it is treated to recover energy, and that the combined concentrations of lead, cadmium, mercury and hexavalent chromium do not exceed 100 ppm (except in plastic crates and pallets used in a closed loop system which are exempted from this requirement).

## REFERENCES AND FURTHER SOURCES OF INFORMATION

BS EN 13429:2004, *Packaging - Reuse*. Downloadable from: <http://www.bsi-global.com/en/Shop/Publication-Detail/?pid=00000000030094797>, price £114.00 (£57.00 for BSi members).

CEN/TR 14520:2005, *Packaging - Reuse - Methods for assessing the performance of a reuse system*, price £58.00 from BSi (£29.00 for BSi members) at [info@bsi.org.uk](mailto:info@bsi.org.uk) or telephone 0208 996 9000.

BS EN 13430:2004, *Packaging - Requirements for packaging recoverable by material recycling*. Downloadable from: <http://www.bsi-global.com/en/Shop/Publication-Detail/?pid=00000000030094800>, price £114.00 (£57.00 for BSi members).



BS EN 13431:2004, *Packaging - Requirements for packaging recoverable in the form of energy recovery, including specification of minimum inferior calorific value*. Downloadable from:

<http://www.bsi-global.com/en/Shop/Publication-Detail/?pid=000000000030094803>, price £80.00 (£40.00 for BSi members).

European Commission Regulation (EC) No 282/2008 of 27 March 2008 on recycled plastic materials and articles intended to come into contact with foods and amending Regulation (EC) No 2023/2006. Downloadable free of charge from:

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:086:0009:0018:EN:PDF>

Envirowise Guide GG360 (2008) *Packaging design for the environment: reducing costs and quantities*. Downloadable free of charge from: <http://www.envirowise.gov.uk/GG360>

WRAP online guidance, *The Guide to Evolving Packaging Design*, available at: [http://www.wrap.org.uk/retail/the\\_guide\\_to\\_evolutionary\\_packaging\\_design/index.html](http://www.wrap.org.uk/retail/the_guide_to_evolutionary_packaging_design/index.html)

Recoup (2006), *Plastics Packaging, Recyclability by Design - What every designer and specifier should know*. Downloadable free of charge from: <http://www.recoup.org/business/default.asp>

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# **DESIGN FOR COMPOSTABILITY**

# **5**

## BIOPOLYMERS, BIODEGRADABILITY AND COMPOSTABILITY

Biopolymers are polymers derived from biomass. They may be natural polymers such as cellulose, or synthetic polymers made from biomass monomers, such as polylactic acid, or they may be synthetic polymers made from synthetic monomers derived from biomass.

There are polymers derived from fossil fuels that biodegrade and there are polymers made from biomass which are not biodegradable.

Biodegradable materials eventually break down into CO<sub>2</sub>, methane and water through the action of naturally occurring micro-organisms.

The term 'biodegradable' doesn't imply any particular timescale or process, whereas 'compostable' means that a biodegradable material will biodegrade and disintegrate under standard test conditions set out in the relevant CEN standard.

Compostability isn't an inherent property of a material. It depends on the particular form it is in - a thin film might be compostable, but the same material in a thicker form may not be.

Compostable packaging materials are attractive to caterers and retailers because many unsold, out-of-date packaged foodstuffs can be sent for composting without the need to unpack it.

However, when biopolymer packaging becomes waste at a household, it is important that the householder does not put it with plastics destined for recycling or add it to kitchen and garden waste destined for composting. This is because biopolymers may adversely affect the material for recycling and plastics contaminate compost.

For further details, see WRAP's biopolymer guidance at:  
<http://www.wrap.org.uk/retail/materials/biopolymers.html>

There are also oxo-degradable plastics that are based on polyethylene or polypropylene. They don't biodegrade in the same way as biopolymers, but contain additives which make them fall apart over time. These are not covered within the CEN standards.

## TRADE-OFFS BETWEEN COMPOSTABILITY AND OTHER ENVIRONMENTAL GOALS

Biopolymers aren't better or worse than other materials and have, in fact, stimulated the market into researching new packaging materials. They just have different properties and, therefore, are only useful if used in the right applications.

Most compostable biopolymer packaging on the market at present is designed to be composted in a commercial composting system with an operating temperature of at least 60°C. It may well not be suitable for home composting, which takes place at a much lower temperature.

## STANDARDS FOR COMPOSTABLE PACKAGING

The BSi (British Standards Institution) has a specification for composted materials, which covers the entire process by which compost is produced, from raw materials and production methods, through to quality control and laboratory testing. The Association for Organics Recycling Certification Scheme provides third-party assessment of conformity. Products certified as compostable can display the Association's seedling logo.

The BSi standard requires all packaging to comply with either the CEN composting standard BS EN 13432:2000 or ASTM D6400. Both standards relate to composting in an industrial-scale facility and don't apply to home composting.

## CHECKLIST FOR PACKAGING TO BE CLASSIFIED AS RECOVERABLE THROUGH COMPOSTING AND BIODEGRADATION

Each pack, packaging material or packaging component must:

- be inherently biodegradable as demonstrated in laboratory tests, and meet the criteria and pass levels laid down in BS EN 13432:2000;
- disintegrate in a biological waste treatment process to the criteria and pass levels laid down, without any observable negative effect on the process;
- when submitted to a biological waste treatment process, have no demonstrable negative effect on the quality of the resulting compost.

Packaging or packaging components intended for the biowaste stream must be recognisable by the end-user as compostable or biodegradable.

If you are considering using compostable packaging, you must also think about whether any residual contents are compostable.

Constituents known to be or expected to be harmful to the environment during the biological treatment process, in excess of the limits laid down, should not be introduced into packaging or packaging materials intended to be compostable. The evaluation criteria in the CEN standard include pass levels for 11 heavy metals.

Chemically unmodified packaging materials of natural origin (eg wood, wood fibre, cotton fibre, paper pulp or jute) can be accepted as biodegradable without testing, but have to be chemically characterised and must fulfil the criteria for disintegration and compost quality.

## CHECKLIST TO HELP DECIDE WHETHER TO CHOOSE COMPOSTABLE PACKAGING

- Is the product likely to be a good candidate for compostable packaging, ie short shelf-life, insensitive to moisture or oxygen, does not require heating in-pack and is non-carbonated?
- Will your compostable packaging be lighter or heavier than the packaging it replaces? Some rigid biopolymers, such as PLA, have better structural properties than their conventional fossil fuel-based counterparts, which makes 10-15% reductions in packaging weight possible, whereas others may need a heavier gauge to provide the same strength.
- Will the use of biopolymers adversely affect the contents of your packaging? If it reduces shelf-life or needs additional temperature-controlled storage or distribution conditions, this may reduce or cancel out the environmental benefits sought.
- Where will your packaging become waste? For example, on retail or catering premises, if both packaging and food become waste together, there could be a good case for using compostable materials so the out-of-date food does not need to be emptied from the packaging - but check with your customers first.
- If it might end up in the home, will the consumer know what to do with it? Is it suitable for home composting? What are the chances of it being mixed up with the recyclables?
- Is there a high probability that your compostable packaging will be landfilled? If so, you should be aware that landfilling biopolymers will actually increase the generation and release of methane gas, which is the opposite of what we are trying to achieve.

Clear and conspicuous labelling is essential, but might not be enough.

The Green Alliance has developed a useful decision tree to help decide when compostable packaging might be appropriate.

At present, the future of biopolymer packaging is uncertain. However, the more these materials are researched and improved upon, and the more the local authorities develop systems for collecting, segregating and processing, the more promising the outcome looks.

## REFERENCES AND FURTHER SOURCES OF INFORMATION

BS EN 13432:2000, *Requirements for packaging recoverable through composting and biodegradation - Test scheme and evaluation criteria for the final acceptance of packaging*.

Downloadable from <http://www.bsi-global.com/en/Shop/Shop-Product-List-Page/Post.aspx>, price £114.00 (£57.00 for BSi members).

BSI PAS 100:2005, *Publicly available specification for composted material*, available on request from WRAP:

[http://www.wrap.org.uk/composting/compost\\_specifications/bsi\\_pas\\_100/bsi\\_pas\\_100\\_1.html](http://www.wrap.org.uk/composting/compost_specifications/bsi_pas_100/bsi_pas_100_1.html)

Fletcher, J (2007), *Consumer attitudes to biopolymers*, WRAP research report. Downloadable free of charge from:

<http://www.wrap.org.uk/retail/materials/biopolymers.html>

Green Alliance (2007), *Applications for compostable packaging: a guidance document*. Downloadable free of charge from:

<http://www.green-alliance.org.uk/waste-content.aspx?id=2342>, together with a useful flow chart.

WRAP Biopolymer briefing 22 January 2008, *Biopolymer packaging in UK grocery market*. Downloadable free of charge from:

<http://www.wrap.org.uk/retail/materials/biopolymers.html>

PACKGUIDE  
A GUIDE TO PACKAGING ECO-DESIGN

# COMMUNICATING WITH STAKEHOLDERS

# 6



## STAFF

Your staff not only do their jobs, they are also ambassadors for the company.

- Have you made sure that they understand and buy into your company's environmental policies?
- Have you provided them with sufficient guidance to ensure that they fulfil in practice what they know in theory? Don't be the company that sends out tiny components in enormous boxes, just because the packer didn't have a more suitable box to hand.
- Have you set up projects, perhaps through teams and designated champions, specifically to look at the environmental impact of your products and processes?

## YOUR BUSINESS PARTNERS

Talk to your customers and suppliers.

- Build awareness along the entire supply chain of your environmental objectives and priorities, and the problems you are trying to overcome.
- Help everyone understand the composition and properties of commonly used additives, inks and adhesives as well as the properties of the packaging materials themselves, to establish what will lead to better eco-design and what will hinder it. This is not a matter of 'good materials' versus 'bad materials', but of matching materials to what you are trying to do - prolong product shelf-life, eliminate one layer of packaging, lightweight your packaging, improve recyclability, increase recycled content and so on.
- Protect your company against possible prosecution by asking your suppliers for written evidence that they are respecting the Essential Requirements - and be prepared for your customers to ask the same of you.

A request for an Essential Requirements guarantee may take the form of a statement of compliance to be included in the product specification, or it may involve you providing detailed information and documentation where your customer wants to make their own assessment.

## CONSUMERS

If products are destined for consumers, they expect the goods they buy to be in perfect condition, but cannot be expected to appreciate that products need protection between the filling plant and the point of purchase. You can help them understand why you pack things the way you do. Consumers want to know that the packaging they buy can be recycled, which also supports their local Council's recycling collection schemes.

Under the Producer Responsibility Obligations (Packaging Waste) Regulations, sellers of filled packaging have an obligation to provide information to packaging users about methods of re-use, recovery and recycling of packaging and about any markings on packaging.

If you fulfil your recovery and recycling obligations through a compliance scheme, check whether the scheme is doing this on your behalf. If it is not, or if you are an individual complier, you must fulfil the consumer information requirement yourself.

Consider what help end-users need in deciding how to dispose of their used packaging. It is obvious when a container is made from glass, but consumers need to be told, for example, to put blue glass into the green bottle bank. They also need to be reminded that bottle banks can be used for jars as well as bottles.

Collection systems, and the types of packaging materials collected, vary from one Council to another, so statements on the label such as 'recyclable' or 'not recyclable' are not particularly helpful and may be misleading. Local authorities provide information to householders on the collection services provided in their area.

WRAP research carried out in October/November 2006 found that only one person in ten claimed that they always looked for advice on how to dispose of packaging, and more than half - 55% - never did. However, public awareness of recycling is increasing.

The WRAP study also found consumers confused about what is or is not recyclable, and about the implications of biopolymers.

Ninety-three per cent said they tended to agree that all plastic should be recycled. They failed to take on board the problems that compostable plastics can cause for conventional recycling.

Further questioning indicated that in the absence of information to give them a reason to do otherwise, most consumers would treat biodegradable plastics in the same way as they would conventional plastics.

Given the difficulty of communicating with consumers, it is vital that you use all possible communications channels - labelling, websites and press releases. But be sure to tailor the message to the audience - consumers everywhere, consumers in particular localities, recyclers, local government, and national and local opinion-formers.

## LOCAL GOVERNMENT

Local Trading Standards authorities subscribe to the Home Authority Principle that promotes a partnership approach to compliance. This means that there is one local authority, usually the authority in whose area the headquarters of a business is based, which the business can turn to for advice and guidance on compliance with a broad range of consumer protection legislation including the Packaging (Essential Requirements) Regulations.

If you are considering a packaging design change that might conflict with the Regulations, make an appointment with your Trading Standards Officer and talk the issues through informally. This will either give you the confidence to go ahead or will indicate that you ought to at least review the design proposed.

As well as improving your company's understanding of how your packaging is perceived by the outside world, such discussions help your home authority understand the technical and commercial realities that underlie packaging design.

If an official at another Council or the Consumer Direct helpline receives a complaint that your products are over-packaged, it may be passed on to the home authority, so the more your local Trading Standards Officer understands what you do, the more likely they are to support you against any complainant. If your local Trading Standards Officers believe that the complaint should be upheld, then you can discuss with them what needs to be done to make the packaging compliant with the law.

# NOTES







INCPEN - the Industry Council for Packaging and the Environment is a research organisation established in 1974 to study the environmental and social impacts of packaging. Its members span the whole packaging chain.

[www.incpen.org](http://www.incpen.org)

### INCPEN charter members



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